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# Tech Tonics

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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**

## **TIMSCDR Research Journal**

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Thakur Institute of Management Studies, Career Development and Research will become a premier Institute renowned internationally for providing education in Software Application to graduates from various disciplines.

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11. Work as a member or leader in diverse teams in multidisciplinary environments.
12. Use Innovation and Entrepreneurship for creation of value and wealth.

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## **Editorial**

The ninth 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), Waste Management, Digital Marketing, e-Commerce and Remote Sensing and its applications 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 seventh 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



# **RESEARCH PAPERS**



# Use of RFID and IoT for Urban Waste Management

*Guided by : Dr. Rajesh Kapur*

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**Abstract**— This paper discusses how radio frequency identification (RFID) and the Internet of Things (IoT) technologies can be used to detect excess urban waste; and how waste areas can be converted from being an environmental hazard to a resource-conserving, sustainable generators of urban agricultural products. This can be achieved by increasing the scale and scope of urban agriculture in conjunction with technology. We discuss how urban waste may be transformed into resources while productively utilizing vacant lands and improving landfills. This paper also discusses a case study of urban agriculture program.

**Keywords**—RFID, IOT, Environmental Hazards

## I. INTRODUCTION

The issue of managing the waste generated in the cities of India is threatening to turn into an environmental disaster. According to the 2011 census the population of India crossed 1.2 billion mark out of which over 30% of the population is urban. India generates around 62 million tonnes of waste every year but collects less than 60% of this and processes only 24%. Due to this situation of under-processing of the waste collected, the landfills are overflowing and quality of land is deteriorating. This is in turn, posing as a threat to the living beings and the environment. Technology can be used to find solutions to the problems of the environmental disaster posed by these problems. In this paper we discuss certain solutions to the problem that incorporate ICTs. The term Internet of Things was introduced by Kevin Ashton, who was the director of the Auto-ID Centre of MIT in 1999 [1].

## II. WASTE GENERATION

The waste generated in India can be divided into three major categories:

- Organic (all kinds of biodegradable waste),
- Dry (or recyclable waste) and
- Biomedical (or sanitary and hazardous waste).

Nearly 50% of the total waste is organic with the volumes of recyclables and biomedical/hazardous waste growing each year as the urban population in India increases.

As mentioned above, only 24% of the total waste collected is processed. The collection rate needs to be improved to avoid illegal dumping and burning waste at street corners and

unoccupied lands. Every Indian town has at least one landfill area. All the collected waste is dumped out of which only limited waste is processed hence, the waste keeps piling leading to deterioration of land quality as well as creating a nuisance to people.

Dump yards are frequently known to catch fires. For instance, the one at Deonar in 2016, located in Mumbai (the most populated metropolitan city of India, with a population of more than 11.5 million people), lasted for three months, pumping tonnes of cancer-causing smoke into the air, caused by burning plastic, leather, etc. Holding waste equal to the height of an 18-ft tower, the dumping ground at Deonar has led to the surrounding areas to be classified as the city's most polluted area.

## III. ILLUSTRATIVE ICT SOLUTION

Numerous challenges plague the waste management supply-chain today. One such challenge involves sticking to pre-defined routes irrespective of whether the bins are full to the brim or not. Initially the problem is to detect when waste has accumulated sufficiently enough to be collected. This may be done through intelligent sensors placed inside dustbins and garbage cans that are RFID enabled. The initial technical realization of IoT was achieved by utilizing RFID technology for the identification and tracking of devices and storing device information. However, IoT utilizing RFID technology was limited to object tracking and extracting information of specific objects. The current IoT performs sensing, actuating, data gathering, storing, and processing by connecting physical or virtual devices to the Internet. For IoT applications performing these functions, a variety of researches on IoT services including environmental monitoring [2, 3], object tracking [4], traffic management [5], health care [6], and smart home technology [7, 8] are being conducted. IoT trans-receivers can also be suitably fitted on these waste containers; they can be virtually enabled and connected intelligent technology, dustbins, and garbage cans can be connected to the Internet as a 'digital' bin or can. These are the future containers of our product; as an "Internet of Product", these can be monitored, supervised and managed by identifying fill levels with every waste dumping. This enables the monitoring of waste, the smart bin or IoT enabled garbage can. The scanned code can scan the code on that bin which can immediately send data to the waste collector. This data leverages collectors to identify the level and quantity of waste to be recycled. It can also be

to be recycled. It can also be used to further optimize logistic operations like what size of the vehicle should be used, which routes to follow, which garbage be collected later and so on.

#### IV. CASE STUDY

UK based ISB Global is using IoT powered applications to manage waste. Using advanced bin-level sensors, cloud-based data collection and a smart app, ISB has created a network of connected devices for effective waste management. The proposed Smart Garbage System (SGS) had been operated as a pilot project in Gangnam district of South Korea. In total 136 SGBs were deployed in Gangnam. The bins were applied to apartment housing areas in five of the sub-districts and to detached housing areas in the other district. Figure 1 shows the locations where the SGBs were deployed, their number, and the system implementation.



Fig. 1. Locations where SGBs were deployed, their number, and the system implementation

As shown in Figure 1, an SGB is structured with a conventional food waste bin placed inside. System implementation was performed by simply placing the SGB at the location where a conventional food waste bin was previously located and fixing the conventional food waste bin inside the smart bin. In addition, since the SGB operates on battery power, additional construction connecting it to a neighboring commercial electricity line was unnecessary.

#### V. RECYCLING WASTE

Proper waste management generates useful by-products (compost in the case of composting, energy in the case of WTE plants and fuel in the case of RDF plants) and creates a circular economy. With heavy subsidies in chemical fertilizers, farmers are not helped to move towards organic farming, as a result of which the market for compost is drastically reducing. A lot more needs to be done to create a market for compost and encourage farmers to move towards organic farming.

Similarly, recycling companies are competing with industries that use fresh raw materials. Buyers of recycled plastic pellets, have no incentives to go for sustainable initiatives, unless some kind of cost savings is involved. Some of the organic wastes can be processed to give by-products like ethanol, etc. This reduces the emission of greenhouse gases compared to commercial processes used otherwise.

Rules can be set by the government like:

- A mandate for all waste generators to segregate waste at their own level with penalties for disposing them off inappropriately.
- Promotion of WTE (waste-to-energy) plants and a directive to the Department of Fertilizers to market compost along with chemical fertilizers.
- Provision for local bodies to levy waