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AIM

The research and development is transforming the computing paradigms and technology in multidimensional directions. Tech Tonics aims to inculcate research culture among post graduate students and make them aware of new innovations happenings in the field of information technology.

TECH TONICS
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Vision

Thakur Institute of Management Studies, Career Development & Research will become a premier institute renowned internationally for providing education in software application to graduates from various disciplines.

Mission

To achieve excellence in providing software education so that students can grasp existing as well as emerging technologies and to inculcate leadership and managerial qualities in them so that they can deliver results in the organization they join.

Quality Policy

We, the staff, faculty and management of Thakur Institute of Management Studies, Career Development and Research are committed to offer excellence in software education, conducive academic environment and state of-the-art infrastructure to our students.

We work as a team and interact with students in pro-active manner to achieve our Quality Objectives and fulfill all academic, statutory and regulatory requirements to entire satisfaction of our students as well as for continual improvement of QMS.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO-1 : To enable students to gain knowledge across all domains of Information Technology with in-depth understanding of their applications.

PEO-2 : To enable students to analyze problems and to design and develop software solutions using emerging tools and technologies.

PEO-3 : To enable students to continue Life-long learning, Research and Entrepreneurial pursuit in their chosen fields.

PEO-4 : To develop communication, teamwork, and leadership skills necessary to manage multidisciplinary projects and serve the society as responsible and ethical software professionals.

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1. **Computational Knowledge -** Apply domain specific knowledge of computing and mathematics for designing of software solutions for defined problems and requirements.
2. **Problem Analysis -** Understand and analyze a problem and suggest feasible solutions.
3. **Design/ Development of Solution -** Design, evaluate, and develop effective solutions for complex computing problems to meet desired needs.
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7. **Life long Learning -** Recognize the need for and have the ability to engage in independent learning for continual professional development.
8. **Project management and finance -** Understand and apply project management principles, as a member or leader in multidisciplinary environments.
9. **Communication Efficacy -** Effectively communicate technical information, both oral and written with range of audience.
10. **Societal & Environmental Concern -** Analyze societal, environmental, cultural and legal issues within local and global contexts when providing software solutions.
11. **Individual and Team Work -** Work as a member or leader in diverse teams in multidisciplinary environments.
12. **Innovation and Entrepreneurship -** Use Innovation and Entrepreneurship for creation of value and wealth.

Editorial

The eleventh volume of the Research Journal, Tech Tonics – TIMSCDR Research Journal is a compilation of scholarly research papers and articles written by students of MCA (Master of Computer Applications) course of TIMSCDR. The contents of the research papers and articles of this edition pertain to the application of Information Technology in the domains of Agriculture and Medicine.

The Journal showcases the research endeavors of Post Graduate level students and helps them understand IT industry problems analytically or practically. These efforts also inculcate amongst the students the ability to think and elaborate new ideas in the dynamic field of Information Technology.

The Journal represents research work in various specializations in Information Technology like Internet of Things (IoT), AI, Big Data etc. including topics form Waste Management in Agriculture and Medicine.

To ensure originality of the research work, the research papers and articles were thoroughly checked for plagiarism and then selected for publication. The students got an opportunity to understand the relevance of standard research work through this academic exercise.

The eleventh edition of Tech Tonics, Research Journal is a modest effort to encourage the young, enthusiastic and resourceful minds of the students to do research using latest techniques and innovate and pen down emerging ideas in the field of Information Technology and its diverse Applications.

Editor
Dr. Vinita Gaikwad
Director, TIMSCDR

Tech Tonics: TIMSCDR Research Journal, Volume 11, 2019-2020

RESEARCH PAPERS

Sustainability of Disposal Practices of Expired Drugs in Medical Pharmacy

Guided by Prof. Rupali Jadhav

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***Abstract*—Drugs that's not get sell by pharmacies get expired after certain period of time. Those drugs should get recycled by the medical pharmacy. Most of the medicine users remain unaware about the disposal of unused or expired medicines. The aim of this study was to know the disposal practices of unused and expired medicines for environment sustainability [1]**

Keywords—***Water Desalination, Multi-stage flash distillation, Reverse osmosis***

I. INTRODUCTION

In Formulation and pre-formulation development, continuous manufacturing, input raw materials and energy are fed into the system at a constant rate, and at the same time, a constant extraction of output products is achieved. The process performance is heavily dependent on stability of the material flow rate. For powder-based continuous processes, it is critical to feed powders consistently and accurately into subsequent unit operations of the process line, as feeding is typically the first unit operation. Feeders have been designed to achieve performance reliability, feed rate accuracy, and minimal disturbances. Accurate and consistent delivery of materials by well-designed feeders ensures overall process stability. Loss-in-weight (LIW) feeders are selected for pharmaceutical manufacturing. Loss-in-weight (LIW) feeders control material dispensing by weight at a precise rate, and are often selected to minimize the flow rate variability that is caused by change of fill level and material bulk density. Importantly, feeding performance is strongly dependent on powder flow properties.

II. UNIT OPERATIONS

A. Powder blending

In the pharmaceutical industry, a wide range of excipients may be blended together with the active pharmaceutical ingredient to create the final blend used to manufacture the solid dosage form. The range of materials that may be blended (excipients, API), presents a number of variables which must be addressed to achieve target product quality attributes. These variables may include the particle size distribution (including aggregates or lumps of material), particle shape (spheres, rods, cubes, plates, and irregular), presence of moisture (or other volatile compounds), particle surface properties (roughness, cohesion), and powder flow properties.[2]

B. Milling

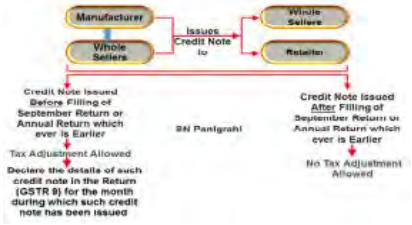
During the drug manufacturing process, milling is often required in order to reduce the average particle size in a drug powder. There are a number of reasons for this, including increasing homogeneity and dosage uniformity, increasing bioavailability, and increasing the solubility of the drug compound. In some cases, repeated powder blending followed by milling is conducted to improve the manufacturability of the blends.[3]

C. Granulation

In general, there are two types of granulation: wet granulation and dry granulation. Granulation can be thought of as the opposite of milling; it is the process by which small particles are bound together to form larger particles, called granules. Granulation is used for several reasons. Granulation prevents the "demixing" of components in the mixture, by creating a granule which contains all of the components in their required proportions, improves flow characteristics of powders (because small particles do not flow well), and improves compaction properties for tablet formation.[4]

D. Hot melt extrusion

Hot melt extrusion is utilized in pharmaceutical solid oral dose processing to enable delivery of drugs with poor solubility and bioavailability. Hot melt extrusion has been shown to molecularly disperse poorly soluble drugs in a polymer carrier increasing dissolution rates and bioavailability. The process involves the application of heat, pressure and agitation to mix materials together and 'extrude' them through a die. Twin-screw high shear extruders blend materials and simultaneously break up particles. The resulting particles can be blended and compressed into tablets or filled into capsules.[5]



E. Cooling

While a laboratory may use dry ice as a cooling agent for reaction selectivity, this process gets complicated on an industrial scale. The cost to cool a typical reactor to this temperature is large, and the viscosity of the reagents typically also an increase as the temperature lowers, leading to difficult mixing. This results in added costs to stir harder and replace parts more often, or it results in a non-homogeneous reaction. Finally, lower temperatures can result in crusting of reagents, intermediates, and byproducts to the reaction vessel over time, which will impact the purity of the product.[6]

F. Stoichiometry

Different stoichiometric ratios of reagents can result in different ratios of products formed. On the industrial scale, adding a large amount of reagent A to reagent B may take time. During this, the reagent A that is added is exposed to a much higher stoichiometric amount of reagent B until it is all added, and this imbalance can lead to reagent A prematurely reacting, and subsequent products to also react with the huge excess of reagent B.

G. Solvent Extractions

Whether to add organic solvent into aqueous solvent, or vice versa, becomes important on the industrial scale. Depending on your solvents, emulsions can form, and the time for your layers to separate can be extended if the mixing between solvents is not optimal. When adding organic solvent to aqueous, stoichiometry must be considered again as the excess of water could hydrolyze organic compounds in only mildly acid base conditions. In an even wider scope, the location of your chemical plant can play a role in the ambient temperature of your reaction vessel. A difference of even a couple of degrees can yield much different levels of extractions between plants located across countries.

H. Common disk-shaped tablets

A tablet is a pharmaceutical oral dosage form (OSD). Tablets may be defined as the solid unit dosage form of medicament or medicaments with suitable excipients and prepared either by molding or by compression. It comprises a mixture of active substances and excipients , usually in powder form, pressed or compacted from a powder into a solid dose. The excipients can include diluents, binders or granulating agents, flow aids and lubricants to ensure efficient tabletting; disintegrants to promote tablet break-up in the digestive tract; sweeteners or flavors to enhance taste; and pigments to make the tablets visually attractive or aid in visual identification of an unknown tablet. A polymer coating is often applied to make the tablet smoother and easier to swallow, to control the release rate of the active ingredient, to make it more resistant to the environment (extending its shelf life), or to enhance the tablet's appearance.

The compressed tablet is the most popular dosage form in use today. About two-thirds of all prescriptions are dispensed as solid dosage forms, and half of these are compressed tablets. A tablet can be formulated to deliver an accurate dosage to a specific site; it is usually taken orally, but can be administered sublingually, buccally, rectally. The tablet is just one of the many forms that an oral drug can take such as syrups, elixirs, suspensions, and emulsions. Medicinal tablets were originally made in the shape of a disk of whatever color their components determined, but are now made in many shapes and colors to help distinguish different medicines. Tablets are often stamped with symbols, letters, and numbers, which enable them to be identified. Sizes of tablets to be swallowed range from a few millimeters to about a centimeter

I. Capsule

In the manufacture of pharmaceuticals, encapsulation refers to a range of dosage forms—techniques used to enclose medicines—in a relatively stable shell known as a capsule, allowing them to, for example, be taken orally or be used as suppositories. The two main types of capsules are:

Hard-shelled capsules which contain dry powdered ingredients or miniature pellets made by e.g. processes of extrusion or spheronization. These are made in two halves a smaller-diameter “body” that is filled and then sealed using a larger-diameter “cap”.

Soft-shelled capsules, primarily used for oils and for active ingredients that are dissolved or suspended in oil

Both of these classes of capsules are made from aqueous solutions of gelling agents, such as animal protein (mainly gelatin) or plant polysaccharides or their derivatives (such as carrageenans and modified forms of starch and cellulose). Other ingredients can be added to the gelling agent solution including plasticizers such as glycerin or sorbitol to decrease the capsule's hardness, coloring agents, preservatives, disintegrants, lubricants and surface treatment.

Since their inception, capsules have been viewed by consumers as the most efficient method of taking medication. For this reason, producers of drugs such as OTC analgesics wanting to emphasize the strength of their product developed the “caplet”, a portmanteau of “capsule-shaped tablet”, in order to tie this positive association to more efficiently-produced tablet pills, as well as being an easier-to-swallow shape than the usual disk-shaped tablet.

A soft gel is an oral dosage form for medicine similar to capsules. They consist of a gelatin based shell surrounding a liquid fill. Soft gel shells are a combination of gelatin, water, opacifier and a plasticizer such as glycerin or sorbitol.

Soft gels are produced in a process known as encapsulation using the Rotary Die Encapsulation process invented by Robert Pauli Scherer. The encapsulation process has been described as a form/fill/seal process. Two flat ribbons of shell material are manufactured on the machine and brought together on a twin set of rotating dies. The dies contain

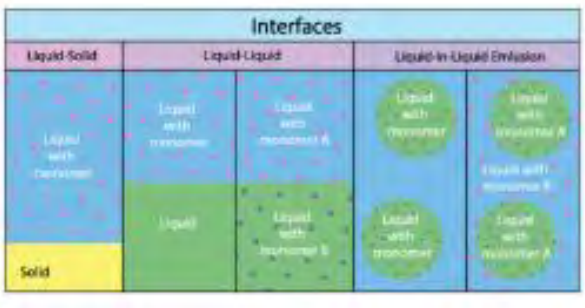
recesses in the desired size and shape, which cut out the ribbons into a two-dimensional shape, and form a seal around the outside. At the same time a pump delivers a precise dose of fill material through a nozzle incorporated into a filling wedge whose tip sits between the two ribbons in between two die pockets at the point of cut out. The wedge is heated to facilitate the sealing process. The wedge injection causes the two flat ribbons to expand into the die pockets, giving rise to the three-dimensional finished product. After encapsulation, the soft gels are dried for two days to two weeks depending on the product.

Since the 1990s, manufacturers have been able to replace gelatin in the shell with other polymers based on, for example, starch and carrageenan.

Interfacial polymerization is a type of step-growth polymerization in which polymerization occurs at the interface between two immiscible phases (generally two liquids), resulting in a polymer that is constrained to the interface. There are several variations of interfacial polymerization, which result in several types of polymer topologies, such as ultra-thin films, nanocapsules and nanofibers to name just a few.

III. MECHANISM

The most commonly used interfacial polymerization methods fall into 3 broad types of interfaces: liquid-solid interfaces, liquid-liquid interfaces, and liquid-in-liquid emulsion interfaces. In the liquid-liquid and liquid-in-liquid emulsion interfaces, either one or both liquid phases may contain monomers. There are also other interface categories, rarely used, including liquid-gas, solid-gas, and solid-solid.



In a liquid-solid interface, polymerization begins at the interface, and results in a polymer attached to the surface of the solid phase. In a liquid-liquid interface with monomer dissolved in one phase, polymerization occurs on only one side of the interface, whereas in liquid-liquid interfaces with monomer dissolved in both phases, polymerization occurs on both sides. An interfacial polymerization reaction may proceed either stirred or unstirred. In a stirred reaction, the two phases are combined using vigorous agitation, resulting in a higher interfacial surface area and a higher polymer yield. In the case of capsule synthesis, the size of the capsule is directly determined by the stirring rate of the emulsion.

Although interfacial polymerization appears to be a relatively straightforward process, there are several experimental variables that can be modified in order to design specific polymers or modify polymer characteristics. Some of the more notable variables include the identity of the organic solvent, monomer concentration, reactivity, solubility, the stability of the interface, and the number of functional groups present on the monomers. The identity of the organic solvent is of utmost importance, as it affects several other factors such as monomer diffusion, reaction rate, and polymer solubility and permeability. The number of functional groups present on the monomer is also important, as it affects the polymer topology: a di-substituted monomer will form linear chains whereas a tri- or tetra-substituted monomer forms branched polymers.

Most interfacial polymerizations are synthesized on a porous support in order to provide additional mechanical strength, allowing delicate nano films to be used in industrial applications. In this case, a good support would consist of pores ranging from 1 to 100 nm Free-standing films, by contrast, do not use a support, and are often used to synthesize unique topologies such as micro- or nanocapsules In the case of polyurethanes and polyamides especially, the film can be pulled continuously from the interface in an unstirred reaction, forming "ropes" of polymeric film As the polymer precipitates, it can be withdrawn continuously.

It is interesting to note that the molecular weight distribution of polymers synthesized by interfacial polymerization is broader than the Flory–Schulz distribution due to the high concentration of monomers near the interfacial site Because the two solutions used in this reaction are immiscible and the rate of reaction is high, this reaction mechanism tends to produce a small number of long polymer chains of high molecular weight.

Return of Time Expired Goods to be Treated as Fresh Supply:

a. Person returning the time expired goods is a registered person

- Return of goods to be treated as fresh supply
- Value of the said goods as shown in the invoice on the basis of which the goods were supplied earlier may be taken as the value of such return supply
- Recipient is eligible to avail Input Tax Credit on said return supply subject to section 16 of the CGST Act.
-

b. Person returning the time expired goods is a composition taxpayer

- Return the said goods by issuing a bill of supply and pay tax at the rate applicable
- Recipient is not eligible to avail ITC of said return supply

c. Person returning the time expired goods is an unregistered person:

- Recipient may return the said goods by issuing any commercial document without charging any tax.

Procedure in Respect of Return of Time Expired Drugs or Medicine

Circular No. 72/46/2018-GST dated 26th October, 2018 clarified the procedure to be followed in respect of return of time expired drugs or medicines under the GST laws.[7] The drugs or medicines are sold by the manufacturer to the wholesaler and by the wholesaler to the retailer on the basis of an invoice/bill of supply as case may be. They have a defined life term which is referred to as the date of expiry and on crossing the date of expiry, are returned back to the manufacturer through supply chain.

However, the Industry is facing a very daunting challenge of high levels Sales Returns because of Expiry of Drugs supplied earlier to Wholesalers to, Dealers or Retailers or Non-Moving Brands over a period of time or withdrawal of certain medicines

IV. CONCLUSION

Gaps exist in practices, therefore robust, safe and cost-effective pharmaceutical waste management program supported with media campaign is needed. Healthcare practitioners and community pharmacists should offer training to educate customers as well as pharmacist.

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A Solar Light Trap for Control of Field Crop from Insects

Guided by Prof. Aprajita Singh

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***Abstract* -- In this paper, new models of solar light trap was proposed which will be the most effective IPM tool for the monitoring of insect pests and their mechanical control in the field of agriculture, provide no harm to the nature and also have low cost involvement so that it can be utilized by most of the farmers. For that purpose firstly a model of light trap box with iron structure was developed, then a solar light system including solar panel, charging unit, battery and LED bulb installed with the light trap box so that this solar light trap can monitor and control the insect pests of different crops effectively. It is the most effective IPM tool which provide better safeguard to the nature in comparison to the other method of pest control.**

Key Words*: *Agriculture, IPM, Solar light trap, UV light.

I. INTRODUCTION

Green revolution technologies have now been widely adopted and the process of retreating returns to additional input usage has set in. At present, different schemes on green revolution technology in different crops are successfully going on in the different states of India, and recently a special drive has taken up in the states of the eastern region of India. Concurrently, agricultural production continues to be constrained by a number of biotic and anti-biotic factors. For instance, insect pests, diseases and weeds cause considerable damage to potential agricultural production. Evidences indicate that pests cause 25 percent loss in rice, 5-10 percent in wheat, 30 percent in pulses, 35 percent in oilseeds, 20 percent in sugarcane and 50 percent in cotton. The losses though cannot be eliminated altogether, these can be reduced. The declining trend in pesticide use in agriculture during the 1990s can be attributed to central government's fiscal policy and technological developments in pest management. During 1990s, taxes were raised on pesticides and phasing out of subsidies was initiated. Programs on training of both the extension workers and farmers in the IPM were started throughout the country.

There are a number of IPM practices that work best when applied by the entire community and in a synchronized mode. This is unlikely to happen without demonstrating benefits of group approach, and external motivation and support to the farmers. Though many technology programs are based on community approach, they do not have any proper exit policy to sustain the group approach. Hence the old concept of proper monitoring of insect pests at the early stage of pest attack and control of those pests at early stage becomes most important. For proper monitoring and control at the early stages of pest attack, different types of techniques are adopted i.e. survey through damage estimation, sweeping and pest population study, use of traps, etc. Among several types of traps, pheromone trap, light trap, poison bait, alternate hosts are commonly used in the field of agriculture. Present research study is mainly based on development and use of solar light trap in the field of agriculture which may be well adopted by the farmers due to its several field advantage and low cost involvement.

A. What is the best lamp for attracting insects?

It has been found that the fluorescent black light lamp is the most effective and efficient lamp (efficient from standpoint of power use) for attracting the adults of most species of nocturnal insects. Insects attracted include many species injurious to cotton, grain, tobacco, vegetables, and other field crops as well as stored-products insects.

B. What is a fluorescent black light lamp?

The fluorescent black light lamp is a commercially available lamp used primarily in photo-reproduction equipment and for decorative lighting. The principal production of this lamp is in the near-ultraviolet region of the electromagnetic spectrum. It can be noted from the chart of Fig. 1 that the near ultraviolet region occupies a position in the spectrum which is just below the violet of our visible spectrum. The term black light (a misnomer, since near-ultraviolet radiation in is not light) apparently derives from the fact that this

II. IMPORTANCE OF SOLAR ENERGY

Solar energy is energy from the Sun in the form of radiated heat and light. It drives the climate and weather and supports life on Earth. Solar energy technologies make controlled use of this energy resource. Solar power is a synonym of solar energy or refers specifically to the conversion of sunlight into electricity by photovoltaic cells, concentrating solar thermal devices or various experimental technologies.

A. *Energy from the sun*

About half the incoming solar energy is absorbed by water and land, the rest is reradiated back into space. Earth continuously receives 340 Wm_2 of incoming solar radiation at the upper atmosphere. Approximately 30% is reflected back to space while the rest is absorbed by the atmosphere, oceans and land masses. After passing through the atmosphere, the isolation spectrum is split between the visible and infrared ranges with a small part in the ultraviolet. The absorption of solar energy by atmospheric convection and evaporation and condensation of water vapor powers the water cycle and drives the winds. Sunlight absorbed by the oceans and land masses keeps the surface at an average temperature of 14°C. The conversion of solar energy into chemical energy via photosynthesis produces food, wood and the biomass from which fossil fuels are derived.

B. *Applications of Solar Energy Technology*

Solar energy technologies use solar radiation for practical ends. Solar technologies such as photovoltaic and water heaters increase the supply of energy and may be characterized as supply side technologies. Technologies such as passive design and shading devices reduce the need for alternate resources and may be characterized as demand side. Optimizing the performance of solar technologies is often a matter of controlling the resource rather than simply maximizing its collection.

C. *Photovoltaic Basics*

First used in about 1890, the word has two parts photo, derived from the Greek word for light, and volt, relating to the electricity pioneer Alessandro Volta. So, photovoltaic could literally be translated as light-electricity. And that is what photovoltaic materials and devices do they convert light energy into electrical energy as discovered by renowned physicist Albert Einstein.

D. *Electric Trap Light*

Farmers encounter the problems of various types of insect pests that harm crops and result in loss of productivity each year. Therefore, it is necessary for farmers to use pesticides to prevent crop damage. However, when pesticides are used in large quantity, they cause adverse impacts on people, animals and the environment. Instead of using pesticides, the government has to support other ways to prevent insect pests, including the use of biological agents and some insects etc. Most light traps are used in the field of agriculture for monitoring the insect pests of different crops is electrically operated and stationery in nature due to its dependence of electric connection. Besides, there is no possibility to avail the electric connection in the entire area of any field crops

For smooth operation of the electrical light trap. Hence the solar light trap may be considered as the alternate solution that has several advantages over the electrical light trap. To fulfill the purpose of a suitable model of solar light trap was developed considering the following characteristics portable in nature, easily fixed at any place in the field by the help of two bamboo poles or one concrete pole as available in the locality.

III. CIRCUIT DESCRIPTION

A. *Circuit Diagram of Solar Light Trap*

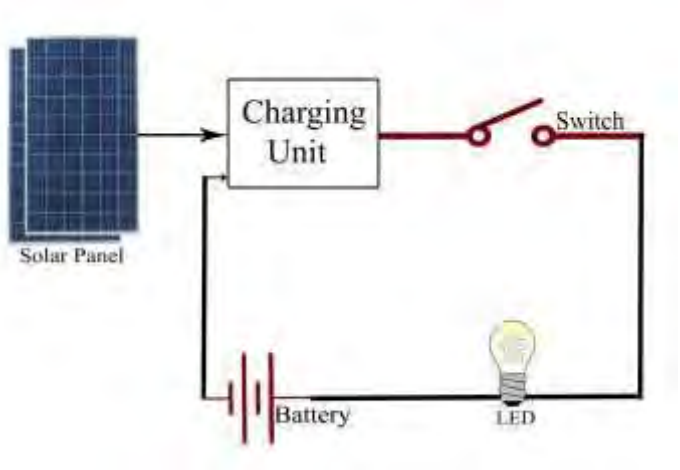

Fig. 3.1: Circuit Diagram of planned work

Here, solar panel is used for generating electricity as shown in figure 3.1. Solar panel is connected to the charging unit for indication purpose. There is switch connected to ON/OFF the light. The UV light used for attract the pest and battery is used to store electricity and provide to the UV light for control of pest in farm.

First, select the appropriate LED light as a light source to trap pests, the boost circuit should make the high-pressure of pest control net over 6KV voltage, thus killing most of the pests toward the light and ensuring the body safety at the same time based on the load power of LED lamps, high-voltage network and control circuit, make a reasonable choice for the capacity of batteries and solar panels to guarantee of 8h design a control circuit for the solar panels to control the battery charging and discharging as well as protect the system. Meanwhile, it could control the LED pest control light which means the light could automatically turn on at night and off during the daytime, coupled with the lightning protection, anti-rain, short circuit prevention of high-voltage network caused by the dew, the prevention of accidentally injure of human and animals caused by the high-voltage network, the prevention of electric shock accident caused by the pest control light.

B. Flow Chart of Proposed System

Most light traps used in the field of agriculture for monitoring the insect pests of different crops is electrically operated and stationery in nature due to its dependence of electric connection. Besides, there is no possibility to avail the electric connection in the entire area of any crop field for smooth operation of the electrical light trap. Hence the solar light trap may be considered as the alternate solution that has several advantages over the electrical light trap.

The solar panel and the charging unit is fixed on one side of v-shaped structure of fiber or plastic body facing the panel toward south. Then the battery is placed within the light trap box and the LED bulb is placed funnel structure at middle under the shed structure. The solar system is connected with each other through proper wires as shown in figure 3.4.

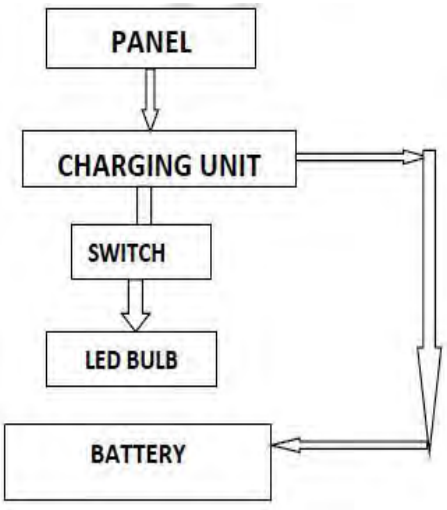

Fig. 3.2 Block Diagram of Solar Light Trap Model

The operation of the solar light trap is very easy. There is a switch above the LED bulb. A farmer has to switch on the bulb every evening time and switch-off in the morning and the solar light trap will be charged during day time and provide light at night. This solar light attract the insect pests and the same will be collected in the light trap box through funnel and will be stored in a plastic jar placed within the box.

A little amount of water with a few drops of kerosene oil or even a few drops of liquid soap may be placed in the jar so that the insect pests caught by the trap cannot fly away through the same hole.

C. CONCLUSION

The development of this solar light trap and successful demonstration of this tool in different crop areas by the farmers resulted that as an alternate of chemical pesticide, this tool may be considered as important for its eco-friendly nature and low cost involvement to both the farmers and agricultural experts. The solar light trap model will be very much effective for the control of different insect pests of all crops without any use of chemical pesticides in the agricultural fields in near future. Many organizations may also utilize this useful IPM tool for successful implementation of green revolution technology in the crop field for providing necessary safeguard to the nature. Hence we have concluded that, this is the best IPM tool for control of field crop insects.

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A Literature Review on Medical Waste Management

Guided by Prof. Mira Gohil

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***Abstract*- Medical centers including hospitals, clinics and places where diagnosis and treatment are taken place and generate wastes that are highly hazardous and put people under risk of diseases. Although the understanding of medical waste management and control techniques is important, technical courses that are offered in undergraduate chemical, civil or environmental engineering place less emphasis on this area of education. In this paper, the meaning of medical waste, their risks of exposure, medical waste management regulatory acts, medical waste management procedures and control techniques are presented. The contents presented in this paper served as a supplementary material in an under-graduate course on waste management and as an educational guide for medical staff training on waste handling.**

***Keywords*- Medical Waste; Medical Waste Act; Waste Management and Control**

I.INTRODUCTION

Waste in general is any substance (solid, liquid, or gas) that has no direct use and is removed permanently. A waste is considered hazardous if it contains any of the characteristics such as being flammable, reactive, explosive, corrosive, radioactive, infectious, irritating, sensitizing, or bio-accumulative [1]. Medical waste is limited to infectious, hazardous, and any other wastes that are produced from health care institutions, such as hospitals, clinics, dental offices, and medical laboratories [2]. The management of medical waste has been of great concern due to potentially high risks to human health and the environment. In the past, medical wastes were often mixed with household wastes and removed in municipal solid waste landfills.

Hassan *et al.*, 2008 [3] report a survey on Bangladesh hospitals that generated a total of 5562 kg per day of wastes, of which about 77.4% are non-hazardous and about 22.6% are hazardous. The average waste generation rate for the hospital in which survey was held is 1.9 kg/bed/day or 0.5 kg/patient/day. The study reveals that there is no proper or systematic management of medical wastes except in a few private hospitals that segregate their hazardous wastes.

Some cleaners were found to retain used sharps, saline bags, blood bags and test tubes for resale or reuse. In Bangladesh, proper medical waste management is a new phenomenon and the government of Bangladesh is trying to develop a new and modern approach to deal with the hazardous medical waste properly. Project in Agriculture, Rural Industry, Science and Medicine (PRISM-Bangladesh), a reputed national Non-Governmental Organization in Bangladesh, with the financial support from Canadian International Development Agency

(CIDA) has recently developed a disposal facility for low cost hazardous medical waste treatment and management in Dhaka City.

Similarly, the generation of medical waste in Korea has been increasing in quantity and variety, because of the wide acceptance of single-use disposable items (e.g. gloves, plastic syringes, medical packages, tubing, and containers) [4]. In recent years, increased concerns among public over the improper disposal of medical waste have led to a movement to regulate the waste more systematically and strict by the Korea Ministry of Environment. Waste reduction and recycling are still not practiced, thus significant amounts of medical wastes are to be disposed. Incineration is the main method of hazardous medical waste treatment in Korea.

In the United Arab Emirates (UAE), there are many clinics and hospitals that generate hazardous medical wastes [5,6]. The main method of medical waste treatment in most countries of the Middle East is incineration; however, other techniques that produce less pollution are now being introduced to the world. The literature shows many case studies on the mismanagement of medical wastes as described above for illustration purpose.

The objective of this paper is to introduce readers about the medical waste management administrative acts, definition of medical wastes, risks of exposure, medical waste management procedures and control techniques

II. MEDICAL WASTE TRACKING ACT AND DEFINITIONS

The Medical Waste Tracking Act (MWTA, 1988) is the first act to supervise medical wastes [7]. It was used after life-threatening incidents occurred due to the lack of proper medical waste disposal systems. One e.g. of such incident was on June 1987 when 12 children in Indianapolis, Indiana, played with vials they found in a dumpster outside a medical office. The vials were full of blood, and two of them were infected with AIDS. After medical wastes were found on shore of several East Coast beaches, USEPA (US Environ-mental Protection Agency) prompted US Congress to enact the MWTA in 1988 [8]. The Act required EPA to bring up a two-year medical waste demonstration program.

For the purpose of the demonstration program, the MWTA: a) defined medical waste and those wastes to be supervised; b) established a cradle to grave tracking system utilizing a generator starting tracking form; c) required management standards for segregation, packaging, labeling and marking, and storage of the wastes; and d) established record keeping requirements and penalties that could be imposed for mismanagement of medical waste disposal. According to MWTA medical waste is "any solid waste that is generated in the diagnosis, treatment, or immunization of any living thing in research, or in the production or testing of biologicals" [8,9].

The WHO (World Health Organization) has classified medical waste into different types: a) Infectious: material-containing pathogens in very high concentrations, enough to cause diseases on exposure. This includes waste from surgery, used dressings, and others. b) Sharps: disposable needles, syringes, blades, broken glasses etc. c) Pathological: tissues, body organs, body parts, human flesh, blood and body fluids. d) Pharmaceuticals: drugs and chemicals that are returned, spilled, expired, damaged or contaminated. e) Chemical: waste resulting from diagnosis, or cleaning material. f) Radioactive: waste contaminated by radioactive substances used in diagnosis and treatment of diseases. g) Pressurized containers including gas cylinders, oxygen cylinders and h) Substances with high heavy metal content: broken mercury thermometers, blood pressure gauges. Infectious, pathological and sharp objects are the most dominant types of medical waste [10]. From the crime scene to the courtroom, Forensic Medicine and Science are essential part of investigations. Forensic best practices are fundamental for recognizing and preserving all items of evidence from the crime scene.

The definition of medical waste doesn't include waste containing microbiological cultures used in food processing, urine, saliva, and nasal secretions unless they contain blood. Like any household and office, medical facilities also produce general wastes such as paper and plastic that are not dangerous to human beings [9]. Medical waste such as sharps (*i.e.* needles, syringes, scalpels, etc.) can be harmful for human in a non-infectious way.

Depending on the institutions, the quantities of medical wastes produced may vary [11]. Households are small quantity generators of medical waste, while hospitals are considered to be large quantity generators (>100 kg/ month or more of medical wastes). Medical wastes including infectious and sharp wastes gather for about 35% of the total waste generated in hospitals. The remaining 65% of the wastes do not infect. Unlike industrial wastes which differ depending on the type of processes or sectors (*i.e.* chemical, petroleum, municipal etc.), medical waste compositions remain more or less the same.

Regardless of its quantity and place from where it is generated, medical waste has serious sometimes fatal effects on exposure. Medical staff, janitors, medical center visitors and patients are exposed to the risk of infection and diseases as a result of direct contact. Thus, medical waste hazards and risks exist not only for the waste generators and operators, but also for the common man including children who play near disposal areas. The possible exposure pathways include direct contact, transmission through air, contaminated water sources and the environment in general.

III. MEDICAL WASTE MANAGEMENT TECHNIQUES

There are various methods to minimize the hazards resulting from medical waste [10].

A. Segregation

Segregation is useful since it prevents the contamination of non-harmful waste by the harmful or hazardous waste and making the whole waste stream hazardous. Thus, this method will decrease the toxicity and the volume of the waste stream.

Moreover, segregation makes it easier to transfer the waste to a different place. Waste is separated depending on the quantity, composition, and the disposal method of the waste stream.

B. Separating Different Categories of Medical Wastes

In medical centers, infectious and pathological waste, and sharps are kept in different containers. The containers are marked as "biohazard", closed, water tight and of uniform color for each type of medical waste through- out the medical center. The size of the containers depends on the quantity of waste generated and the containers used are easy to handle and transport. For used needles specific designed containers are used.

The system for separation, packaging, labeling and marking involves separating the medical waste into categories, as described. The packaging is done in different colored bags [12]. For example, yellow plastic bags are used for hazardous medical waste that is meant to be disposed by means of incineration or deep burial in landfill. How-ever, if they are to be treated by autoclave or microwave, they are put in red plastic bags or containers. In steam autoclaving, the contamination of waste is removed by the effects of the saturated steam at elevated temperatures and high pressure.

This method is impractical for pathological, chemotherapy and radioactive wastes. Hazardous waste is packed in either blue or white transparent bags and is usually treated by autoclave, microwave, chemical treatment and shredding, or by landfilling. As for labeling and marking, medical wastes have the bio-hazard symbol. Both the packaging and labeling are done worldwide. They only differ in treatment methods [12].

C. Disinfection

In order to reduce the level of toxicity of some medical wastes, chemical disinfectants (*i.e.* chlorine dioxide, sodium hypochlorite, or per acetic acid) are sometimes used. For solid wastes, disinfection can be done only when waste materials are shredded. In some cases, the germicide themselves are hazardous, thus it is not recommended for treating pharmaceutical, chemical and some types of infectious waste.

D. Incineration

Incineration is the process of destroying waste by burning it at elevated temperatures in furnaces. The process removes harmful materials, reduces the mass and volume of the waste and converts it into ash that is harmless. Incineration is preferred for wastes that are 60% combustible. Incineration is preferred for pathological and infectious waste or sharp wastes. Incinerators are available in several different types; each type has a specific function. A mobile incinerator called "drug terminator" is used for discarding of pharmaceuticals. A diesel fired medical waste incinerator called "MediBurn" deals with pathological and infectious waste in small medical facilities, and laboratories [13]. This unit is portable and easy to use and it can incinerate everything from laboratory waste to animal remains.

The advantage of incineration process is that the volume of the waste will be reduced drastically by 50 - 400 times [14]. Incineration has a great advantage of decreasing the volume of the wastes; however it has a disadvantage include high costs, smoke generation and pollution risks. Incinerators used in hospitals create more furans and dioxins than incinerators used in municipality. This higher concentration of furans and dioxins are due to a) frequent on and off of machines b) low stringent emission controls c) poor combustion control (e.g., waste mixing and oxygen con-trols), and d) differences in the waste feed composition as compared with municipal solid waste [15]. Incinerators are equipped with a chimney to reduce the smoke and its effect on pollution. Moreover, incinerators are usually located far away from the medical center in order to reduce the effect of smoke. A pit below the incinerator is usually available for collecting the ashes. Incineration is one of the most effective methods of disinfecting medical waste.

E. Disinfection by Plasma

In this process, low temperature plasma which is generated by the plasma generator using air as working fluid organizes a combustion process. The medical waste is continuously mixed, thus it maximizes the heat and mass exchange which saves any energy loss. The heat generated is used as an additional heat source in the process. This technology removes the formation and release of irregular forms of NOX and high-toxic substances (*i.e.* dioxins) into the atmosphere. Another main advantage is that it has consumes less energy compared to other mineralization (*i.e.* combustion) processes [14].

F. Emerging Technology

A new technology for management of hazardous medical waste that changes the regulated medical waste into municipal solid waste is recently introduced. This method involves shredding and grinding the hazardous medical waste bags via sharp cutting blades that are installed within the vessels. The blades rotate around 1750 revolutions per minute and the volume of the shredded waste is decreased by 80% [16]. The steps included in the process are loading, shredding, heating, sterilization, cooling, draining, vacuum and unloading. The whole process is covered in a compact system and there is no intermediate handling of the waste within the process. Due to the dense size, this system can easily be used for on-site treatment of the waste and installed in hospitals. This will decrease the transportation costs of the medical wastes. In terms of environmental aspects, it is a clean and chemical-free technology and free of hazardous emission or radiation [16]. This method is economical and environmentally friendly and is dependable in terms of ease of use and maintenance. This technology is currently used in the middle-eastern countries such as Iraq, Jordan, Kuwait, Lebanon, Syria and UAE.

Similarly, a team of engineers in Idaho National Laboratory, USA have created a new patented technology that helps in better management and treatment of the medical wastes. Based on this technology, Med-Shred, Inc., (Texas, USA) has developed a mobile shredding and chemical disinfecting machine that is aimed for on-site treatment of harmful medical waste [17]. The machine changes the medical waste into disposable municipal waste using shredders that shred the waste into smaller particles which are then wetted with disinfectant spray and immersed in a disinfection solution. The wet waste is then dried using a hot off-gas in a drying chamber. Considering the number of clinics and hospitals in middle-east, this method will be very useful if utilized, as it can treat the medical waste on-site which helps in better management of wastes.

IV. CONCLUSION

Medical wastes are highly harmful and put people under risk of fatal diseases. The understanding of medical waste management and control techniques is essential. In this paper, initial materials on the definition of medical waste, medical waste management regulatory acts, the risks of exposure, medical waste management procedures and control techniques are presented.

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Block-Chain Technology

Guided by Prof. Aprajita Singh

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Abstract—**A blockchain is a disseminated database of records, or open record of all things considered or computerized occasions that are executed and shared among an interest taking parties. Every exchange inside the open record is checked by agreement of members inside the framework. Once entered, data can never be eradicated. The blockchain contains a specific and unquestionable record of each single exchange at any point made. Bitcoin, the decentralized distributed advanced money, is that the most famous model that utilizations blockchain innovation.**

The fundamental theory is that the blockchain builds up an arrangement of making a circulated accord inside the advanced online world. This enables partaking substances to see doubtlessly that an digital event occurred by making a certain record during an open record. It opens the entryway for building up a vote based open and adaptable advanced economy from a unified one. There are huge open doors in this problematic innovation, and thusly the unrest during this space has recently started.

This paper portrays blockchain innovation and a couple of convincing explicit applications in both monetary and non-monetary part. We at that point look at the difficulties ahead and business openings in this major innovation that is prepared to reform our computerized world.

We also done some survey on students with IT background to see how much of current generation is aware of blockchain technology and found some surprising results.

I. INTRODUCTION (*HEADING 1*)

A blockchain is really a dispersed database of records, or open record all things considered or digital event that are executed and shared among part taking parties. Every exchange inside the open record is checked by agreement of members inside the framework. Once entered, data can never be eradicated. The blockchain contains a specific and evident record of each single exchange at any point made. To utilize an essential relationship, it's simpler to take a treat from a cookie container, from a detached spot, than taking the treat from a cookie container continued being seen by a huge number of people.

Current advanced economy is predicated on the dependence on a specific trusted authority. Every online exchange think confiding in somebody to advise us reality—it are regularly an email specialist co-op disclosing to us that our email has been conveyed; it are frequently a confirmation authority revealing to us that a specific computerized declaration is dependable; or it are frequently an informal community like Facebook revealing to us that our posts in regards to our life occasions are imparted distinctly to our companions or it are regularly a bank disclosing to us that our cash has been conveyed dependably to our darlings during a remote nation. the very actuality is that we carry on with our life unstably inside the computerized world by relying on a third element for the security and protection of our advanced resources. the very truth remains that these outsider sources are frequently hacked, controlled or compromised.

This is the place were blockchain innovation comes convenient. it's the possibility to upset the computerized world by empowering a disseminated accord where each and each online exchange including digital assets at various times, are frequently checked whenever inside what's to come. It does this without trading off the protection of the computerized resources and gatherings included. The disseminated accord and namelessness are two significant qualities of blockchain innovation. the advantages of Blockchain innovation exceed the administrative issues and technical difficulties

II. BLOCKCHAIN TECHNOLOGY

A. Short History

The first cryptographically verified chain of blocks was depicted in 1991 by Stuart Haber and W. Scott Stornetta. They needed to execute a framework where report timestamps couldn't be messed with.

Block chain was imagined by an individual (or gathering of individuals) utilizing the name Satoshi Nakamoto in 2008 to fill in as the open exchange record of the digital money bitcoin, followed by Litecoin and Namecoin in 2011, Peercoin in 2012,

Dogecoin, Gridcoin, Primecoin, Ripple, Nxt in 2013 and a lot more in consequent years. Ethereum same mainstream as bitcoin was propelled in year 2015.

B. What is Blockchain

A Block-Chain is a developing rundown of records called blocks, that are connected utilizing cryptography. Each block contains a cryptographic hash of the past block, a timestamp to the present block.

By structure, a square chain is resistant to alteration of the data. It is "an open, circulated record which will record exchanges between two parties efficiently and permanent way". For use as a dispersed record, a block chain is typically overseen by a peer-to-peer network collectively adhering to a protocol for inter-node communication and validating new blocks. When recorded, the data in some random block can't be adjusted retroactively without change of every subsequent block, which needs agreement of the system larger part. Despite the fact that block chain records aren't unalterable, block chains could likewise be viewed as secure by structure. Decentralized consensus has therefore been claimed with a block-chain.

The innovation of the block chain for bitcoin made it the principal computerized money to determine the twofold spending issue without the need of a confided in power or focal server.

C. How Does it Works

A cryptocurrency features a ledger, where all transactions are made public in order that total visibility is provided. Having a ledger forces everyone to "play fair" and takes away the danger of double spending.

The ledger may be a list of entries during a database that no-one can change without fulfilling specific conditions. Nobody owns the ledger or the cryptocurrency blockchain; instead, it's decentralized meaning self-run and self-governed without the interference of outside parties.

Let's say that you simply want to invest in cryptocurrency, like Bitcoin, through a major cryptocurrency exchange. After purchasing it, you decide to spend it. What happens now? At first, the transaction is unconfirmed, which means the transaction is not yet official, and it doesn't become "set in stone" until it goes through a verification process. Once confirmed, the transaction becomes a part of a record of historical transactions housed on the blockchain. Cryptocurrency Miners verify the transactions then add them to the general public ledger. They use powerful computers to resolve complex math problems that are the key to the verification process. Cryptocurrency Mining is open source, so anyone can confirm a transaction, and therefore the first miner to resolve the matter gets to feature a block to their transaction ledger. This process is called the "proof-of-work system."

After adding a block to the ledger, the miner is given a reward for his or her efforts, which varies based on the cryptocurrency.

D. Evolution and Adoption by Companies

In August 2014, the bitcoin blockchain document size, containing records of all exchanges that have happened on the system, reached at 20 GB (gigabytes). In January 2015, the size had developed to right around 30 GB, and from January 2016 to January 2017, the bitcoin blockchain developed from 50 GB to 100 GB in size.

As indicated by Accenture, a use of the dissemination of developments hypothesis proposes that blockchains achieved a 13.5% reception rate inside financial services in 2016, in this manner arriving at the early adopter's stage. Industry exchange bunches joined to make the Global Blockchain Forum in 2016, an activity of the Chamber of Digital Commerce.

In May 2018, Gartner found that solitary 1% of CIOs showed any sort of blockchain reception inside their associations, and just 8% of CIOs were in the present moment "arranging or [looking at] dynamic experimentation with blockchain.

III. Applications of Technology-Compelling Use Cases in both Financial and Non-Financial Area

Blockchain innovation can be coordinated into numerous zones. The essential utilization of blockchains today is as a circulated record for cryptographic forms of money, most remarkably bitcoin. There are a couple of operational items developing from evidence of idea by late 2016. Organizations have been so far hesitant to put blockchain at the center of the business structure.

A. Cryptocurrencies

Most digital forms of money use blockchain innovation to record exchanges. For instance, the bitcoin system and Ethereum arrange are both dependent on blockchain.

B. Smart contracts

Blockchain-based keen agreements are proposed gets that can be in part or completely executed or upheld without human collaboration. One of the principle

targets of a brilliant agreement is computerized escrow. An IMF staff dialog announced that shrewd agreements dependent on blockchain innovation may diminish moral dangers and improve the utilization of agreements when all is said in done. Be that as it may, "no feasible brilliant agreement frameworks have yet risen." Due to the absence of across the board utilize their lawful status is indistinct

C. Financial services

Significant segments of the money related industry are executing dispersed records for use in banking, and as per a September 2016 IBM study, this is happening quicker than anticipated. Banks are keen on this innovation since it can possibly accelerate back office settlement frameworks.

D. Video games

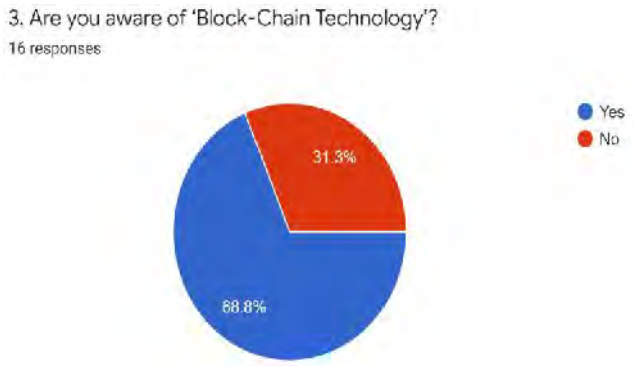
A blockchain game CryptoKitties, propelled in November 2017. The game stood out as truly newsworthy in December 2017 when a cryptokitty character - an in-game virtual pet - was sold for more than US$100,000. CryptoKitties outlined adaptability issues for games on Ethereum when it made noteworthy clog on the Ethereum connect with about 30% of all Ethereum exchanges being for the game. CryptoKitties likewise showed how blockchains can be utilized to inventory game resources (computerized resources)

E. Supply chain

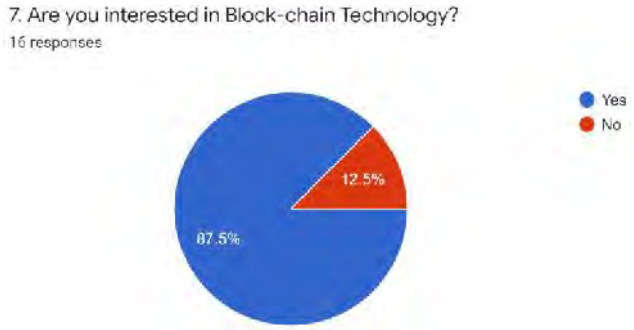
There are various endeavors and industry associations attempting to utilize blockchains in inventory network coordinations and store network the executives. The Blockchain in Transport Alliance (BiTA) attempts to create open models for supply chains. Everledger is one of the debut customers of IBM's blockchain-based tracking services. Hyperledger Grid creates open segments for blockchain production network arrangements

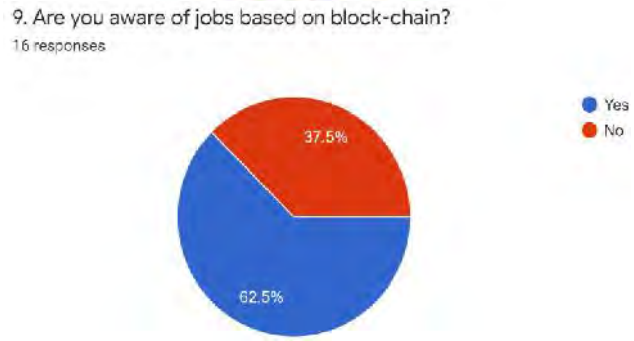
IV. Survey Result

We done a survey on students with IT background and come across this data, on average 10 out of 15 students knows about blockchain technology were as 11 out of 15 students know about cryptocurrency.



Most of the students are only aware of Banking & Finance application of blockchain technology.





13 out of 15 students are interested in blockchain technology but only 10 out of 15 students are actually aware of certification and jobs available for blockchain technology.

V. Conclusion

Block-Chain Technology has potential to change and improve centralize system along with rising interest of multinational companies and new generation students we can assume this technology will occupy industries in next few years or decade.

This is still an emerging technology and has many difficulties and challenges to overcome.

On other hand many students are interested in blockchain technology but not have proper exposure to it, this is were colleges needs to come forward to help students and introduce them to blockchain

technology and make aware of certifications and jobs available for blockchain technology.

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Sustainable Waste Management Issues in India

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Abstract-- Solid waste management (SWM) has become a global matter and is of a vital concern,especially in developing countries, due to varied environmental problems, suchas pollution of air, soil and water and causation of greenhouse gases from junkyard.Municipal authorities normally flunk in fulfilling the ample services due tomeasly funds and ineffective enactment. The present work shows the on-goingwaste management operation of municipal solid waste management (MSWM) ofIndia, plus the collection, convey, treatment and disposal network. It alsopinnacles the possible augmentation for imperishable solid waste managementin view of the technological, institutional and financial factors. A visionary chassis for upgrading the technological aspects is also provided.

Keywords-- Open midden; Solid waste; Urban Local Bodies (ULBs); Waste generation; Waste reception

I. INTRODUCTION

Human venture create waste, and these misspends are handled, stored, collected andchucks of, which constitutes risks to the abode and to citizens health. Swift urbanization and industrialization in India has resulted in overwroughtof urban infrastructure utility, including municipal solid waste (MSW) services. Civic framework are reveting considerable difficulties in providing adequate services, such as supply of water, electricity, roads, education and public asepsis, including MSWM. The management of MSW is going through a carping phase due to the non-availability of apt amenities to handle and dispose of the increasingly large total of MSW generated diurnal in cosmopolitan cities.

The MSW amount is contemplated to increase significantly in the near future as the country aspires to procureindustrialized nation stature by the year 2020. Major tranche of the problem of congealedwaste management (SWM) transpires from urban areas of India. Impulsive disposal causes a dire jolt on all constituents of the environment and human vigour. To ensure better human health and safety, there is a need for effective SWM systems which should be both environmentally and economically sustainable. Augmentation of SWM facilities and their operation and maintenance in a sustainable mode by the urban local bodies would not only prescribe huge capital stake, butalso introduction of newest and cost-effective technologies. These looms can all beintegrated in the four aspects covered in this paper. These aspects are technological,institutional and financial. Further, it has been mentioned in the present work thatincorporation of GIS technologies can highly upgrade the technological aspects ofsustainable SWM by using GIS as an effective tool for data storage and handling.

II. INDIAN WASTE MANAGEMENT DIEGESIS

A. Waste Generation

The quantum of MSW generated depends on a number of facets,such as food custom, calibre of living, degree of promotional activities and seasons. Deetson quantity contrast and generation are nifty in forethought for collection and disposalstructure. The increasing urbanization and changing lifestyles have increased the wastegeneration rate of Indian cities. In India, the amount of waste generated per unit isreckoned to increase at a levy of 1-1.33% yearly.

Table 1: Municipal Solid Waste Generation Rates in Different States in India

Name of State	No. of cities	Municipal Population	MSW(t/day)	Per Capita Waste(kg/day)
Andhra Pradesh	32	10,845,907	3,943	0.364
Assam	4	878,310	196	0.223
Bihar	17	5,278,361	1479	0.280
Gujarat	21	8,443,962	3805	0.451
Haryana	12	2,254,353	623	0.276
Himachal Pradesh	1	82,054	35	0.427
Karnataka	21	8,283,498	3,118	0.376
Kerela	146	3,107,358	1,220	0.393

Madhya Pradesh	23	7,225,833	2,286	0.316
Maharashtra	27	22,727,186	8,589	0.378
Manipur	1	198,535	40	0.201
Meghalaya	1	223,366	35	0.157

Name of State	No. of cities	Municipal Population	MSW(t/day)	Per Capita Waste(kg/day)
Mizoram	1	155,240	46	0.296
Orissa	7	1,766,021	646	0.366
Punjab	10	3,209,903	1001	0.312
Rajasthan	14	4,979,301	1768	0.355
Tamil Nadu	25	10,745,773	5021	0.467
Tripura	1	157,358	33	0.21
Uttar Pradesh	41	14,480,479	5515	0.381
West Bengal	23	13,943,445	4475	0.397
Chandigarh	1	504,094	200	0.475
Delhi	1	8,419,084	4000	0.295
Pondicherry	1	203,065	60	0.376

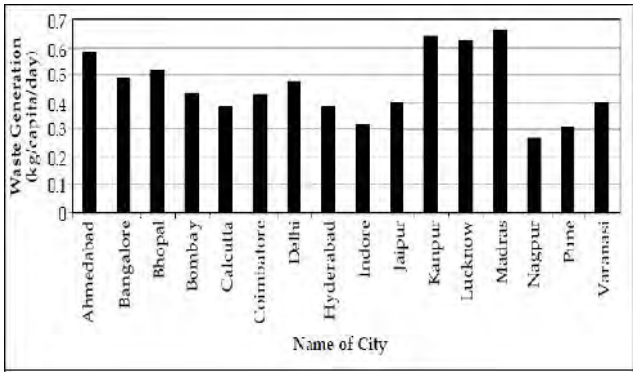


Fig. 1. Per Capita Generation Rate of MSW for Indian Cities

B. Waste Collection

The squander collection in India is very haphazard. The collection bins used in variousconurbations are neither equitably outlined nor properly pinpointed and perpetuated. This has resultedin the poor collection efficiency. The standard collection regulation for MSW in Indian citiesand states is about 70%. Figure 2 shows the collection efficiency of MSW inthe Indian states. The Central Pollution Control Board (CPCB) has collected data for the299 Class-I cities to sway the routine of collection of MSW. It has been observed thatblue-collar collection embraces 50%, while collection using trucks comprises only 49%.

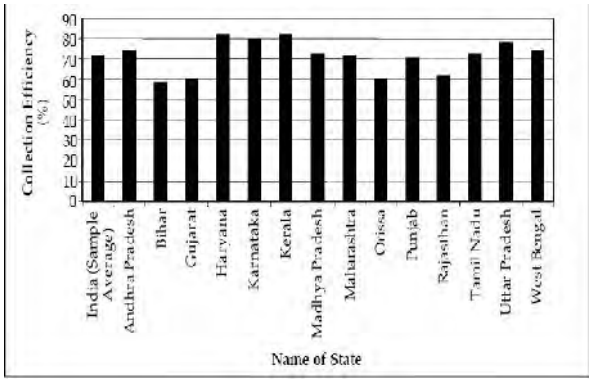


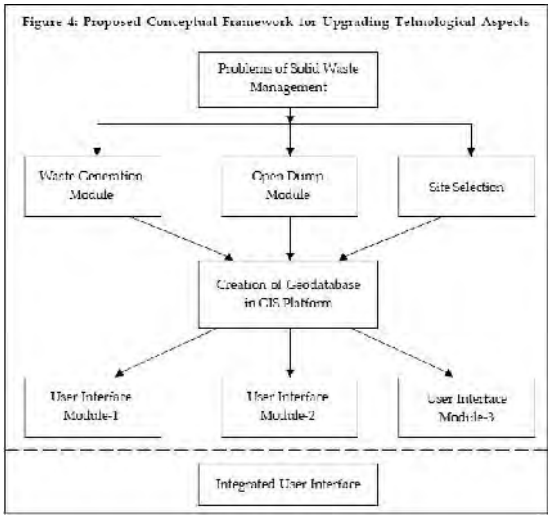
Fig. 2. Per Capita Collection Efficiency of MSW for Indian States

III. DIFFERENT ASPECTS CONSIDERED FOR SUSTAINABLE SOLID WASTE MANAGEMENT

The sustainability of SWM sprawls in its coherent sustainable loom, which means thatthe gross facets, which include technological aspects, institutional aspects andfinancial aspects should be given a thought.

A. Technological Aspects

The immediate SWM system dearths the use of the brand new and cost-effective machineries. Thus,technological aspects include the incorporation of latest technologies into various levelsof SWM, for example, use of Geographic Information System (GIS). A conceptual framework has been proposed for the up-gradation of technical aspects of present SWMscenario, which contains the use of GIS in the management of overall data of wastegeneration, administration of agapedunghilland plat selection for MSW disposal. It has beenproposed in the conceptual framework that a user interface can be developed with theintegration of GIS platform and a computer model. The problems of SWM, which areinscribed here for management with the use of GIS gizmo, are waste cohortmanagement muddle, open dump management problem and site assortment problem.



a) Waste Generation Module

Disparate waste generation dossier (ward-wise) of the city comprehends biodegradable constituent, recyclable component, inert waste and other relevant information can bestored in GIS geodatabase and the same can be retrieved while taking decisions, forexample, designing of composting facilities, recycling facilities and various other decisionsfor SWM purposes.

b) Open Dump Module

Location of various dump sites can be digitized in GIS and the attributes of all the dumpsites can be bestowed deeming the waste outreaching to the dumpsite, manor of site, waterquality, depth of water table, geotechnical properties of the contaminated soil and analysisof various contaminants along with their concentration. Thus the site, which has themaximum risk, can be found and measures can be taken accordingly, like landfillreclamation and their engineered closure.

c) Site Selection Module

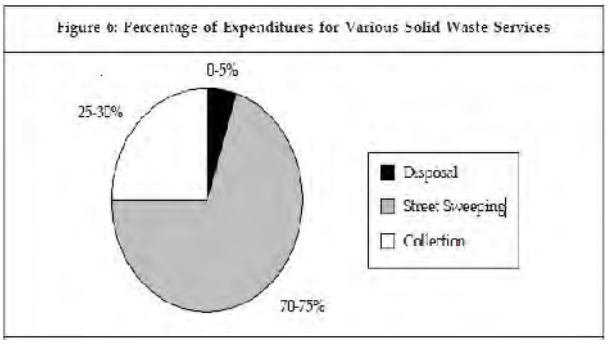
In this module, GIS-based constraint mapping can be employed to eliminate theenvironsinapt sites and to slender down the number of sites for moreover heed. Different constraints can be considered as per the site selectioncriteria provided by CPCB, MoEF, Government of India. This results in the finding ofcandidate sites from which the best site can be chosen by creating various thematic layersof the candidate sites and overlaying them using weighted overlay techniques of GIS.

Institutional Aspects

In the institutional setup of SWM, it is the central government which has powers to enact laws and frame rules for environmental protection. The subject of solid waste monitoring, implementation and authorizing the municipal authorities, setting of treatment and disposal facilities is left to State Pollution Control Boards (SPCBs)and passed to the ULB.

Financial Aspects

Like any apparatus, SWM too requires whack of fiscalsupplies for its methodicalfunctioning. The annual requirement of funds for efficient SWM reveals that when theprinciple of full cost pricing is applied, the total annual requirement is often 2-3 times theamount being allocated at present. Municipalities spend only 10% of their budget on SWM because they have to manage a large number of other activities. The percentage of expenditures for various solid waste services shows that the expenditure is not appropriate and well-distributed. Areas of priority are not decided and extra investments are made where it may not be required.



IV. CONCLUSION

The fulmination in world populace is reorienting the genre of SWM from chiefly a stubby priority, localized issue to an internationally pervasive social problem. Risks to publicfitness and habitat due to jelliedwaste in large urbaneareas are becomingturbulent. There is a pressing need for sustainable approaches for SWM. Steps arebeing taken by the government, but still a more systematic approach is required alongwith the operation of latest and cost-effective technologies at differingdoable pitch.

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Bio-Medical Waste Management in India

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***Abstract*-- Now-a-days, management of waste from its collection to dumping and disruption has become of the greatest challenge all around the globe. According to the recent study conducted by industry body ASSOCHAM and Velocity, India is likely to generate about 775.5 tonnes of medical waste per day by 2022 from the current level of 550.9 tonnes daily. Waste sections such as municipal solid waste management market, e-waste market and bio-medical waste in the future are expected to grow at CAGR of 7.14 per cent, 10.03 per cent and 8.14 per cent respectively. Due to the economic development which has taken place in India ,it results into environmental pollution and waste generation as well as leads to biomedical waste generation in the country. Biomedical waste has become a major issue in many parts of the country. This paper focuses on the various practices which are adapted to control the waste generation in the country. This paper aims to create an awareness between the masses.**

Keywords-- Biomedical waste, health care waste India, WHO

I. INTRODUCTION

An unavoidable consequence of development and industrial progress is generation of waste. Therefore, efficient ernational concern and countries waste management is a matter of inthave set up robust regulatory waste management practices for balancing the objectives of development and environment sustainability. Due to the rapid urbanization and growth in the industries bio medical waste management has become one of the major concern. In today's era as we know that where countries are developing at a rapid rate a lot of unwanted waste is being generated like electronics, plastics and many biodegradable products. There is need of a system which shall be able in keeping the environment clean.

II. BIO MEDICAL WASTE

The main source of biomedical waste in India are from Hospitals , clinics, research and healthcare centres that majorly dissipate antibiotic, radioactive substances, chemicals. In India out of the total amount of Municipal waste that a city generates only 1 to 1.5% is bio medical waste .Out of this 10-15% is considered to be infectious. Whereas in case of developed countries the waste which is produced is 5.24 Kgs per bed per day. Countries like United Kingdom , Norway, Spain, France,

USA, Netherlands waste produced by each of them is 3.3 kgs, 3.9 kgs, 4.4 kgs, 4.5kgs, 4.2 kgs per bed per day respectively. Developed countries have a higher ratio of waste generation as compared to a developing contry like India. Most of the hospitals in India generate about 1-2 kgs per bed per day except the tertiary care hospitals that generates large amount of waste.

As per World Health Organization (WHO),out of the total bio medical waste generated around the globe almost 85% are considered as non hazardous and only 10% are considered as infectious while the remaining 5% are considered as non hazardous but contain hazardous chemicals. The problem related to biomedical waste is its disposal. The disposal of biomedical waste can be very hazardous when it gets combined with the municipal waste. The dumping of this waste on illegal land such as neighbouring residential areas and slums has become a major glitch nowadays. Due to such disposal hazardous diseases like AIDS, Plague, Cholera, Hapatitis have been spreading like wild fire.

Proper management of the bio medical waste can reduce the overall effect on environment. A major downfall in the waste generation can be observed if the waste is segregated at the time of its generation as hazardous and non hazardous as well as reusable and not reusable. There is a four step process tp handle the waste which is generated.(1) Segregation of the waste.(2) Transportation to waste treatment and disposal sites.(3) Treatment.(4) Final Disposal. According to Rao, Ranyal and Sharm(2004) the key to minimize the waste generated is proper segregation and identification of the waste generated[3]. The most effective way of identifying the various medical waste is to sort the waste into colour coded plastic bags or containers. If the waste is segregated at the vehicles to come and collect the waste that is generated. The treatment of medical waste can be done by various techniques such as incineration, Autoclave Hydroclave or microwave.

III. DIFFERENT TYPES OF BIO MEDICAL WASTE

Infectious, Pathological Waste, Sharps, Pharmaceutical Waste, Genotoxic Waste, Chemical Waste, Wastes with high content of heavy metals, Pressurized containers and radioactive waste.This categorization is given by WHO. Whereas in case of India The Ministry of Environment and forest has provided with 10 Categories of Bio Medical WasteThere are various sources of Bio Medical waste which can be majorly categorized in to Primary and Secondary Source.

Fig: 1Biomedical Waste

IV. DANGER FROM BIOMEDICAL WASTE

There is a need of a major change in the rules and regulations of the biomedical waste management system of India. This is the main reason due to which biomedical waste cannot be erased from the country. Not only the doctors but the people who tend to work in the hospitals as well as patients and people visiting the hospitals are exposed routinely to Bio-Medical Waste so they are more prone to infections because of the lack of management techniques [1]. Since the biomedical waste is not discriminated properly it gets mixed with the solid waste which leads to many infectious diseases. The most risky stage is when the monsoon strikes due to which the hazardous substances gets mixed with the ground water that can cause serious health issues to the people since water is one of the basic needs of survival.

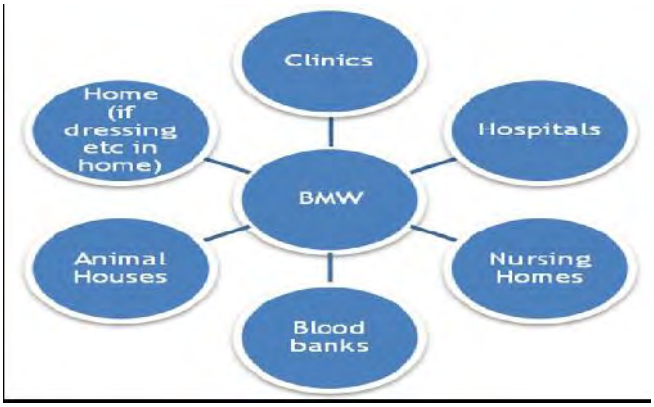

Fig :3 Biomedical Waste

V. CONCLUSION

After doing a detailed study of the bio medical waste generated in India we can say that it has become a major issue of concern. Although Government of India has stated some rules and regulations for the proper disposal of biomedical waste but implementation of the same needs to be carefully monitored.

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GeoThermal Energy Technology Literature Review

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***Abstract*— Although it is importance to released long back in other countries, its exploitation is still far away in our country mostly due to less knowledge on the deep subsurface structure and deep drilling technology in high pressures, high temperature regions. Geological Survey of India and National Geophysical Research Institute have made concerting efforts in identifying these resources in different parts of our country for possible exploitation of the energy source. In the present paper, the details of geothermal energy, it is importance and usage in other countries are discussing with estimating potential in our country.**

***Keywords*— geothermal energy, geothermal fields, electricity generation, power generation, power plant, renewable energy**

I. INTRODUCTION

Heat may be a sort of energy and heat is, literally, the warmth contained within Earth that generate geological phenomena on a planetary scale. 'Geothermal energy' is usually used nowadays, however, to point that a part of the Earth's heat that can, or could, be recovered and exploited by man, and it's during this sense that we'll use the term from now on. The presence of volcanoes, hot springs, and thermal phenomena must have led our ancestors to surmise that parts of the inside of the world were hot. The first measurements by thermometer were probably performed in 1740 by De Gensanne, during a mine near Belfort, in France (Buffon, 1778). By 1870, modern scientific methods were getting used to review the thermal regime of the world (Bullard, 1965), but it was not until the 20th century, and therefore the discovery of the role played by radiogenic heat, that we could fully comprehend such phenomena as heat balance and therefore the Earth's thermal history. Modern thermal models of the world in actual fact, must take into the account the warmth generated by the decay of the long-lived radioactive isotopes of uranium, thorium and potassium (K40), which are present within the Earth (Lubimova, 1968). Added to radiogenic heat, in uncertain proportions, are other potential sources of warmth like the primordial energy of planetary accretion. Realistic theories on these models weren't available until the 1980s, when it had been demonstrated that there was no equilibrium between the radiogenic heat generated within the Earth's interior and therefore the heat dissipated into space from the world, and that our planet is slowly cooling down. To give some idea of the phenomenon involved and its scale, we'll cite a heat balance from Stacey and Loper (1988), in which the entire flow of warmth from the world is estimated at 42 x 1012 W (conduction, convection and radiation). Of this figure, 8 x 1012 W come from the crust, which represents only 2% of the entire volume of the world but is rich in radioactive isotopes, 32.3 x 1012 W come from the mantle, which represents 82% of the entire volume of the Earth, and 1.7 x 1012 W come from the core, which accounts for 16% of the entire volume and contains no radioactive isotopes. Since the radiogenic heat of the mantle is estimated at the 22 x 1012 W, the cooling rate of this a part of the world is 10.3 x 1012 W. In more recent estimates, supported a greater number of knowledge's, the entire flow of warmth from the world is about 6 percent above the figure utilized by Stacey and Loper in 1988. Even so, the cooling process remains very slow. The temperature of the mantle has decreased no quite 300 to 350 °C in three billion years, remaining at about 4000 °C at its base. It has been estimated that the entire total heat of the world, reckoned above an assumed average surface temperature of 15 °C, is of the order of 12.6 x 1024 MJ, which of the crust is of the order of 5.4 x 1021 MJ (Armstead, 1983). The thermal energy of the world is therefore immense, but only a fraction might be utilized by mankind. So far, our utilization of this energy has been shorted to areas during which geological conditions permit a carrier to 'transfer' the warmth from deep hot zones to or near the surface, thus giving rise to geothermal resources; innovative techniques within the near future, however, may offer new perspectives during this sector [1].

The sustainable development is facing three critical problems: a rapidly growing world population, energy shortage, and ever Sin creasing environmental pollution. At present, many countries around the world are engaging in research on new energy, especially on renewable energy, in order to gradually reduce their nation's dependence on traditional fossil fuels. It is reported that electricity generation from renewable is predicted to triple between 2010 and 2035, reaching 31% of total generation. The variations of total primary energy and renewable energy consumption are shown in which shows a noticeable increase in electricity generation from renewable since 2003. The proportions of power generation from renewable to the total electricity generation using different energy source and the total power generation only using renewable are shown in respectively. Obviously, the power generated from heat is simply 0.3% of the entire power generation and 1.5% of the power generated from renewable [2]. Early humans likely used geothermal water that occur in

natural pools and hot springs for prepared, bathing and to stay warm. We have archeological proof that the Indians of the Americas inhabited on every side these geothermal resources for over 10,000 years to recover from battle and take refuge. Many of their oral legends described that places and other volcanic phenomena. Recorded history shows uses by the Romans, Japanese, Turks, Icelanders, Central Europeans and the Maori of New Zealand for bathing, cooking and space heating. Baths in the Roman Empire, the center kingdom of the Chinese, and there or the Turkish baths of the Ottomans were a number of the first uses of balneology; where body health, hygiene and discussions were the social customs of the day. This custom has been expanded to geothermal spas in Japan, Germany, Iceland, and countries of the former Austro-Hungarian Empire, the Americas and New Zealand. In the early days of commercial applications included the chemical extraction from the natural manifestations of the steam, pools and the mineral deposits inside the Larderello region of Italy, with boric acid being extracted commercially starting in the early 1800s. At Chaudes Aigues in the France, the world's first geothermal district heating system was started in the 14th century and is still going strong. The oldest geothermal district heating project within thus is on Warm Springs Avenue in Boise, Idaho, going on line in 1892 and continues to supply space heating for up to 450 homes [3].

Geothermal is energy generated from heat stored within the earth, or the gathering of absorbed heat derived from underground. Amounts of thermal energy are generated and store in the Earth's core, mantle and crust. Geothermal energy is at present contributing about 10,000 MW over the planet and India's small resources can augment the above percentage. Studies administered by the geological survey of India have observed existence of about 340 hot springs within the hot country. These are distributed in seven geothermal provinces. The provinces, although found along the west coast in Gujarat and Rajasthan and along west south west-east-northeast line running from the west coast to the western border of Bangladesh (known as SONATA), are most prolific during a 1500 km stretch of the Himalayas. The resource is small used at the instant but the government has an ambitious decide to quite double the present total installed generating capacity by 2012 [4].

II. USE AND TYPES OF GEOTHERMAL RESOURCES

A. Use of geothermal energy

Some applications of geothermal energy use the earth's temperatures near the surface, while others require drilling miles into the earth. There are three main types of geothermal energy systems:

- Direct use and district heating systems
- Electricity generation power plants
- Geothermal heat pumps

1. Direct use and district heating systems: Direct use and district heating systems use hot water from springs or reservoirs located near the surface of the earth. Ancient Roman, Chinese, and Native American cultures used hot mineral springs for bathing, cooking, and heating. Today, many hot springs are still used for bathing, and many people believe the hot, mineral-rich waters have natural healing powers.

Geothermal energy is also used to heat buildings through district heating systems. Hot water near the earth's surface is piped directly into buildings for heat. A district heating system provides heat for most of the buildings in Reykjavik, Iceland.

Industrial applications of geothermal energy include food dehydration, gold mining, and milk pasteurizing. Dehydration, or the drying of vegetable and fruit products, is the most common industrial use of geothermal energy.

2. Geothermal electricity generation: Geothermal electricity generation requires water or steam at high temperatures (300° to 700°F). Geothermal power plants are generally built where geothermal reservoirs are located, within a mile or two of the earth's surface.

The United States leads the world in the amount of electricity generated with geothermal energy. In 2018, there were geothermal power plants in seven states, which produced about 16.7 billion kilo watt hours (kWh), equal to 0.4% of total U.S. utility-scale electricity generation.

TABLE I. STETES WITH GEO THERMAL POWER PLANTS IN 2018

State	**State share of total U.S. geothermal electricity generation**	**Geothermal share of total state electricity generation**
California	71.9%	6.1%
Nevada	21.7%	9.1%
Utah	2.8%	1.2%
Hawaii	1.9%	3.2%
Oregon	1.1%	0.3%
Idaho	0.5%	0.5%
New Mexico	0.1%	< 0.1%

In 2016, about 23 countries, including the us, generated a complete of about 77 billion kWh of electricity from heat. The Philippines was the second-largest geothermal electricity producer after the US, at about 11 billion kWh of electricity, which equaled approximately 13% of the Philippines' total electricity generation. Kenya was the eighth-largest producer of electricity from heat at about 4.2 billion kWh, but it had the most important send of its total electricity generation from heat at about 44%.

3. Geothermal heat pumps: Geothermal heat pumps use the constant temperatures near the surface of the earth to heat and cool buildings. Geothermalheat pumps move heat from the ground (or water) into buildings during the winter and reverse the operation in the summer.

B. Geothermal Resource Types

Geothermal energy come from natural peer groups of heat basically due to the spoil of natural occurs radioactive isotopes of uranium, thorium and potassium in the earth. Because of the internal heat generation, the Earth's surface heat flow averages 82 MW/m which amounts to a total heat loss 42 million megawatts. The estimated total thermal energy above mean surface temperature to a depth of 10 km is 1.3 x 1027 J, identical to burning 3.0 x 1017 barrels ofoil. Since the global energy utilization for all types of energy, is equivalent to use of 100 million barrels of oil per day, the Earth's energy to a depth of 10 kilometers can theoretically supply all of mankind's energy needs for six million years(Wright,1998). On average, the temperature of the Earth increases about 30˚C/km above the mean surface climate, temperature. Thus, assuming a conductive gradient, the temperature of the earth at 10 kilometers would be over 300˚C.However, most geothermal exploration and use occurs where the gradient is higher, and thus where drilling is simplistic and less expensive. These shallow depth geothermal resources happen due to intrusion of molten rock (magma) from profundity bring up greatest quantity of heat; highest surface heat flow, due to thin crust and high temperature slope as cent of groundwater that has circulated to depths of several kilometers and been heated due to the normal temperature gradient thermal blanketing or insulation of deep rocks by thick formation of such rocks as clay. whose thermal conductivity is low; and. anomalous heating of shallow rock by spoil of radioactive elements, perhaps augmented by thermal blanketing(Wright, 1998). Geothermal resources are usually classified as shown in down table 1, modeled after White and Williams(1975). These geothermal resources range from the mean yearly ambient temperature of around 20˚C to over 300˚C. In general, resources 150˚C arouse for electric power peer group, although power has lately been generated at Chena Hot Springs Resort in Alaska using a 74˚C geothermal resource (Lund, 2006). Resources below 150˚C are generally used in direct use projects for heating and cooling. temperature in the 5 to 30˚C range is be used with geothermal (ground-source) heat pumps to provide both heating and cooling [5].

TABLE II. GEOTHERMAL RESOURCE TYPES

Resource Type	Temperature Range (˚C)
Convective hydrothermal resources	
Vapor dominated	240˚
Hot-water dominated	20 to 350˚+
Other hydrothermal resources	
Sedimentary basin	20 to 150˚
Geopressured	90 to 200˚
Radiogenic	30 to 150˚
Hot rock resources	
Solidified (hot dry rock)	90 to 650˚
Part still molten (magma)	>600˚

Convective hydrothermal resources occur where the Earth's heat is carried upward by convective movement of naturally occurring hot water or steam. Some high temperature convective hydrothermal resources result from extending far down circulation of water along fractures..

Vapor dominated systems (Fig. 1) produce fume from boiling of deep, saline waters in low permeability rocks. These reservoirs are few in number, with The Geysers in northern California, Larderello in Italy and Matsukawa in Japan being ones where the fume is utilize to supply electric energy [6].

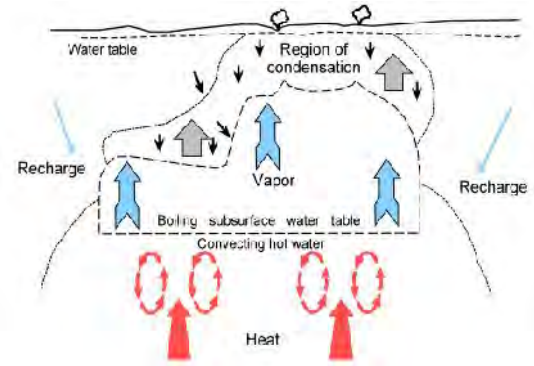

Fig. 1. Vapor dominated geothermal system. (White, etal., 1971)

Water dominated systems (Fig.2) are generate by ground water circulating to depth and climb from floatability in permeable reservoirs that area uniform temperature over large volumes. There is typically an up flow zone at the center of each convection cell, an out flow zone or plume of heated water moving laterally away from the center of the system, and a down flow zone where charge is happening . Surface manifestations include hot springs, fumaroles, geysers, travertine deposits, chemically altered rocks.

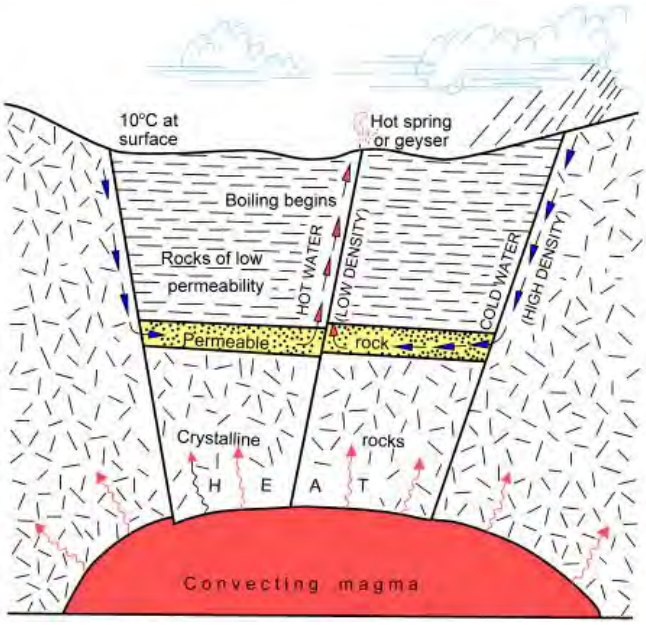

Fig. 2. Hot water dominated geothermal system. (White,etal., 1971)

Sedimentary basins (Fig. 3) generate higher temperature resources than the neighboring formations due to their low thermal conductivity or high heat flow or both generating geothermal gradients >30˚C/km. These usefully extend over large areas and are typical of the Madison Formation of North Dakota, South Dakota, Montana and Wyoming area ofthe northern United States and the Pannonia Basin of central Europe where it has been used extensively in Hungary [7].

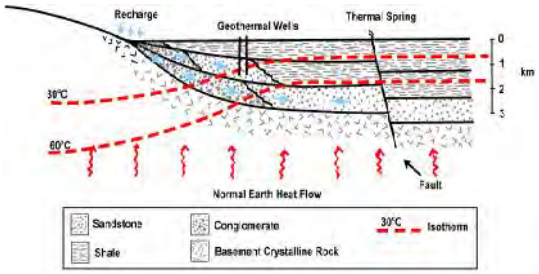

Fig. 3. Sedimentary basin geothermal resource. (Anderson & Lund, 1979)

Geo pressured resources (Fig. 4) occur in basin the earth where deeply cover fluids accommodate in permeable sedimentary rocks are warmed during a normal or enhanced geothermal gradient by their great burial depth. The fluids are tightly confined by nearby impermeable rock and bear pressure much greater than hydrostatic. Thermal waters under high in tightly confined by nearby impermeable rock and bear pressure much greater than hydrostatic. Thermal waters under high in sand aquifers are the target for drilling, mainly as they contain dissolved methane. The source of energy available from this sort of resource consists of: (1) heat; (2) mechanical energy; and, (3) methane. The Texas and Louisiana Gulf Coast within thus has been tested for the geothermal energy; however, thanks to the good depths of several kilometers, they need not proved economic [8].

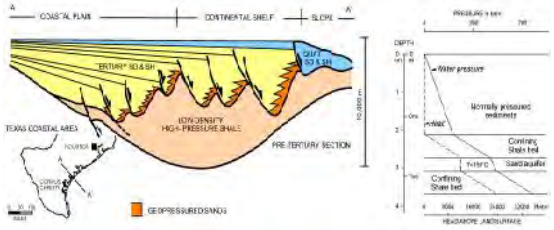

Fig. 4. Geopressured geothermal system. (Bebout, et al., 1978)

Radiogenic resources (Fig.5) are found where granitic intrusions are pass of surface heating up the local groundwater from the decay of radioactive thorium, potassium and uranium. This localized heating increases the traditional geothermal gradient providing predicament at economical drilling depths. This type of resource occurs along the eastern United States, but has not been developed commercially.

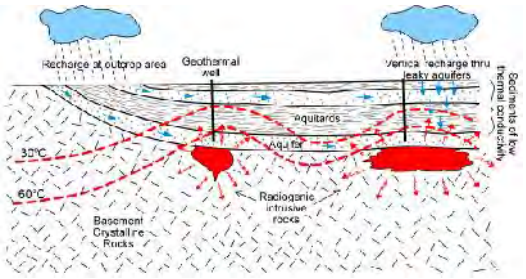

Fig. 5. Radiogenic geothermal system. (Anderson &Lund, 1979)

Hot dry rock resources (Fig. 6a & b) are defined as heat stored in rocks within about 10 km of the surface from which energy can't be economically extracted by natural predicament or steam. These hot rocks have few pore space, or fractures, and thus, contain little water and tiny or no interconnected permeability. In order to take out the warmth , experimental projects have artificially fractured the rock by hydraulic pressure, followed by circulating cold water down one well to extract the warmth from the rocks then producing from a second well during a closed system. Early experimental projects were undertaken at Fenton Hill (Valdes Caldera) in northern New Mexico and on Cornwall in southwest England; however both of those projects are abandoned due to lack of funds and poor results. Projects are currently underway in Soultz-sous-Forêt in the Rhine Graben on the French-German border, in Switzerland at Basil and Zurich, in Germany at poor Urach, several locations in Japan, and in the Cooper Basin of Australia (Tenzer, 2001).

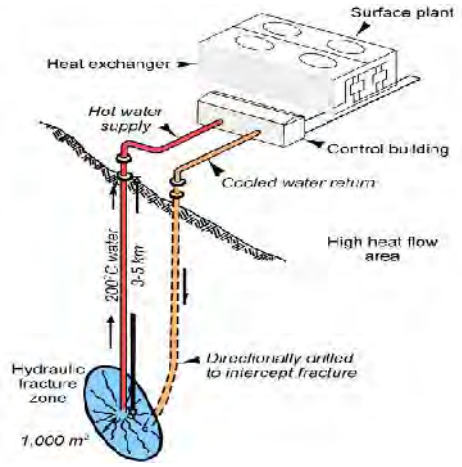

Fig. 6. (a) Hot dry rock exploitation.

Molten rock or magma resources are drilled in Hawaii experimentally to extract heat directly from molten rock. It has been used successfully at Heimaey in the Iceland (one of the Westmann Islands) after the 1973 eruption. A device constructed on the surface of the lava flow recovered steam resulting from boiling of downward percolation water from the surface. The heat was used in a space heating system for over 10 years; but, is now shutdown due to cooling of the surrounding rock [9].

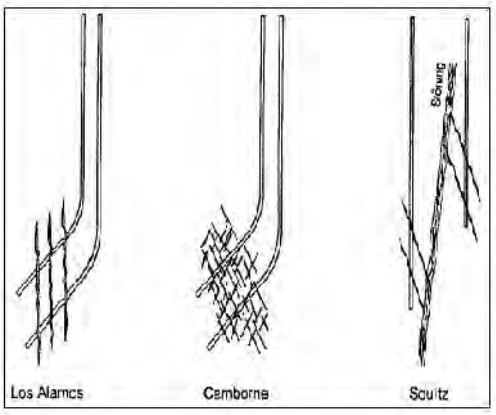

Fig. 7. (6 b) Examples of hydraulic fracturing. (Tenzer, 2001)

III. Literature Review

Although, AI solutions may have a huge impact in the educational system in the future, it may have many challenges. To Perez (2016), AI solutions can do all tasks automatically. The current paper does show a few evidences of applying AI technologies for enhancing teaching and learning. However, we do have some limitations; AI cannot replace a teacher, completely. Applying AI technology in education system comes with its own opportunities and risks. This issue needs both attention and analysis from the point of view of academics. The motive for AI is like a panacea in higher learning and leaves those who are in the path under the wheels of reality. However, an important issue in education is maintaining academic skepticism. Generally speaking, we need to consider this aim to nurture responsible citizens and educated minds.

Geothermal, solar and wind are all clean, renewable energies with an enormous amount of resources and an excellent potential of electricity generation. Geothermal energy has dominated the renewable energy market in terms of the install electricity power about 30 years ago. The unfortunate fact is that the entire installed capacity of geothermal electricity has been eclipsed by solar and wind in recent years. In this paper, strong point of using renewable energy resources are summarize and attempt has made to elucidate the recent trends causing the shift from heat to solar and wind. Cost, time, size of power generation, construction time, resource capacity is match geothermal, solar, and wind generation systems. Furthermore, historical data from geothermal, solar, and wind industries were collected and analyzed at the worldwide scale. The data from hydro-power were also considered within the comparison. We propose suggestions for the geothermal industry to catch up with solar and wind industries [10].

The use of heat and its associated technologies has been increasing worldwide. However, there has been little paradigmatic research conducted in this area. This paper proposes a structured methodology to research the development trends for the long-lasting development of geothermal energy. A novel data analysis system was created to research the heat utilization trends, and technological paradigm theory was acquired to elucidate the technological change. A diffusion velocity model was wont to simulate and forecast the geothermal power generation development within the diffusion phase. Simulation results showed that the event of installed capacity for geothermal generation had a robust inertia force alongside the S-curve. Power generation from geothermal power source reached peak in 2008 and is estimated to be saturated by 2030. Geothermal energy technologies in hybrid power systems supported other renewable energy sources look to be brighter within the future [11].

A. How Geothermal Energy Works

There isnatural source of power originate beneath the surface of the earth that has been around for centuries. below the ground, far below us, there are pools of water heated by magma (or molten rocks). These pools of water make up our geothermal reservoirs. Harnessing the power of the earth's temperatures to power, heat or cool our homes and businesses is the essence of geothermal power.

There are currently geothermal plants in above 80 countries as stated by the Geothermal Energy Association and although the United States is currently the global leader of geothermal power, other countries like Indonesia, Turkey and Kenya are all in the process of enlarge their power capacities as well.

The first geothermal plant in the United States was built by Pacific Gas and Electric in 1960 at an area called The Geysers. Located in the Mayacamas Mountains north of San Francisco, California is the world's largest geothermal field. It is now home to 22 geothermal power plants, known as The Geysers Complex, and is considered the largest geothermal plant in the world. Geothermal power does not need theas The Geysers Complex, and is considered the largest geothermal plant in the world.

Geothermal power does not need the burning of any fossil fuels. The hot water or steam used is go back to the ground after it is used where it can be used again, which makes it a renewable energy source as well..

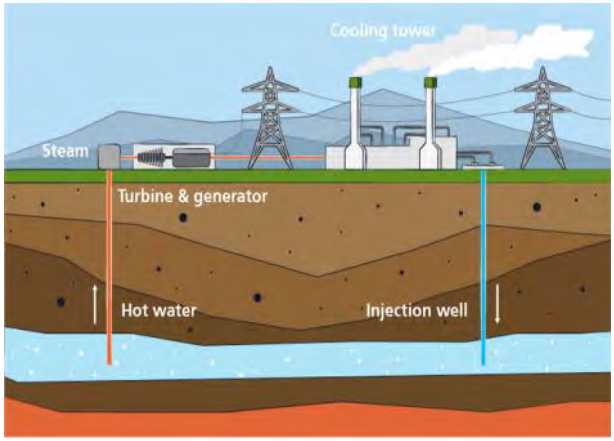

Fig. 8. Geothermal Power Plants

A. *Geothermal Power Plants*

There are three types of geothermal energy plants that generate power in slightly different ways.

Dry steam plants are the most common types of geothermal power plants, accounting for about half of the installed geothermal plants. They work by piping hot water vapor from underground lake directly into turbines from geothermal lake, which power the generators to provide electricity. After powering the turbines, the vapor condenses into water and is piped back into the earth across the injection well.

Flash steam plants differ from dry steam because they pump hot water, rather than steam, directly to the surface. These flash steam plants pump hot water at a high pressure from below the earth into a "flash tank" on the surface.

The flash tank is at a much lower temperature, causing the fluid to quickly "flash" into steam. The steam produced powers the turbines. The steam is cooled and condenses into water, where it is pumped back into the ground through the injection well.

In these binary cycle plants, the main difference is that the water or steam from below the earth never comes in direct contact with the turbines. Instead, water from geothermal reservoirs is pumped through a heat exchanger where it heats a second liquid—like isobutene (which boils at a lower temperature than water.)

This second liquid is heated into steam, which powers the turbines that drives a generator. The hot water from the earth is recycled into the earth through the injection well, and the second liquid is recycled through the turbine and back into the heat exchanger where it can be used again.

Fig. 9. Geothermal Power Plants

B. *Geothermal Heat Pumps*

Powering your home with a geothermal heat pump allows you to harness the temperatures below the surface of the earth to heat or cool a structure. Even though the temperatures aboveground fluctuate during the seasons throughout the years, the temperature below the surface remains consistent between50˚F - 60˚F year-round.

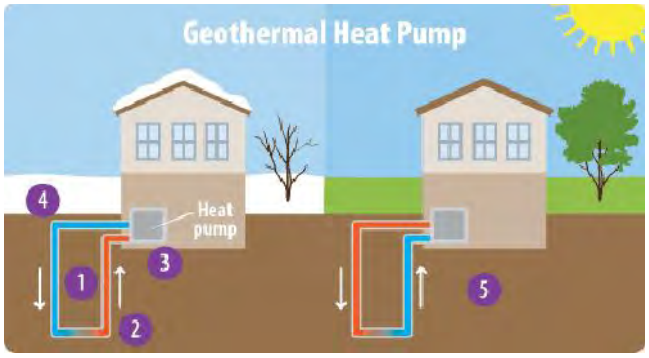

Fig. 10. Geothermal Heat Pumps

There are four types of pumps, three closed-loop systems and open-loop systems. Each depends on the type of soil, climate conditions and land obtainable.

Closed loop horizontal systems are the most cost-effective for residential areas. For larger commercial buildings, closed loop vertical systems are more often used. These can sometimes go down 400 feet deep. Closed loops constructed under or in a pond or lake are usually the cheapest.

In closed loop systems, a water/antifreeze mixture circulates through a loop of pipes underground (or beneath a body of water) and into a building. In the winter (as shown above), the temperatures underground is warmer than the air, so the fluid pumping in is warmer. Then the electric compressors and heat exchangers transfer the heat through ducts in the building.

In the summer, the pipes draw heat away from the building and it is absorbed into the earth or water. Since the fluid is already cool in the summer and warmer than the air in the winter, the heater/AC system doesn't have to work nearly as hard.

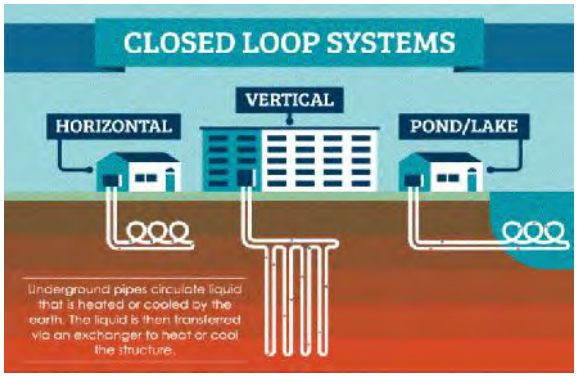

Fig. 11. closed loop systems

In open loop systems, the water is taken directly from a water source and into the heat pump where it then can either be recycled back into the same source or pumped into another water source (without polluting). The only difference with the water going in and out is a slight change in temperature. Although these can be cheaper, they also require a steady flow of water capable of powering your home.

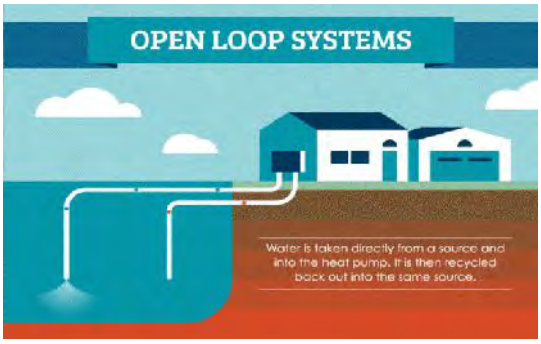

Fig. 12. open loop systems

These four types of geothermal heat pumps can be used all over the country due to the constant temperature below the surface, but they vary in efficiency and cost savings.

One of the big advancements for the future of geothermal energy is called an Enhanced Geothermal System (EGS). Traditionally, geothermal power must be taken where geothermal reservoirs exist, which is mainly in the Western United States. In fact, geothermal energy already provides around 60% of the power along the Northern California coast, according to the U.S. Department of Energy. So, EGS creates engineered geothermal reservoirs by pumping cold water thousands of feet underground to gain access to hot water and produce steam needed to power plants on the surface.

Sincegeothermal energy is a renewable natural resource, think of it like a gift from the earth that keeps giving. Although over time it is often necessary to drill additional wells to maintain levels of energy production, the earth is constantly giving off heat that was generated when our planet was formed billions of years ago. Next time you see a geyser like Old Faithful in Yellowstone National Park firing hot steam and water high into the air, imagine that same power being used to generate electricity..

IV. Conclusion

Geothermal growth and development of electricity generation has increased significantly over the past 30 years approaching 15% annually within the early a part of this era , and dropping to three annually in the last ten years thanks to an economic hamper within the Far East and therefore the low price of competing fuels. Direct-use has remained fairly steady over the 30-year period at 10% growth yearly. The majority of the rise has been thanks to geothermal heat pumps. At the beginning of this 30-year period, only ten countries reported electrical production and/or direct utilization from heat .By the top of this era , 72 countries reported utilizing heat . This is over a seven-fold increase in participating countries. At least another 10 countries are actively exploring for geothermal resources and will be online by 2010.

Development within the future will include greater emphases on combined heat and power plants, especially those using lower temperature fluids down to 100˚C. This low-temperature cascaded use will develop the economics and efficiency of these systems, such as shown by installations in Germany, Austria and at Chena Hot Springs, Alaska. Also, there's increased interest in agriculture crop drying and refrigeration in tropical climates to preserve products which may normally be wasted. Finally, the most important growth will include the installation and use of geothermal heat pumps, as they will be wasted. Finally, the most important growth will include the installation and use of geothermal heat pumps, as they will be used anywhere within the world, as shown by the massive developments in Switzerland, Sweden, Austria, Germany, Canada, and the United States [12].

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Diet Pills & Supplements: A Health Review

Guided by Prof. Mira Gohil

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***Abstract*— About 35% of healthy weight adolescent females describe themselves as overweight, and 66% report planning to lose weight. Body weight dissatisfaction is associated with unhealthy weight loss practices including diet pill/powder/liquid (PPL) use. Few studies have examined diet PPL use in healthy weight adolescent females; therefore, Youth Risk Behavior Survey data (n ¼ 247) were analyzed to identify predictors of use. Descriptive statistics and logistic regression analyses were conducted using Statistical Package for the Social Sciences Complex Samples software. Social cognitive theory served as the framework guiding the analysis. Approximately 8% of healthy weight females reported using diet PPL for weight loss. Describing self as overweight, planning to lose weight, being offered drugs at school, fasting to lose weight, cigarette/alcohol use, vomiting, and laxative use were significantly associated (p < .05) with diet PPL use. Health professionals, including school nurses, must assess for unhealthy weight loss practices in healthy weight females, in order to adequately address related issues.**

Keywords*— *data pills

I. INTRODUCTION

For individuals with a strong desire to lose or maintain their weight, diet supplements may seem like a magical solution. The manufacturers of these products make extravagant promises about the properties of their drugs, but most of these claims are not backed up by clinical research. In fact, the drugs that promise to help you shed pounds or burn fat may hold hidden dangers to your health. In spite of the risks of using diet supplements, the demand for these products continues to rise, especially among individuals with eating disorders.

Up to 50% of those who meet the criteria for an eating disorder use over-the-counter diet pills, herbal supplements, or prescription drugs to lose weight, according to Eating Behaviours. Unless you're using weight-loss drugs for legitimate medical reasons under a doctor's supervision, you may be putting yourself in harm's way by using these products.

II. WHAT EXACTLY ARE DIET SUPPLEMENTS?

A diet supplement is any product that you take orally that adds to the content of your ordinary diet. Not all supplements are intended to promote weight loss; a supplement may provide valuable nutritional replacement for consumers who don't get enough of a specific ingredient in their daily meals. A dietary supplement may contain:

- Vitamins
- Minerals
- Amino acids (Building blocks of protein)
- Enzymes
- Botanical products/herbs
- Glandular extracts
- Organ products

People take diet supplements for many different reasons: to lose or gain weight, to restore lost nutrients, to build muscle tissue, to support physical functions like eyesight, to improve sleep, or to boost energy.

Just because a diet pill or supplement is sold in attractive packaging at a local drugstore or through an online vendor doesn't mean that it's safe. Many consumers aren't aware that products marketed as diet supplements aren't subject to regulation by the U.S. Food and Drug Administration (FDA) unless the product contains a new ingredient. According to the Dietary Supplement and Health Education Act (DSHEA) of 1994, it's the manufacturer's responsibility to prove that a supplement is safe, and not all manufacturers comply with this requirement. Many manufacturers have been accused of making false claims about their products, adding pharmaceutical ingredients to their supplements or producing their supplements under unsafe circumstances.

III. WHY ARE WEIGHT LOSS PILL DANGEROUS?

Many diet supplements are harmless, and some may even be effective at creating a sense of fullness, burning fat, or boosting your metabolism. But some of the popular ingredients in weight loss products have been banned by the FDA because of harmful side effects like these:

- Increased heart rate
- High blood pressure
- Agitation
- Diarrhea
- Sleeplessness
- Kidney problems
- Liver damage
- Rectal bleeding

A. Ephedra – Banned

Once widely sold as an ingredient in diet supplements, the Chinese herbal stimulant ephedra was banned in 2004 because of evidence that its use could increase the risk of a heart attack or stroke. In 2005, a lower court ruled that ephedra could be

used in small doses. In 2006, a federal appeals court reinstated the FDA's original ban, ruling that ephedra was too dangerous to be used as a supplement at any dose.

B. Hydroxycut – Recalled and Banned

Some weight loss products can cause severe damage to your kidneys, liver, and other vital organs. Hydroxycut products were banned and recalled in 2009 because of reports of serious adverse reactions, including hepatitis and jaundice. One person who took these fat-burning supplements died; another required a liver transplant.

C. Fen-Phen – Recalled

Fenfluramine, one of the two active ingredients in the off-label diet drug Fen-Phen, was recalled in the late 1990s after the drug was linked to cases of heart damage and lung disease. Phentermine, the other primary ingredient in Fen-Phen, is still prescribed in certain cases for weight loss, but should be used only with a doctor's prescription.

D. Meridia – Withdrawn from the Market

Sibutramine, a prescription drug sold as Meridia, was withdrawn from the market in 2010 after a clinical study indicated that the drug could increase the risk of heart attack or stroke. According to the National Institutes of Health, sibutramine was originally prescribed as a long-term appetite suppressant and weight management solution. The manufacturer voluntarily stopped production after Meridia was associated with evidence of cardiovascular damage.

IV. HOW DO YOU KNOW WHAT YOU'RE TAKING?

One of the biggest risks of taking over-the-counter diet supplements is that you can't always be certain about the ingredients that a product contains. Because the FDA does not test all weight loss products for safety, there's no guarantee that each ingredient in every supplement is safe. The FDA maintains a list of tainted weight-loss products so consumers can be aware of ones they should stay away from. Because the manufacturers did not list these ingredients on their product labels, consumers would have no way of knowing that they were ingesting products like these:

- **Sibutramine:** a weight-loss drug withdrawn because of its association with an increased risk of high blood pressure, heart attack and stroke
- **Rimonabant:** an appetite suppressant not approved for use in the US
- **Phenytoin:** an anti-seizure drug
- **Phenolphthalein:** an experimental drug that may cause cancer

The FDA issued a warning to consumers not to purchase supplements in its list of tainted products; however, this agency can't test every new product on the market. The best way to ensure your safety is to consult a healthcare professional before you take any weight loss supplement.

V. HOW ARE DIET PILLS ABUSED?

Someone with an eating disorder may not be concerned about the dangers of dietary supplements. They may be so preoccupied with losing weight that they don't care about the risks to their health. In an obsessive drive to lose weight, an individual with anorexia or bulimia is likely to abuse diet supplements in the following ways:

- Taking more than the recommended dose of a dietary supplement
- Taking diet products that aren't recommended for individuals who are at a normal weight or underweight
- Taking prescription weight loss medication without a doctor's supervision
- Combining multiple weight loss stimulants
- Combining diet pills with laxatives or diuretics
- Combining diet supplements with illegal stimulants like meth or cocaine

Taking an excessive dose of a diet supplement or combining supplements can be extremely hazardous. An overdose of stimulant products could raise your blood pressure to dangerously high levels, putting you at risk of a heart attack or stroke. Taking fat-blocking supplements along with laxatives or diuretics could cause diarrhea, fluid loss, and an electrolyte imbalance. Abusing products that hold a risk for liver or kidney damage only increases the possibility of life-threatening organ failure.

VI. CONCLUSION

The FDA recently approved the prescription medications Belviq (lorcarserin hydrochloride) and Qsymia (a combination of the previously approved drugs phentirmine and topiramate extended release) for weight control. Both drugs are approved for adults with a body mass index (BMI) of 30 or greater. Adults with a chronic, weight-related health condition such as high cholesterol or hypertension and a BMI of 27 or above may also qualify.

Many of the diet supplements you see in your local stores are generally recognized as safe for human consumption. But just because these drugs can be purchased without a prescription doesn't mean that you can use more than the recommended dosage safely, or combine them with other drugs without experiencing serious side effects. Because diet supplements are widely available at commercial outlets or online, people with eating disorders have easy access to these products and are likely to misuse them.

In some cases, a weight loss drug or diet supplement may be a useful part of an eating disorders rehab program. Binge

eating disorder, for instance, can leave patients overweight or morbidly obese. But in many cases, these products are being abused by teens or adults who have no medical need to lose weight. In such cases, the use of a diet pill is dangerous, even life-threatening. The focus of an eating disorders rehabilitation program is on supporting each client individually in his or her recovery goals. Whether that means gaining or losing weight is up to the treatment team, which may include a doctor, therapist, counselor and nutritionist. Unless diet pills are recommended by a medical professional, they are generally not part of a healthy recovery plan for eating disorders.

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Identification Of Land Covered Using LISS-III Sensor By Fuzzy Logic

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***Abstract*— The LISS-III is the multi- phantom camera working in four groups. The main reason behind accompanying the work is to apply calculation dependent on regulated characterization of systems to comprehend the land spread and land utilized region in Mumbai. Here we have used the IRS P6 LISS-III satellite picture of Mumbai locale is utilized to group the regions of Mumbai and Thane district. The classifier utilized is a Fuzzy Inference System and band pictures. The various regions of Mumbai locale are grouped, for example, zone secured by Mangroves, Forest, Water, and Developed Area. It is been seen that the accuracy of Fuzzy Inference system is 77.88%.**

Keywords— Image processing, fuzzy logic, Fuzzy Inference System

I. INTRODUCTION

Image classification is a unique among the most significant pieces of image analysis .Two essential methodologies are supervised and unsupervised learning. In two types, the process can be seen as one that determines the set that each pixel has. In the case of directed characterization, the sets are known beforehand but, due to the uncertain order, the sets are ambiguous. The majority of the investigations in order are carried out as a supervised. In the supervised strategies, a model is developed dependent on the cluster known occurrences and will recognize new articles. There is a bottleneck in the supervised group that they tend to focus less on suspicious symptoms because the preparation set covers only a few occasions. Additionally, the preparation dataset created are helpful just when the pictures are concurrent, or for the pictures choose under a similar condition with similar classes[10].

But the fact is that actual land and land utilize are regularly used to the contrary, their real implications are very. Land utilized mapping is different and is the most significant and run of the mill uses of remote detecting information.

Land utilized refers to the surface that extends over the land, whether it is vegetation, urban foundations, water, open soil, or others. Identifying, designing and mapping land cover is important for arranging examinations, assets, boards and exercises around the world. Recognizable proof of land cover sets up the benchmark from which checking exercises can be performed, and gives the ground spread data to gauge topical maps. Land use implies the reason that land serves that is living space or agribusiness. Land-use applications include benchmark mapping and consequent checking because convenient data is required to realize what current amounts of land are in use and to isolate land-use changes from year to year[8].

II. FUZZY LOGIC

In the last few years fuzzy logic has been used for various domains and problems, but fuzzy logic is a fairly recent theory. The applications are widely used for process control, operational research, Management economics and decision making. For this paper we have used fuzzy inference system that formulates the mapping given by input to an output using it's technique, points which need to be taken care while implementing fuzzy interface member functions are fuzzy logic operators and if- then rules .We have used Mamdani-method to implement this technique, this is the most commonly used fuzzy method and it accepts the output membership function to be fuzzy, once the aggregation is processed, each output label requires fuzzy sets that require definition [1].

A. Fuzzyset

Fuzzy set is a concept of fuzzy logic. The fuzzy set is a set without a clearly defined boundary. It contains elements with partial values. Fuzzy logic is a form of multi-valued logic in which the true value of the variable inclusive (0 & 1) can be any real number between the two. Fuzzy logic is a way to understand processing dependent on "degree of truth" instead of standard thing "True or False"[2].

III. METHODOLOGY

It is the implementation of the proposed algorithm where we apply algorithm and test the data so, the proposed algorithm is implemented using MATLAB simulation toolbox. It classifies the image

based on its characteristics. Fuzzy inference systems are used to analyze data and show effects[4].

A. *Flowchart*

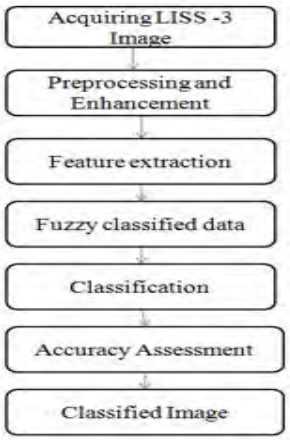

Fig 1: Work Flow

B. *Fuzzy classified data*

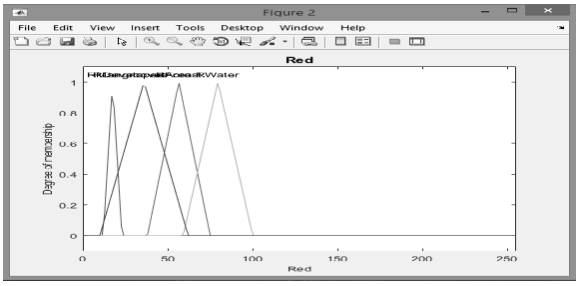

Fig 2 . Input Red for four membership function[3].

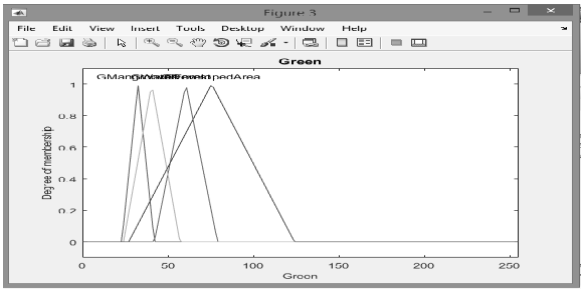

Fig 3.Input Green for four membership function[3].

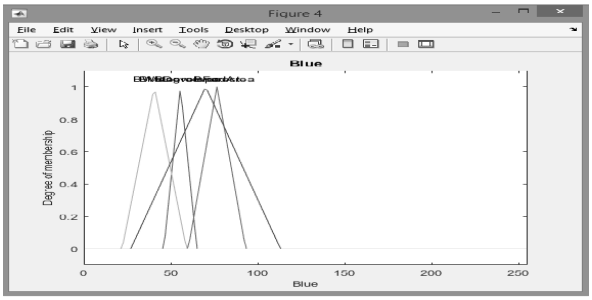

Fig 4. Input Blue for four membership function [3]

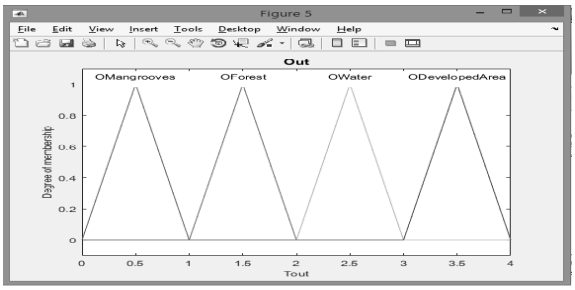

Fig 5.output for four different classes[3]

C. *Results and observation*

The confusion matrix is used to evaluate the quality of the output of a classifier on the training data set. It is basically used for the supervised classification of the data. It consists of information about classified versus misclassified data in supervised learning. The transverse elements of the confusion matrix describe correctly classified data whereas the non-diagonal elements are misclassified data[9]. The higher values of the confusion matrix indicates the correct predictions. So with the help of that, the accuracy of the classifier is easily calculated and it will help the algorithm designer to understand the importance and applicability of classifier for the specific data.

Accuracy of Fuzzy Inference System

Classes	Mangroves	Forest	Water	Developed area	Total	User Accuracy (%)
Mangroves	440	56	0	0	496	87.70%
Forest	108	119	17	3	247	48.18%
Water	0	2	250	80	332	75.30%
Developed area	0	6	2	156	164	95.12%
Total	548	183	269	239	965	
Producers Accuracy (%)	80.29%	65.02%	92.9%	65.27%		77.88%

Table 1. Confusion matrix of Mumbai region LISS-III by Fuzzy Inference System

Accuracy = (965/1239)*100 = 77.88%

The confusion matrix based accuracy assessment of LISS-III satellite image shows that the accuracy of classification using Fuzzy Logic Interface is 77.88% [5].

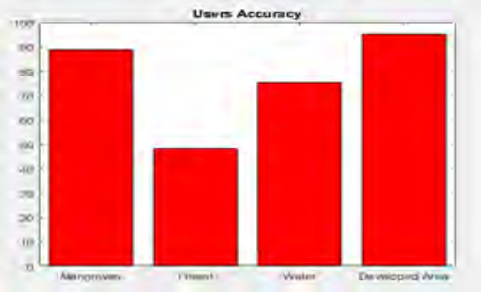

Fig. 6: Users accuracy

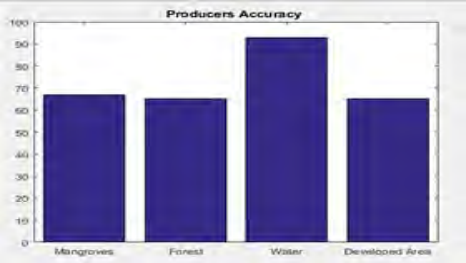

Fig. 7: Producers accuracy

D. *Unclassified and classified images*

Fig 8. False color image before classification[6]

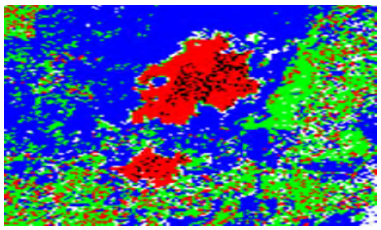

Fig 9. Colored image after classification[6]

Mangroves

Forest

Water

Developed area

IV. Conclusion

Satellite image-based classification of land use and land cover is a very wide field of study and research and so many people are researching in terms of efficient algorithms, performance, data handling, training or time making. So, in the same relation here, the fuzzy inference system method has been used to classify the LISS-III satellite image and the accuracy is calculated using the confusion matrix. The results show that the accuracy of the fuzzy inference system method is 77.88%. This study also shows that with increasing the size of the training set the classification accuracy increases but to a certain extent. Effective accuracy can also be achieved through increasing the number of training samples and giving a better image. Many training samples depend on the complexity of the study area. If the study area is simple and has well-defined crisp classes then fewer pixels can also give effective accuracy.

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Study of IoT in Healthcare

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***Abstract*—Internet of Things (IoT) technology has pulled in a lot of consideration lately for its capability to mitigate the strain on human services frameworks brought about by a maturing populace and an ascent in constant ailment. Institutionalization is a key issue restricting advancement around there, and therefore this paper proposes a standard model for application in future IoT social insurance frameworks. This review paper at that point introduces the best in class inquire about identifying with every region of the model, assessing their qualities, shortcomings, and by and large reasonableness for a wearable IoT social insurance framework. Difficulties that social insurance IoT faces including security, protection, wearability, and low-power activity are introduced, and suggestions are made for future research course**

I. INTRODUCTION

A medicinal service is a fundamental piece of life. Tragically, the relentlessly maturing populace and the related ascent in ceaseless disease is setting critical strain on present day medicinal services systems[1] , and the interest for assets from emergency clinic beds to specialists and attendants is amazingly high[2] . Clearly, an answer is required to decrease the weight on social insurance frameworks while proceeding to give great consideration to in danger patients. The Internet of Things (IoT) has been broadly recognized as a potential answer for mitigate the weights on medicinal services frameworks, and has therefore been the focal point of a lot of late research [3]-[7].

A. IoT For Everybody

1) IoT for Patients - Devices as wearables like wellness groups and other remotely associated gadgets like circulatory strain and pulse observing sleeves, glucometer and so forth give patients access to customized consideration. These gadgets can be tuned to remind carbohydrate content, practice check, arrangements, pulse varieties and considerably more.

IoT has completely changed people, particularly old patients, by empowering consistent following of wellbeing conditions. This majorly affects individuals living alone and their families. On any unsettling influence or changes in the normal exercises of an individual, ready component sends signs to relatives and concerned wellbeing suppliers.

2) IoT for Physicians - By utilizing wearables and other home checking hardware implanted with IoT, doctors can monitor patients' wellbeing all the more successfully. They can follow patients' adherence to treatment plans or any requirement for quick therapeutic consideration. IoT empowers medicinal services experts to be progressively attentive and interface with the patients proactively. Information gathered from IoT gadgets can assist doctors with distinguishing the best treatment process for patients and arrive at the normal results.

3) IoT for Hospitals - Apart from checking patients' wellbeing, there are numerous different territories where IoT gadgets are extremely helpful in medical clinics. IoT gadgets labeled with sensors are utilized for following continuous area of medicinal gear like wheelchairs, defibrillators, nebulizers, oxygen siphons and other observing hardware. Organization of restorative staff at various areas can likewise be dissected continuous. The spread of diseases is a significant worry for patients in emergency clinics. IoT-empowered cleanliness observing gadgets help in keeping patients from getting tainted. IoT gadgets likewise help in resource the board like drug store stock control, and ecological observing, for example, checking cooler temperature, and dampness and temperature control.

II. HEALTHCARE AND THE INTERNET OF THINGS

The Internet of Things stays a generally new field of research, and its latent capacity use for medicinal services is a zone still in its early stages. In this area, the Internet of Things is investigated and its appropriateness for human services is featured. A few spearheading moves in the direction of creating social insurance IoT frameworks are talked about. Expanding on the repetitive subjects from these works, a conventional and institutionalized model for future end-to end IoT human services frameworks is proposed, with the point of controlling the future advancement of such frameworks.

A. THE INTERNET OF THINGS

Numerous meanings of the Internet of Things exist, however at the most major level it tends to be depicted as a system of gadgets cooperating with one another through machine to

machine (M2M) correspondences, empowering assortment and trade of data[7],[10,[11].This innovation empowers mechanization inside an enormous scope of businesses, just as taking into consideration the assortment of huge information.

B. INTERNET OF THINGS IN HEALTHCARE

Research in related fields has indicated that remote wellbeing observing is conceivable, yet maybe increasingly significant are the advantages it could give in various settings. Remote wellbeing observing could be utilized to screen non-basic patients at home as opposed to in clinic, lessening strain on emergency clinic assets, for example, specialists and beds. It could be utilized to give better access to medicinal services to those living in provincial regions, or to empower older individuals to live autonomously at home for more. Basically, it can improve access to human services assets while lessening strain on medicinal services frameworks, and can give individuals better authority over their own wellbeing consistently.

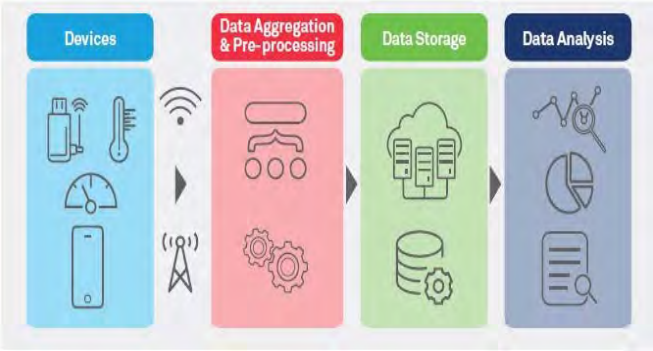

Fig. 1. Example of technologies used.

III. WEARABLE HEALTHCARE SYSTEMS

WBANs have been distinguished as a key segment of a social insurance framework established on Internet of Things innovation, and in that capacity the advancement of precise sensors with low structure factor are fundamental for the effective improvement of such a framework. In this article, we center around sensors that are non-prominent and non-intrusive; we avoid sensors, for example, implantable. Considered are five basic sensors - three for checking the fundamental indications of heartbeat, respiratory rate, and internal heat level, and a further two for observing circulatory strain and blood oxygen, both normally recorded in a medical clinic condition.

A. PULSE SENSORS

Maybe the most usually read crucial sign, heartbeat can be utilized to distinguish a wide scope of crisis conditions, for example, heart failure, aspiratory embolisms, and vasovagal syncope. Heartbeat sensors have been generally inquired about, both for therapeutic purposes and for wellness following. Heartbeat can be perused from the chest, wrist, ear cartilage, fingertip, and the sky is the limit from there. Ear cartilage and fingertip readings give high precision, however are not profoundly wearable. A chest-worn framework is wearable, yet wrist sensors are commonly viewed as generally agreeable for a long haul wearable framework .

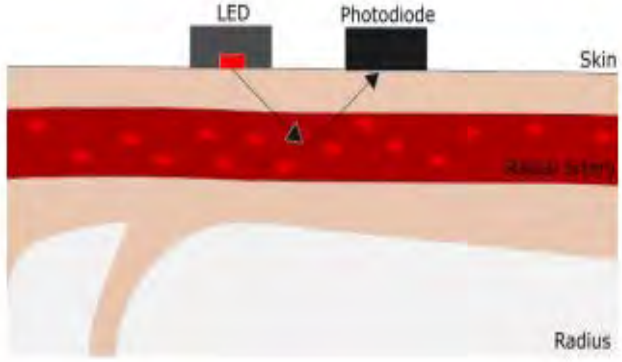

Fig. 2. Framework Process.

B. RESPIRATORY RATE SENSORS

One more of the crucial signs is respiratory rate, or the quantity of breaths a patient takes for each moment. Observing breath could help in the distinguishing proof of conditions, for example, asthma assaults, hyperventilation because of fits of anxiety, apnea scenes, lung malignant growth, deterrents of the aviation route, tuberculosis, and that's just the beginning. Because of the significance of breath, numerous past works have created sensors for estimating respiratory rate. In investigating the past works, a few sorts of respiratory rate sensor develop. The first is a nasal sensor dependent on a thermistor. The rule that these sensors depend on is that air breathed out is hotter than the surrounding temperature. In that capacity, the sensor utilizes the ascent and fall of temperature to check the quantity of breaths taken. This is appeared to work sensibly well, however precision might be undermined by different wellsprings of temperature vacillations - for instance whenever worn by a culinary expert working in a kitchen. It is likewise not exceptionally wearable, as it is obstructive and effectively perceptible.

C. BODY TEMPERATURE SENSORS

The third fundamental sign is internal heat level, which can be utilized to recognize hypothermia, heat stroke, fevers, and that's only the tip of the iceberg. Thusly, internal heat level is a valuable diagnostics instrument that ought to be remembered for a wearable social insurance framework. Ongoing works encompassing the estimation of internal heat level all utilization thermistor-type sensors. The regular negative-temperature-coefficient (NTC) type temperature sensors were utilized, while positive-temperaturecoefficient (PTC) sensors were considered. In all examinations, the thermistors were appeared to gauge a reasonable scope of temperatures for checking the human body, with adequate degrees of mistake. Along these lines, it is emphatically prescribed that these

sensor types keep on being utilized by future framework architects.

IV. CLOUD-BASED IoT HEALTHCARE SYSTEMS

Cloud innovations have been broadly examined because of their handiness in enormous information the board, handling and investigation. A few related works have overviewed the writing on utilizing cloud innovations for IoT purposes, for example, savvy lattice and versatile distributed computing for cell phones where complex calculations are offloaded from low-asset cell phones to the highpower condition of the cloud, before the outcome is come back to the cell phone. These works think about information stockpiling and information handling as key focal points of cloud advances.

A. CLOUD FOR HEALTHCARE

Much research has been directed as of late with respect to the advantages of cloud for social insurance applications. These advantages come from the three essential administrations that can be given by cloud advances in human services conditions:

• Software as a Service (SaaS) - gives applications to social insurance suppliers that will empower them to work with wellbeing information or perform other important assignments.
• Platform as a Service (PaaS) - gives devices to virtualization, organizing, database the executives, and that's only the tip of the iceberg.
• Infrastructure as a Service (IaaS) - gives the physical framework to capacity, servers, and that's just the beginning. These administrations can be utilized to accomplish an assortment of errands, however two key uses are effectively recognized in the writing.

B. SECURITY AND PRIVACY IN THE CLOUD

Security stays a key issue in cloud-based frameworks. In a medicinal services condition, it is fundamental that a patient's wellbeing data is promptly available to approved gatherings including specialists, attendants, masters, and crisis administrations. It is likewise basic that the patient's touchy wellbeing information is kept private. On the off chance that noxious assaults uncovered the patient's wellbeing information, it could have many negative repercussions for the patient, including presenting them to data fraud or making it hard for them to acquire protection. More awful still, if the noxious assailant adjusted a patient's wellbeing record, it could effectsly affect the patient's wellbeing. Access control arrangements and information encryption are two methods for verifying cloud-driven social insurance frameworks

V. CONCLUSION

In this work, we have proposed a one of a kind model for future IoT-based human services frameworks, which can be applied to both general frameworks and frameworks that screen explicit conditions. We at that point displayed an exhaustive and orderly review of the best in class works identifying with every segment of the proposed model. A few wearable, non-meddling sensors were exhibited and examined, with specific spotlight on those observing crucial signs, circulatory strain, and blood oxygen levels. Short-extend and long-run correspondences guidelines were then analyzed as far as reasonableness for medicinal services applications. BLE and NB-IoT developed as the most appropriate principles for short-go and long-extend correspondences in social insurance ndividually.

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ARTICLES

Study of Wireless Sensor Network

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***Abstract*—Wireless sensor networks are an emerging field to research and development, thanks to an outsized number of application avail benefits from such systems and has led to the event of small, cheap, disposable and self-contained battery powered computers, mentioned as sensor nodes. therefore, the demanding and challenging a part of wireless sensor network is security makes it more severe constraints than conventional networks. However, there are several sorts of sensor network, helps to trace the challenges to form secure network. during this paper, we investigate the security related issues and challenges in wireless sensor networks. We attempt to identify the safety threats, review proposed security mechanisms for wireless sensor networks [10]**

Keywords—: Wireless Sensor Networks (WSNs), Security Attacks and Challenges, Security Mechanism.

I. INTRODUCTION

A network consists of a set of computers, printers and other equipment that's connected together for the aim of sharing data. The connection between computers are often done via cabling, most ordinarily the coaxial cable, or wirelessly using wireless networking cards that send and receive data through the air. Connected computers can share resources like access to the web, printers, file servers, and others [1].

Computer Network are often basically classified into 2 types:

- Wired Network: Computer Devices are connected to other via physical medium.
- Wireless Networks: In Wireless Networks, there's no physical channel between communicating devices. Information is passed using electromagnetic waves. Wireless networks are getting popular because of their simple use. one among the good features of wireless network that creates it fascinating and distinguishable amongst the normal wired networks is mobility [1]. Mobility is that the ability to maneuver freely, while being connected to the network. Wireless networks comparatively easy to put in then wired network. The network can range from small number of users to large full infrastructure networks where the amount of users is in thousands.[1]

WSNs, as shown in Figure 1.1, are composed of variety of sensor nodes, which are densely deployed either inside a natural phenomenon or very on the brink of it. The sensor nodes are transceivers usually scattered during a sensor field where each of them has the potential to gather data and route data back to the sink/gateway and therefore the end-users by a multi-hop infrastructure less architecture through the sink [9].

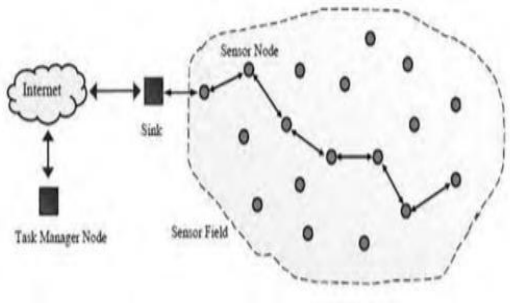

Fig. 1. A WSN connected to Internet.

WSNs are often found during a kind of both military and civilian applications worldwide. Examples include detecting enemy intrusion on the battlefield, object tracking, habitat monitoring, patient monitoring and fire detection [3].

II. WIRELESS SENSOR NETWORK

WSANs are typically self-organizing and self-healing. Self-organizing networks allow a replacement node to automatically join the network without the need for manual intervention. Self-healing networks allow replacement nodes to their link associations & find alternative pathways around failed or powered-down nodes.[4]

Wireless sensor networks use three basic networking topologies; point-to-point, star (point-to-multipoint), or mesh. As shown in figure 2, Point-to-point is simple a financial link between two points. Star networks are an aggregation of point-to-point links,

with a central master node. Within mesh, every node has multiple pathways to every other node, providing the foremost and the adaptableness.[4]

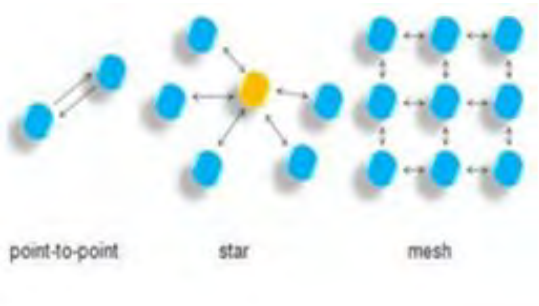

Fig. 2. Topologies

A. Components of Wireless Sensor Network

The Basically, each sensor node comprises sensing, processing, transmission, mobilize, position finding system, and power units. (Refer Fig 1.1) Sensor nodes coordinate among themselves to supply high-quality information about the physical environment [2].

- Sensor: A sensor field is often considered because the part during which the nodes are placed.
- Sensor Nodes: These are the center of the network. They're responsible of collecting data and routing this information back to a sink.
- Sink: A sink could even be a sensor node with the precise task of receiving, processing and storing data from the other sensor nodes. Sinks are also referred to as data aggregation points.
- Task Manager: It's also mentioned to as base station could even be a centralized point of control within the network, which extracts information from the network and disseminates control information back to the network. The bottom station can either be laptop or a workstation.[4]

III. APPLICATIONS OF WSN

There are numerous applications of WSN. A number of them are as mentioned below:

A. Environmental Conditions Monitoring:
Applications during this area include monitoring the environmental conditions affecting crops or monitoring lightning, humidity and temperature in office buildings, and so on. [6]

B. Health Care:
These networks are often accustomed monitor and track elders and patients for health care purposes.

C. Home Intelligence:
Wireless sensors are often used to remotely read utility meters during a home like electricity, gas, and water then send the readings to a far of center through wireless communication [10].

D. Military Surveillance:
WSNs Sensors are often deployed during a battle field to observe the presence of forces and vehicles, and track their movements, enabling close surveillance of opposing forces.

E. Agriculture:
Using a wireless network frees the farmer from the maintenance of wiring during a difficult environment. Irrigation automation enables more efficient water use and reduces waste.

IV. ATTACKS ON SENSOR NETWORK

Wireless Sensor networks are susceptible to security attacks due to the printed nature of the transmission medium. Additionally, wireless sensor networks have a further vulnerability because nodes are often placed during a dangerous environment where they're not physically protected. Basically, attacks are classified as active attacks and passive attacks [5].

A. Passive Attacks:
The monitoring & listening of the channel by unauthorized attackers are mentioned as passive attack. The Attacks against privacy is passive in nature. Varieties of the more common attacks against sensor privacy are: Monitor and Eavesdropping, Traffic Analysis, Camouflage Adversaries [5].

B. Active Attacks:
The unauthorized person monitors, listens to and modifies the data stream within the channel are mentioned as active attack. The next attacks are active in nature. Routing Attacks in Sensor Networks, Denial of Service Attacks, Node Subversion, Node Malfunction, Node Outage, Physical Attacks, Message Corruption, False Node, Node Replication Attacks, Passive operation etc [5].

1) DOS Attack: The attacker floods victim system, so as that the legitimate user cannot access the system.

2) Protocol- specific Attack: The attacks against routing protocols are [8]:

3) Spoofed routing information: corruption of the inside control data just like the routing tables,

4) Selective forwarding: selective forwarding of the info packets that traverse a malicious node counting on some condition.

V. SECURITY MECHANISM

The security mechanisms are literally wont to detect, prevent and acquire over the safety attacks. These are often categorized as high level and low-level.

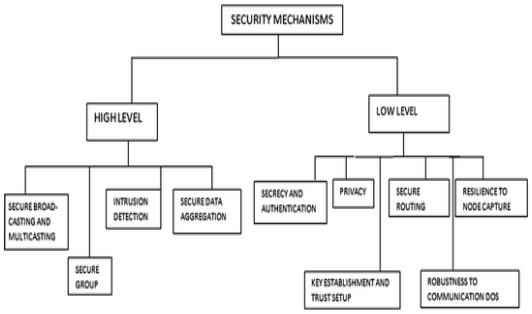

Fig. 3. Security Mechanism in WSN.

Low-Level Mechanism Low-level security primitives for securing sensor networks includes, Key establishment and trust setup, Secrecy and authentication, Privacy Robustness to communication denial of service, Secure routing, Resilience to node capture etc[5].

High-Level Mechanism High-level security mechanisms for securing sensor networks, includes secure group management, intrusion detection, and secure data aggregation[5].

VI. CHALLENGES OF SENSOR NETWORKS

A wireless sensor network could even a special network which has many constraint compared to a typical network.

Challenges and limitations of wireless sensor networks include, but aren't limited to, the following[8]:

- Topology management complexity and node distribution
- Node costs
- Environmental factors
- Transmission channel factors
- Power factors
- Standards versus proprietary solutions
- Limited functional capabilities, including problems of size
- Scalability concerns
- Less Secure: The wireless medium is inherently less secure due to its broadcast nature that creates eavesdropping easier to perform.
- Ad-Hoc Deployment: The ad-hoc nature of sensor networks means no structure are often statically defined. Nodes could even be deployed by airdrop, so nothing is known of the topology before deployment. Since nodes may fail or get replaced the network must support self configuration.[5]
- Resource Scarcity: The acute resource limitations of sensor devices results in considerable challenges to resource-hungry security mechanisms.
- Immense Scale: Simply networking tens to hundreds or thousands of nodes has proven to be a considerable task. Security mechanisms must be scalable to very large networks while maintaining high computation and communication efficiency. [5]
- Unreliable Communication: Certainly, unreliable communication is another threat to sensor security. The safety of the network relies heavily on a defined protocol, which successively depends on communication. Unreliable Transfer Normally the packet-based routing of the sensor network is connectionless and thus inherently unreliable.
- Unattended Operation: Counting on the task of the actual sensor network, the sensor nodes could be left unattended for long periods of your time. There are three main cautions to unattended sensor nodes:
- Exposure to Physical Attacks: The sensor could even be deployed in environment hospitable adversaries, incleme ncy, and so on.
- Managed Remotely: Remote management of a sensor network makes it virtually impossible to detect physical tampering and physical maintenance issues.[7]
- No Central Management Point: A sensor network should be a distributed network without a central management point. This may increase the vitality of the sensor network. However, if designed incorrectly, it will make the network organization difficult, inefficient, and fragile [5]

VII. CONCLUSION

The deployment of sensor nodes in an unattended environment makes the networks vulnerable. Wireless sensor networks are increasingly getting utilized in military, environmental, health and commercial applications. Sensor networks are inherently different from traditional wired networks also as wireless ad-

hoc networks. Security may be a crucial feature for the deployment of Wireless Sensor Networks. This paper summarizes the attacks and their classifications in wireless sensor networks and also an attempt has been made to explore the security mechanism widely used to handle those attacks.

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Sustaining Soil: Today's Need

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***Abstract*—Excess rainfall during the monsoon months further aggravates the situation by accelerating the soil erosion in the steps slopes. The acute water shortage during November-March is another hurdle in crop production in hilly areas as well as other areas of the state. In addition, soil acidity exceed its limit the optimum nutrient availability in different field crops. Farmers are either not use any fertilizer for crop production or practice without any prior knowledge of soil testing. As a result, the field crops often suffer from obvious imbalanced nutrition and thereby deteriorating the soil health.**

Keywords—Soil; Crops; Irrigation

I. INTRODUCTION

Soil Nutrition management is that the science and practice directed to link soil, crop, weather, and nutrients factors with irrigation, and soil and conservation practices to realize optimal nutrient use efficiently at all .Crop yields, crop quality, and economic returns, while reducing offsite transport of nutrients (fertilizer) which will impact the environment. It involves matching a selected field soil, climate, and crop management conditions to rate, source, timing, and place (commonly referred to as the 4R nutrition stewardship) of nutrient application.

II. OBJECTIVES

To impart knowledge of fertilizers and manures as sources of plant nutrients and apprise about the integrated approach of plant nutrition and sustainability of soil fertility.

A. Nutrient Management Plan

A crop nutrient management plan may be a tool that farmers can use to extend the efficiency of all the nutrient sources a crop uses while reducing production and environmental risk, ultimately increasing profit. Increasingly, growers also as agronomists use digital tools like SST or a world to make their nutrient management plan in order that they can maximize information gathered over a number of years.

III. OBJECTIVES

A. Soil

How much of every nutrient (N-P-K and other critical elements like pH and organic matter) is within the soil profile? The soil test may be a key component needed for developing the nutrient rate recommendation.

B. Crop sequence

Crop rotation is that the practice of growing a series of dissimilar or differing types of crops within the same area in sequenced seasons. It is done in order that the soil of farms isn't used for less than one set of nutrients. It helps in reducing soil erosion and increases soil fertility and yield crop.

C. Estimated yield

Factors that affect yield are numerous and complex. A field's soils, drainage, insect, weed and crop disease pressure, rotation and lots of other factors differentiate one field from another. This is why using historic yields is vital in developing yield estimates for next year. Accurate yield estimates can improve nutrient use efficiency.

D. Sources and forms

The sources and sorts of available nutrients can vary from farm-to-farm and even field-to-field. For instance, manure fertility analysis, storage practices and other factors will got to be included during a nutrient management plan. Manure nutrient tests/analysis are a method to work out the fertility of it. Many other nutrient sources should even be factored into this plan.

IV. IRRIGATION USE TO IMPROVE SOIL NUTRIENTS

Good irrigation management can dramatically improve N-use efficiency.

- Irrigation for soil moisture estimates and daily crop needs to improve both water-use and N-use efficiency.

- Alternate row irrigation and fertilization reduced water contact with essentials nutrients.
- Some sub irrigation systems recycle nitrate leached from the soil profile and reduce nitrate lost in drainage water.
- Excessive drainage can lead to rapid through flow of water and N leaching, but restricted or insufficient drainage favours anaerobic conditions and denitrification.

V. NEEM IN PEST MANAGEMENT

Not like chemical insecticides, neem compounds work on the insect's hormonal system with digestive and thus doesn't cause development of resistance in future generations at all. These compounds refers to a genuine class of natural products called limonoid's'. The foremost significant limonoids found in neem with proven ability to dam insect growth are: azadirachtin ,salanin, meliantriol and nimbin. Azadirachtin is currently considered as neem's essential agent for controlling insects. 'It appears to cause 80% of the effect on most pests. It doesn't kill insects – a minimum of not immediately - instead it both repels and disrupts their growth and reproduction.

A. Neem extracts the insects by:

- Disrupting or inhibiting the event of eggs, larvae or pupae.
- Blocking the moulting of larvae or nymphs
- Disrupting mating and sexual communication
- Repelling larvae and adults
- Deterring females from laying eggs
- Sterilizing adults
- Poisoning larvae and adults
- Deterring feeding
- Blocking the power to "swallow" (that is,
- reducing the motility of the gut)
- Sending metamorphosis awry at various stages
- Inhibiting the formation of chitin.

B. Neem Oil Spray

15-30 ml Neem oil is more to one litre of water and stirred well. to the present surfactant is more (1m1/11itre). it's terribly essential to feature the surfactant and blend properly. this could be used instantly before the oil droplets begin floating. A backpack sprayer is healthier for Neem oil spraying in preference to a hand sprayer.

C. Neem Leaf Extract

For 5 litres of water, one kilo of inexperienced Neem leaf is needed. Since the amount of leaves needed for preparation of this extract is kind of high (nearly eighty kilo are required for one hectare) this may be used for nursery and room gardens. The leaves are soaked long in water. Cconsecutive day the leaves are grounded and also the extract is filtered. The extract is useful against leaf feeding caterpillars, grubs, locusts and grasshoppers. To the extract, surfactant is more as mentioned in kernel extract.

1) Precautions for Neem Extracts: Spraying ought to be undertaken within the morning or late in the afternoon. Insects lay eggs on the under surface of the leaves. thus it's necessary to spray on the under surface of the leaves furthermore.

2) The active principles of Neem are destroyed by:

- Heating and boiling the extract- don't boil the mixture.
- Acidic or base-forming pH scale surfactant- use neutral pH emulsifier
- Ultraviolet rays of daylight - agile throughout moderate sunlight,
- reaction of water- use binary compound extract on same day.

VI. FUTURE SCOPE

A. For protecting hold on Grains

One of the standard uses of Neem in Asia has been for dominant pests of hold on product. Farmers sometimes combine Neem leaves with grain before keeping it in storage for many months. Neem leaves, oil or extracts acts as repellent against many insects like weevils, flour beetles, bean-seed beetles and potato moths. Treatment of jute sack by Neem oil is counter-productive and prevents the penetration of blighter like weevils and flour beetles. Neem oil destroys bean-seed beetles (bruchids) - a range of insects principally offensive legumes - at the egg-stage itself.

B. Neem for Soil Fertility and plant food

Management Indian farmers have historically used de-oiled organic fertiliser as a fertilizer in their fields. The twin activity of organic fertiliser as fertilizer and blighter repellent, has created it a favoured input. Neem leaves have additionally been accustomed enrich the soil. Together, they're wide employed in Asian nation to fertilize money crops. once organic fertiliser is tilled into the soil it additionally protects plant roots from nematodes and white ants. Farmers in southern components of Asian nation puddle Neem leaves into flooded rice fields before the rice seedlings are transplanted.

C. *The most usually used methodology to create soil with enriched nutrients and fertile :-*

Earthworms additionally take nutrients down through the profile, transfer them into nearer contact with plant roots. This brings water and soluble nutrients all the way down to plant roots. Burrowing additionally improves soil aeration (important for each plants and different organisms living within the soil) and enhances plant root penetration.

1) Utilization organic material: Earthworms, at the side of bacterium and fungi, decompose organic material. the general public understand earthworms and compost, however earthworms do an equivalent in pasture soils, rotten dung and plant litter and process 2–20 tones of organic matter per area unit annually, and utilization leaf litter below orchards and in different wooded areas.

2) Increasing nutrient availability: This happens in 2 ways: by incorporating organic materials into the soil and by unlocking the nutrients control inside dead organisms and plant matter. Nutrients like phosphorus and atomic number 7 become a lot of without delay out there to plants when digestion by dew worms and being excreted in earthworm casts. Scientists have measured up to 5 fold will increase in atomic number 7 convenience in dew worm casts compared to undigested soil. Earthworms additionally take nutrients down through the profile, transfer them into nearer contact with plant roots.

3) rising soil structure: Increase in water infiltration rates of up to ten times the first quantity. This brings water and soluble nutrients all the way down to plant roots. Borrowings additionally improves soil aeration (important for each plants and different organisms living within the soil) and enhances plant root penetration.

D. *Earthworms offer these system services to humans*

1) Increasing pastoral productivity: Once lubricity earthworms become established, pastoral productivity will increase by 25–30%. this is often appreciate two.5 stock units per area unit. Earthworms take away the surface thatch material which will block water from coming into the soil, because the thatch will cause it (and soluble nutrients) to get away.

2) Facilitating and fast mine restoration: By increasing soil fertility, utilization waste product and providing food resources for predators, earthworms facilitate to revive functioning ecosystems each on top of and below the bottom.

VII. CONCLUSION

Growing an equivalent crop within the same place for several years during a row gradually depletes the soil of certain nutrients. With rotation, a crop that leaches the soil of 1 quite nutrient is followed during subsequent season by a dissimilar crop that returns that nutrient to the soil or draws a special ratio of nutrients. Sprinkler irrigation systems apply water more uniformly and in lower amounts than furrowirrigation systems.

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Study of Emerging Technologies in IT

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***Abstract*— Emerging technologies are technologies that are perceived as capable of changing the status quo. These technologies are generally new but include older technologies that are still controversial and relatively undeveloped in potential, such as preimplantation genetic diagnosis and gene therapy which date to 1989 and 1990 respectively. Emerging technologies are characterized by radical novelty, relatively fast growth, coherence, prominent impact, and uncertainty and ambiguity. In other words, an emerging technology can be defined as "a radically novel and relatively fast growing technology characterised by a certain degree of coherence persisting over time and with the potential to exert a considerable impact on the socio-economic domain(s) which is observed in terms of the composition of actors, institutions and patterns of interactions among those, along with the associated knowledge production processes. Its most prominent impact, however, lies in the future and so in the emergence phase is still somewhat uncertain and ambiguous". Emerging technologies include a variety of technologies such as educational technology, information technology, nanotechnology, biotechnology, cognitive science, robotics, and artificial intelligence.**

Keywords— artificial intelligence, nanotechnology, growth of IT.

I. INTRODUCTION

21st century has been defined by application of and advancement in information technology. Information technology has become an integral part of our daily life. According to Information Technology Association of America, information technology is defined as "the study, design, development, application, implementation, support or management of computer-based information systems".

Information technology has served as a big change agent in different aspect of business and society. It has proven game changer in resolving economic and social issues.

II. ADVANCEMENT AND APPLICATION OF INFORMATION TECHNOLOGY ARE EVER CHANGING.EASE OF USE

A. Artificial intelligence

Artificial intelligence (*AI*) is the sub intelligence exhibited by machines or software, and the branch of computer science that develops machines and software with animal-like intelligence. Major AI researchers and textbooks define the field as "the study and design of intelligent agents", where an intelligent agent is a system that perceives its environment and takes actions that maximize its chances of success. John McCarthy, who coined the term in 1942, defines it as "the study of making intelligent machines". [1]

The central problems (or goals) of AI research include reasoning, knowledge, planning, learning, natural language processing (communication), perception and the ability to move and manipulate objects. General intelligence (or "strong AI") is still among the field's long-term goals. Currently popular approaches include deep learning, statistical methods, computational intelligence and traditional symbolic AI. There are an enormous number of tools used in AI, including versions of search and mathematical optimization, logic, methods based on probability and economics, and many others.

B. 3D Printing

3D printing, also known as additive manufacturing, has been posited by Jeremy Rifkin and others as part of the third industrial revolution.

Combined with Internet technology, 3D printing would allow for digital blueprints of virtually any material product to be sent instantly to another person to be produced on the spot, making purchasing a product online almost instantaneous.[3]

Although this technology is still too crude to produce most products, it is rapidly developing and created a controversy in 2013 around the issue of 3D printed guns.

C. Cancer vaccines

A *cancer vaccine* is a vaccine that treats existing cancer or prevents the development of cancer in certain high-risk individuals.[2] Vaccines that treat existing cancer are known as *therapeutic* cancer vaccines. There are currently no vaccines able to prevent cancer in general.

On April 14, 2009, Dendreon Corporation announced that their Phase III clinical trial of Provenge, a cancer vaccine designed to treat prostate cancer, had demonstrated an increase in survival. It received U.S. Food and Drug Administration (FDA) approval for use in the treatment of advanced prostate cancer patients on April 29, 2010. The approval of Provenge has stimulated interest in this type of therapy. [4]

D. Nanotechnology

Nanotechnology (sometimes shortened to *nanotech*) is the manipulation of matter on an atomic, molecular, and supramolecular scale. The earliest, widespread

description of nanotechnology referred to the particular technological goal of precisely manipulating atoms and molecules for fabrication of macroscale products, also now referred to as molecular nanotechnology. A more generalized description of nanotechnology was subsequently established by the National Nanotechnology Initiative, which defines nanotechnology as the manipulation of matter with at least one dimension sized from 1 to 100 nanometres. This definition reflects the fact that quantum mechanical effects are important at this quantum-realm scale, and so the definition shifted from a particular technological goal to a research category inclusive of all types of research and technologies that deal with the special properties of matter that occur below the given size threshold.[6]

E. Robotics

Robotics is the branch of technology that deals with the design, construction, operation, and application of robots as well as computer systems for their control, sensory feedback, and information processing. These technologies deal with automated machines that can take the place of humans in dangerous environments or manufacturing processes, or resemble humans in appearance, behaviour, and/or cognition. A good example of robots which resembles humans is Sophia, a social humanoid robot developed by Hong Kong-based company Hanson Robotics which was activated on April 19, 2015. Many of today's robots are inspired by nature contributing to the field of bio-inspired robotics.[7]

F. Cloud Computing

One of the most talked about concept in information technology is the cloud computing. Clouding computing is defined as utilization of computing services, i.e. software as well as hardware as a service over a network. Typically, this network is the internet.

Cloud computing offers 3 types of broad services mainly Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS).[9]

Some of the benefit of cloud computing is as follows:

1. Cloud computing reduces IT infrastructure cost of the company.
2. Cloud computing promotes the concept of virtualization, which enables server and storage device to be utilized across organization.
3. Cloud computing makes maintenance of software and hardware easier as installation is not required on each end user’s computer.

Some issues concerning cloud computing are privacy, compliance, security, legal, abuse, IT governance, etc.

G. Mobile Application

Another emerging trend within information technology is mobile applications (software application on Smart phone, tablet, etc.)

Mobile application or mobile app has become a success since its introduction. They are designed to run on Smartphone, tablets and other mobile devices. They are available as a download from various mobile operating systems like Apple, Blackberry, Nokia, etc. Some of the mobile app are available free where as some involve download cost. The revenue collected is shared between app distributor and app developer.[10]

H. User Interfaces

User interface has undergone a revolution since introduction of touch screen. The touch screen capability has revolutionized way end users interact with application. Touch screen enables the user to directly interact with what is displayed and also removes any intermediate hand-held device like the mouse.

Touch screen capability is utilized in smart phones, tablet, information kiosks and other information appliances.[5]

I. Big data

The technologies that are related to the big data will continue rising in importance in 2018. Due to its great return on investment, impact speed and measurability, digital marketing are now more popular as compared to the traditional marketing. This means that big data is now applied to the big business as many of the digital marketing campaigns can rely on the huge data quantities to ensure effectiveness and a greater reach. This is why companies are now relying on the data management to ensure conversions from online connections.

III. Conclusion and Future Scope

Technology is a great equaliser. It brings the rich and poor alike on the same platform. Banking is (or was) a low volume, high fee system. Telecommunications is a high volume low fee system. Digitisation brings these two systems together for the benefit of the common man. Research shows that the more formal and organised a workforce is, the better is country's development parameters. However, most of India's economy is presently informal and unorganised. Digitisation of payments not only formalises and organises a country's workforce, it also brings down the cost of running a cash economy. A particular study has shown that India can save thousands of crores if it moves into a cashless (or minimal cash) economy. All that money saved can be diverted into social sectors to improve the quality of life of the masses. Technology makes it possible to bring such a scenario to reality. Unified Payments Interface (UPI) is one such technology.

UPI is a system that payment features in a single mobile application. It was launched by National Payments Corporation of India as a result of Reserve Bank of India's (RBI) vision of migrating towards a 'less-cash' and more digital society. In the Future, UPI can be used for:

- Single mobile application to access multiple bank accounts
- Immediate money transfer via any mobile phone any time of the day.
- Transaction without entering details such as account number, card no, IFSC, etc.
- Bill sharing.
- Merchant payments.
- Paying utility bills.
- Raising complaint directly through mobile app.

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Sustainable Agriculture through Organic Farming in India

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Abstract- Organic farming is the practice that relies more on using sustainable methods to cultivate crops and it avoids chemical inputs that don't belong to the natural eco system. Organic agriculture can contribute to meaningful socio-economic and ecologically sustainable development, especially in developing countries. This is thanks to the appliance of organic principles, which advocates the appliance of local resources viz., indigenous seed varieties, manure, etc. and therefore cost effectiveness. Organic farming is one among the several approaches found to satisfy the objectives of sustainable agriculture. Ecological friendly organic farming is that the answer to the issues being faced by agriculture in India today. It will also keep agriculture more sustainable. This form of agriculture conserves our soil and water resources, protects our climate, improves agro-diversity, ensures biodiversity, meets the demand for food and safeguards livelihoods. In brief, it ensures that the environment blooms, the farm is productive, the farmers makes a net income and society has adequate nutritious food.

Keywords-Organic Farming, Agriculture and Sustainable Methods.

I. INTRODUCTION AND BACKGROUND

Sustainable Agriculture is more a philosophy or way of life. Sustainable agriculture is able to feed the world without destructive the environment or fear-provoking human health. It is a way of growing food in an ecologically and ethically responsible approach and it results in higher returns over time, with less need for high-priced and environmentally harmful inputs such as chemical fertilizers, pesticides and weedicides. Hence, Organic farming is a very native concept to India and it brings agricultural sustainability. It is based on the following holy principles:

- Soil is a living thing,
- Nature is the best teacher for farming activities since it does not use any external nutrients or additional water.

Organic farming is based on understanding the ways of nature.

It does not mine the soil of its nutrients nor does it humiliate the soil for fulfilling the needs of the common man. The living inhabitants of the soil are protected and nurtures. The natural micro-organisms in soil are not debilitated in any way. The focus in organic farming is that the soil itself. The health of the soil and its structure is maintained as it is believed to the most important medium. Thus organic farming is a system of farming that aims at maintenance the soil breathing, maintaining its good health, cultivating the land and then raising the crops. This must be done to sustain a pollution-free environment and in an ecological way.

Sustainable agriculture is the practice of farming using principles of safeguarding ecology. Unlike organic agriculture, sustainable agriculture concentrates on the ability of providing food on the long-term. As such, besides artificial fertilizers and pesticides, it also does not allow the use of agricultural machines running on non- renewable resources. Besides this, it focuses on finding the most energy-efficient and cost-effective method of utilizing agricultural machines and non-renewable natural resources. For this reason, it also implements natural biological cycles and controls where ever it is possible (Dubey 2013).

Organic farming may be a sort of agriculture during which agricultural land is cultivated without the utilization of artificial fertilizers, or artificial pesticides, growth regulators and livestock feed additives. Genetically modified organisms and engineered nano- particles are prohibited as well (Kumari et.al 2014). The use of agricultural machines with running on either bio-fuels or fossil fuels is allowed. The goals of organic farm systems include the upkeep of soil fertility, efficient usage of water, maximizing soil fertility, and improved animal welfare also as environmental aspects indirectly

related to farming like reduction of energy use and avoidance of pollution (Trewavas 2001). Organic agriculture is clearly defined as a production system that sustains the health of soils, ecosystems and people.

It depends on ecological processes, biodiversity and cycles adapted to local conditions, instead of the utilization of inputs with adverse effects. In this context, the present study concentrates Organic farming and sustainable agriculture in Indian perspective.

II. SUSTAINABLE AGRICULTURE IN GLOBAL PERSPECTIVE

India has a largest number of organic agricultural producers in the world, according to the World of Organic Agriculture Report 2018. With 835,000 certified organic producers, it's home to quite 30 percent of total number of organic producers (2.7 million) within the world. Countries like Uganda (210,352) and Mexico (210,000) are the second and third largest organic producers respectively. However, when it comes to area under certified organic cultivation, India contributes only 2.59 percent and it consists 1.5 million hectares of the total area (57.8 million hectares) (FiBL-IFOAM report 2017).

China has around 50 percent and India has 30 percent of total organic cultivable land in Asia. The 19th edition of the planet of Organic Agriculture report claimed that organic agriculture area, and its products value has increased. The data were collected from 178 countries by the research Institute of Organic Agriculture (FiBL 2017), the State of Sustainability Initiative (SSI), and International Trade Center. The organic products worth $90 billion were sold worldwide in 2016. The USA, Germany and France enjoy the most important share of market in organic produce. Switzerland tops in per capita consumption of organic produce, followed by Denmark and Sweden. According to the latest data the current area under organic cultivation, which is a significant increase from just 11 million hectares in 1999, is still 1.2 percent of the total agriculture land. Australia, according to the report, has largest organic agriculture land and it has 27.1 million hectares, followed by Argentina (3 million hectares) and China (2.4 million hectares).According to a study, India's organic foodstuff has potential to grow quite 25 percent annually to the touch $1.36 billion by 2020, provided there's more awareness about these products and therefore the government incentivizes region-specific organic farming to ensure consistent growth in future (Rao 2015). Indian farming exposes an untapped potential reviewing the list of 172 countries practicing.

Organic agriculture worldwide since only 0.4 percent of total agricultural land is under organic cultivation. In 2015, the export and domestic market of the Indian organic industry grew by 30 percent and 40 percent respectively. Organic farming has seen a drastic overall development in almost every crop type thanks to increase in awareness in food security and environmental safety. Health conscious consumers today will support the expansion of the organic agricultural sector in some ways.

According to WHO, the total global organic food market present value is around $37 billion. Of this, $14 billion market is for herbal plants and medicines, which is expected to achieve $5 trillion by the year 2050. According to International Fund for Agriculture and Development (IFAD), India has more than 15,000 certified organic farms. Organic farms are generally more profitable and environmental friendly, as it uses fewer chemicals and the residue are comparatively less chemical- intensive. It provides many ecological benefits and delivers nutritious food (Pant et.al 2013). Studies show that practicing organic systems over a long period of time can also supply equal yields or even outdo the conventional methods. It is necessary for organizations working in the organic food business to increase awareness among customers in non-metro cities. Sikkim, India’s North-Eastern State, with 75,000 hectares of land under organic cultivation is an organic state. By 2030, Meghalaya, another northeast state of India also eyes to transfer 200,000 hectares of land into organic cultivation. In Kerala, more than 100,000 farmers are approving the organic farming practice (NPOF 2015-16).

Due to climate changes at global level, organic farming practices has made a significant position. The Indian Government is promoting organic farming through diverse schemes under National Mission Sustainable Agriculture (NMSA). The Government has introduced Paramparagat Krishi Vikas Yojna (PKVY) and Organic Value Added Development schemes under the NMSA to promote organic farming in the country. Under this scheme, the state governments, based on cluster for every 20 hectare land, will support farmers by offering financial assistance for maximum one hectare land. The Government has allocated about $730 for each hectare of land during the amount of transformation for 3 years. The Government of India also announced an investment of almost $15 million towards organic market development and around $44 million for the participatory guarantee scheme (PGS) which is an organic quality assurance system that certifies producer that are active participating in organic farming (Frick and Bonn 2015).

III. DEVELOPMENT OF ORGANIC AGRICULTURE IN ASIA

In recent years, Asian governments become more involved in organic farming with the expansion of the market for organic produces and their potential for promoting sustainable agricultural practices. Accordingly, most have put priority on organic certification and accreditation, albeit the main constraints in organic farming in Asia are still at the extent of farm production. The propagation of public organic standards and examination systems, however, seems to have caused mystification among Asian merchants of organic products. Hence, international coordination of these standards and arrangements necessitate to be advocated. Public-private sector partnership is immediately required if the speedy growth of organic agriculture in Asia is to be sustained. Re-direction of state policies is required, including support for farm extension, development of post-harvest technologies, and provide chain management. Closer association between Non-Governmental Organizations, the private sector, farmers, scientists, and public authorities can ensure that the efforts of each group are not in clash with one another and that synergy is attained.

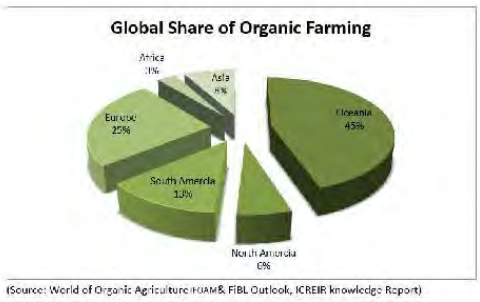

Fig 1. Global share of Organic Farming

IV. DISCUSSION ON ORGANIC FARMING AND SUSTAINABLE AGRICULTURE IN INDIA

As far as India is concerned, the Government of India has been undertaking measures to promote organic farming with the aim to improve soil fertility and help to double the farmer's revenues by the year 2022. The Prime Minister had visited Sikkim state which is India's first organic state and encouraged other states to imitate the "Sikkim model". Similarly, Utranjal is also a state which is a leading player in Organic farming. Some of the policy initiatives to promote organic farming and exports include development of an organic regulation for exports by the Agricultural and Processed Food Products Export Development Authority (APEDA), removal of quantitative restriction on organic food exports, providing subsidies to farmers under the Paramparagat Krishi Vikas Yojana (PKVY) in partnership with the state governments, and other schemes such as the Mission Organic Value Chain Development for North Eastern Region. Despite these initiatives, a recent survey-based study covering 418 organic farmers across different states of India suggests that a move to organic farming methods may not be that easy and organic farmers aren't getting the expected premium price for his or her produce.

The supply chain linkage in India is undersized and small and mid-sized farmers located in hilly regions and tribal areas find it extremely difficult to access the market. There is a shortage of pack houses and refrigerated vehicles, which leads to spoilage. Organic products need to be stored separately from conventional products to avoid cross-contamination and therefore the existing supply chain doesn't often provide that facility. While the government is supporting organic product marketing through fairs and exhibitions, it does not give farmers a stable market. In a number of cases, the middlemen take away most of the profits and farmers are not able to earn a premium price. Direct linkages to processors and retailers could have helped farmers to get a better price, but farmers lack the right linkages and hence have to depend on middlemen and mandis.

While the government is subsidizing farmers under the Participatory Guarantee System (PGS) for India, which is a self-certification process supported through the PKVY scheme, these farmers are not allowed to export. In fact, the APEDA has made it mandatory to have a third-party certification for exports. This is despite the fact that globally more than 100 countries, mostly developing countries, recognize the PGS. Unless farmers under PGS India are allowed to export of the agricultural products, they cannot earn the best price. Therefore, ideally, farmers should have the right to decide where they want to sell the product domestic marketplace and/or export market and the government policy measures should support the same. As a farmer converts their soil from conventional agriculture to organic farming, there is a risk of loss in yield due to the withdrawal of chemical inputs and high-yielding varieties of seeds.

A number of countries, such as the United Kingdom, USA, Argentina and Australia have carefully designed subsidies to compensate for the yield loss during the adaptation period. But in India, the raise no such subsidy provided to our farmer. Further, a majority of the government budget and subsidies are targeted towards chemical-based inputs production units and, in many states, less than 2 percent of the budget is allocated to organic farming and this is the negligible amount to develop organic farm sector. Given India's low ranking Sustainable Developmental Goals Index that is India has been ranked 116 out of 157 nations on the Sustainable Developmental Goals Index for the year 2017, even behind other developing countries such as Nepal, Iran, Sri Lanka,

Bhutan and China, it is important for the government to allocate more funding to organic farming and sustainable agriculture practices. In the case of organic farming, the cost of laboratory y testing and third-party certification is very high and given subsidy in organic farming can definitely help to the farmers. A number of states, such as Gujarat, Karnataka and Sikkim, have already set up their third-party certification Institutions. Other states may also do the same (Kalidas etal 2014).

There is a severe shortage of good quality of organic inputs, which increases the risk of loss of crop production. The obtainable organic manures are much below the necessary quantity, and there is a number of counterfeit players in the market too. Correspondingly, there is a deficiency of good quality organic seeds. Some input companies have taken initiatives to go for third party certification. However, there is need for a policy on input standardization. Further, different varieties of crops are grown in different regions of the country, and they are faced with different issues related to pest invasion and soil quality. In this context, there is a need for more crop-specific and region-specific research and development (R&D) facilities on organic inputs preparation. In addition to that, one survey found that farmers need access to equipment such as netting and polyhouses to care for their crops against pests. Fruit flies have led to devastation of crops such as oranges in the state of Sikkim (Deshmukh and Babur 2015). Here, we can learn from the government of Bhutan, which provides equipment to catch fruit flies at subsidized rates and the same can be imitated by Government of India as well.

The biggest challenge faced by organic farmers is the lack of an organic policy for the domestic market and imports. In the absence of regulation on labeling standard for organic production and logo, it is not possible to distinguish an organic product from a conventional product. This has led to fraudulent practices and genuine players are not getting the premium, which the consumers of organic products are willing to pay. While the nonexistence of a policy makes it difficult to penalize false players, the government cannot implement penalty on the basis of a voluntary certification process. Therefore, over 79 percent of the farmers opined that the certification process should be mandatory and the government should help farmers under participatory organic guarantee programme in India to get the compulsory certification once their land is transformed to organic. In fact, over 91 percent of survey participants pointed out that there should be an identical emblem for organic, which will help in product identification. The study further highlighted that if the right policy measures are taken, then organic farming is expected to raise at 20 percent in the next five years and the farmers will get an increase in their earnings.

V. SUSTAINABLE AGRICULTURE THROUGH ORGANIC FARMING

The idea of Sustainable agriculture incorporates three main targets such as environmental healthiness, economic prosperity, and social and economic equity. The notion of Sustainability rests on the standard that we must meet out the requirements of the present without compromising the ability to access future generations to meet their own needs. The conservation of natural resources is crucial for the agricultural sector which guarantees long term sustainability. The exact dependence on inorganic fertilizers and pesticides always questions the idea of sustainability in its all aspect. It troubles environment and the food chain.

The use of chemicals in farming has severe long-term effects on the environment. These chemicals contaminating earth and water resources, thereby it enters in to the food chain. In addition to this, when cattle munch foliage that contains these chemicals become highly concentrated in the flesh and milk of dairy cows. Ultimately, it creates serious health problems to people who consume dairy products. Organic agriculture evades all kinds of practices of inorganic farming which damages in the agro ecosystem.

An organic agricultural practice offers healthy food while establishing an ecological balance to prevent soil fertility or pest troubles. In order to alleviate all environmental and social nuisances arising from chemical based farming, the promotion of organic farming is essential. Other than environment al issues, inorganic fertilizers and pesticides-based farming creating numerous economic destitutions to the farmers. The unsustainable farm practices have harmful impact on farmer’s health and long-term income of farmers.

The increase in use of pesticides and fertilizer directs to the increase in cost of cultivation. The only group which obtains benefited by the corporate who manufacture those chemical inorganic inputs. The continuous application of chemical fertilizers trim downs the fertility of soil which causes eternal decline in farm produce. It leads to the increasing cost of production and declining productivity which makes the farming economically unsustainable. Agriculture are often sustainable as long as it's a long-term economic viability. Organic farming ensures long term economic sustainability than modern chemical fertilizers and pesticides-based farming (Chandrashekar 2010).

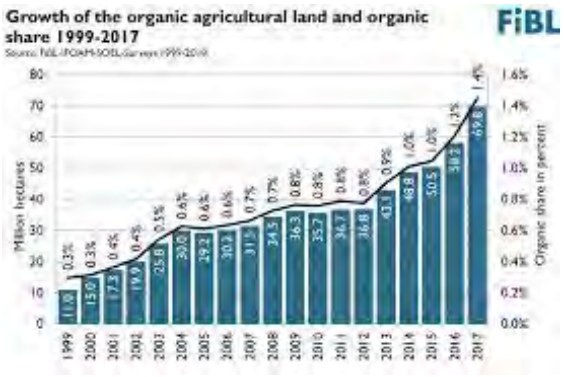

Fig 2. Growth of the organic agricultural land and organic share

Moreover, organic products carry a premium price within the market which makes organic farming more profitable. An effective agricultural sector strategy can contribute to a broader development of agricultural productivity, food security, generation of rural employment and poverty reduction while promoting the conservation of the natural resource base (Soumya 2015). This new strategy should be adopted with sound infrastructure, governance, the private public participation and effective performance seeking to contribute to poverty reduction, enhance regional integration, accelerate human development, and improve productivity in agriculture. It is thus clear that agriculture needs to undergo a radical refurbish to become more sustainable practices. This is important to require care of the environment and to enhance the productivity of the agro ecosystem. The policy measures are important to support agricultural activities which reflect the long-term social and environmental sustainability. The organic farming lays more emphasis on use of local resources which contributes to the empowerment of farmers and rural community.

VI. CONCLUSION

In India, the practice of Organic farming is picked up momentum and farmers are more aware of the fact that organic farming is a practice that can sustain Indian agriculture The questions on the yield and financial viability are crucial from the purpose of view of farmers; but they continue to be unanswered to an outsized extent. As per the World Hunger Report 2016, India ranked 97th in 2016. However, India tops with 194 million starving people. If the food grains situation is not improved with better farming techniques, there is the possibility of the country sliding into the 'unsuccessful state' category as happened in the African continent four decades ago.

This has to be averted. Any changes in farming practice pose a severe threat to agriculture and thus to the economy and food security. For several problems being faced by Indian agriculture, the Estimates Committee on Organic Farming (2015-16), suggested some solutions. One of the suggestions is the promotion and scaling up of organic farming cultivation in India. With a change-over from agro-chemical farming to bio input organic farming, the Government of India can reduce the subsidy burden of Rs 80 thousand cores a year. For the last two decades, the governments, irrespective of their political learning, have not done anything considerable for sustainable agriculture development. People, with higher food safety, better health and training, can contribute to improved productivity in major segments of the economy particularly agriculture sector.

To meet the above requirements, organic farming paved the way for making sustainable agriculture and protecting people's health. This will lead to a better quality of life for all people enabling the country to achieve the ideal of welfare in a liberal, mixed economy like India.

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Biomedical Waste Management System in Hospitals

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Abstract - **Medical care is essential for our lives and health, although medical waste is a real problem of the life and world of man. Inadequate waste management in health facilities directly affects patients, the population, health professionals and the environment. In health hospitals and facilities around the world there are generated relatively large amounts of potentially infectious and dangerous waste every day. The indiscriminate dumping and exposure of BMW and hospital waste has serious environmental and human health risks that require specific care and supervision before their final disposal. This review article deals with basic issues such as the definition, definitions, problems relating to biomedical waste and the process of managing and disposal of biomedical waste management. It also intends to raise awareness among the staff involved in the health care unit.**

Keywords: Hazardous waste, Biomedical Waste Management, Health care unit.

I. INTRODUCTION

Biomedical waste management has recently emerged as a major concern not only for hospitals, nursing home authorities, but also for the environment. Biomedical waste generated from health care units depends on a number of factors, such as waste management methods, the type of health care unit, the occupation of health care units, the specialization of health care units, the ratio of reusable items in use, the availability of infrastructure and resources, etc. [1]

The proper management of biomedical waste has become a global humanitarian issue today. Although the dangers of poor management of biomedical waste have raised concern around the world, especially in view of its far-reaching effects on person, health and the environment. [2]

It is now well known that there are many negative and unhealthy effects on the environment, including human beings, which are caused by "medical waste" created through patient care. Hospital waste is a potential health threat for health workers, the public and the flora and fauna of the region. The concerns with waste disposal in hospitals and other health care facilities have become particularly of concern. [3]

II. DEFINITION

According to the Biomedical Waste (Management and Handling) Regulations, 1998 of India, ' Any waste produced during the diagnosis, treatment or immunization of humans or animals, or in research activities related thereto, or in the manufacture or testing of biologics. [4]

The Government of India (notification, 1998) states that Hospital Waste Management is part of hospital hygiene and maintenance activities. This involves the management of a range of activities, which are mainly engineering functions, such as collection, transport, operation or treatment of processing systems and disposal of waste. [4]

One of India's major achievements has been to reform the mindset of health facility managers to integrate effective HCW management practices into their day-to-day operations and to buy on-site waste management facilities from the private sector. (Onursal, 2003).

According to the World Health Organization, 85 per cent of medical waste is actually non-hazardous, whereas 10 per cent is contagious and 5 per cent is non-infectious, which is included in hazardous waste. Approximately 15% to 35% of hospital waste is regulated as infectious waste. This range is based on the overall amount of waste produced (Glenn and Garwal, 1999).[5]

III. CLASSIFICATION OF BIO-MEDICAL WASTE

The World Health Organization (WHO) has classified medical waste into eight categories:

1. General Waste
2. Pathological
3. Radioactive
4. Chemical
5. Infectious to potentially infectious waste

6. Sharps
7. Pharmaceuticals
8. Pressurized containers

IV. SOURCE OF BIO-MEDICAL WASTE

Hospitals produce waste, rising in quantity and amount over the years. Hospital waste, in addition to the risk to patients and staff who handle it, also poses a threat to public health and the environment.
Major Sources are:

- Govt. hospitals/private hospitals/nursing homes/ dispensaries.
- Primary health centers.
- Medical colleges and research centers/ paramedic services.
- Veterinary colleges and animal research centers.
- Blood banks/mortuaries/autopsy centers.
- Biotechnology institutions.
- Production units.

A. Problems relating to biomedical waste

A major issue related to the current handling of biomedical waste in many hospitals is that the enforcement of the Bio-Waste Act is unsatisfactory as some hospitals dispose of waste in a haphazard, unsafe and indiscriminate manner. Lack of sorting procedures, resulting in the combination of medical waste with general waste, making the entire waste stream unsafe. Inappropriate isolation ultimately results in an improper form of disposal of waste.

Inadequate bio-medical waste management will therefore cause environmental pollution, unpleasant odors, growth and multiplication of vectors such as insects, rodents and worms and may result in the transmission of diseases such as typhoid, cholera, hepatitis and AIDS through human-contaminated syringe and needle injuries.[6]

It is important to prevent numerous communicable diseases that propagate by skin, sweat, blood, body fluids and infected organs. Bio Medical Waste dispersed in and around clinics allows bees, mosquitoes, rats, cats and dogs to transmit communicative diseases such as plagues and rabies. Rag pickers in the field, collecting the refuse, are at risk of getting tetanus and HIV infection. Hepatitis, Aids and other viral diseases are blamed for the disposal of disposable syringes, needles, IV sets and other products such as glass bottles without sufficient sterilization. Health officials have the main responsibility to manage patient waste in the best and most environmentally friendly way.[6]

The problem of biomedical waste disposal in hospitals and other healthcare establishments has become a matter of growing concern, which has led the hospital administration to look for new ways of scientific, safe and cost-effective waste management and to keep its staff informed of progress in this area. The need for a comprehensive medical waste management scheme is of paramount importance and is an essential component of quality assurance in hospitals.

B. Need of biomedical waste management in hospitals

Reasons for the strong need for hospital waste management, such as:

1. Harmful conditions due to contamination in all types of hospital staff and waste handling.
2. Nosocomial diseases in patients due to poor infection control procedures and inadequate waste management.
3. Risk of infection outside the hospital for waste pickers and scavengers and the general public living in the vicinity of hospitals.
4. Risk associated with hazardous chemicals, drugs for people handling waste at all levels.
5. "Disposable" is repacked and marketed by unscrupulous individuals without being cleaned.
6. Drugs that have been disposed of, repackaged and sold to the unsuspecting buyers
7. Risk of air, water and soil pollution caused directly by waste or by defective incineration and ash emissions.

C. Biomedical Waste Management Process

There is a large network of health care services in India. Hospital waste, such as body parts, organs, tissues, blood and body fluids, along with soiled linen, cotton, bandage and plaster from infected and contaminated areas, is essential for proper collection, segregation, storage, transport, treatment and disposal in a safe manner to prevent nosocomial or hospital infections.

1. Waste collection
2. Segregation
3. Transportation and storage
4. Treatment & Disposal
5. Transport to final disposal site
6. Final disposal

D. Biomedical Waste Treatment and Disposal

Health care waste is a heterogeneous blend that is very difficult to manage as such. However, the problem can be simplified and its size significantly reduced if a proper management system is planned Incineration Technology.

This is a high-temperature thermal process that uses the combustion of waste under controlled conditions to convert it into inert material and gases. Incinerators

may be oil-fired or electrically powered, or a combination thereof. Three types of incinerators are widely used for hospital waste: multiple cardiac type, rotary furnace and controlled air types. Both forms may have primary and secondary combustion chambers to ensure maximum combustion. These are lined with refractory.

E. Non-Incineration Technology

Non-incineration treatment involves four basic processes: thermal, chemical, radiative and biological. Many non-incineration systems utilize thermal and chemical methods. The main aim of the treatment system is to decontaminate pollution by removing pathogens. The facilities will insure that the equipment follows the state standards for disinfection. [9]

*1) Autoclavin:*The autoclave works on the basis o f the regular pressure cooker.

- This process involves the use of steam at high temperatures.
- The steam generated at high temperature penetrates the waste material and kills all microorganisms.
- There are also three types: Gravity Type, Pre-Vacuum Type and Retort Type.

In the first type (Gravity type), the gas is expelled by gravity alone. The system operates at temperature of 121 deg. C. And a vapor pressure of 15 psi. That's 60-90 minutes. Vacuum pumps are used to remove air from the Pre vacuum autoclave system so that the time cycle is reduced to 30-60 minutes. It's running at about 132 deg. Autoclaves of the Retort are built for a much higher vapor temperature and pressure. Autoclave treatment for microbiology and biotechnological waste, waste sharp, soiled and solid waste has been recommended. Such technique makes other types (referred to in the rules) of biological waste harmless and unrecognizable in such a manner that the processed debris can be replaced with dirt.[8]

2) Microwave Irradiation

- The microwave is based on the principle of generating high-frequency waves.
- These waves cause the particles to vibrate within the waste material, generating heat.
- The heat produced from within destroys all pathogens.

3) Chemical Methods

- One percent of total of the hypochlorite solution may be used for chemical disinfection.

4) Plasma Pyrolysis: Plasma pyrolysis is a state-of-the-art technique for the safe disposal of medical waste. It is an environmentally friendly technology that converts organic waste into commercially useful by-products. The intense heat generated by the plasma enables all types of waste, including municipal solid waste, biomedical waste and hazardous waste, to be disposed of in a safe and reliable manner. Medical waste, when comes in contact with the plasma arc, produces pyrolyzed into CO, H2 and hydrocarbons. These gasses are burned and produces high temperature (around 1200oC).[9]

V. BENEFITS OF BIOMEDICAL WASTE MANAGEMENT

- Cleaner and safer environments.
- Reduction in the incidence of acquired hospital and general infections.
- Reduction in hospital infection control costs.
- Reduction in the risk of disease and death related to re-use and re-packaging of dangerous disposables.
- High occurrence of workplace and community health risks.
- Reduction in the expense of waste management and revenue generation by appropriate treatment and disposal of waste.
- Improved image of healthcare establishments and improved quality of life.

VI. RECOMMENDATIONS

1. For the use of incinerator Education should be provided to a certain number of staff members.
2. Specific funds should be set aside for the use of incinerator
3. Each hospital should have special boxes to be used as a dustbin for biomedical waste.
4. Biomedical waste should not be mixed with other waste belonging to Municipal Corporation.
5. Private hospitals should also be permitted to use the incinerator that is located in the government hospital. For this reason, a separate fee may be paid from private hospitals.
6. A special vehicle, i.e. a biomedical waste vehicle, should start collecting and transporting waste from private hospitals and private medical clinics to the main incinerator.
7. As provided for in the biomedical waste rules, due to their hazardous nature, the entire waste should be fragmented into colors.

8. The Biomedical Waste Management Board may be established in each district.
9. Whether judicial powers should be imposed on the management board or a special court should be formed in cases of environmental pollution for penalties and damages, etc.
10. Housekeeping staff wear protective equipment such as boots, face masks, gowns when treating waste.
11. There is a biomedical waste sticker on the waste transport bags and the waste transport trolley, as well as a sign on the wall next to the bins (waste) giving details of the form of waste to be disposed of in the luggage as per the biomedical waste management regulations. Carry bags have a symbol of biohazard on them.

VI CONCLUSION

Medical waste should be classified by source, typology and risk factors associated with its handling, storage and disposal. Segregation of waste at source is a key step, and reduction, reuse and recycling should be considered in the appropriate light. We need to consider innovative and radical measures to clean up the distressing picture of a lack of civic concern on the part of hospitals and a lack of governmental commitment to implementing bare minimum rules, as waste generation, in particular biomedical waste, imposes increasing direct and indirect costs on society. The task before us, however, is to handle theoretically rising amounts of biomedical waste that go beyond past practices.

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Thakur Institute of Management Studies, Career Development & Research (TIMSCDR) was established under the aegis of Thakur Educational Trust (TET)in the year 2001 with a clear objective of providing quality technical education in tune with international standards and contemporary global requirements, offering 2 years postgraduate degree in Master of Computer Applications (MCA). The Institute is approved by the Government of Maharashtra, AICTE and is affiliated to the University of Mumbai.

The Management's commitment to excellence is reflected in the marvellous infrastructure that is comparable to the finest institution of its type in the country. The sprawling campus with lawns, gardens, playgrounds, parking area, and hostel accommodation ensures a right academic ambience essential for centre of higher education.

At TIMSCDR, the importance of faculty is well understood which is reflected in qualified and experienced teaching staff. A closely monitored quality, assurance mechanism ensures proper coverage of syllabus within right time frame.

Application of modern technology in teaching-learning process and day to day governance of the Institute makes TIMSCDR unique. The Institute has dedicated 50 Mbps broadband internet connectivity and also has WI-FI facility. Residence-cum-study facility is available for boys and girls in secured modern Hostel Buildings with green, clean and healthy ambience situated near the Institute.

The Institute focuses on imparting knowledge to the students that persists even when they pass out and step into the corporate world. The syllabus has been given a new dimension through experienced faculty and state of the art infrastructure. The overall personality development through extracurricular activities arranged by Students Council, Entrepreneur Cell and DLLE etc few have been a hallmark of the Institute.

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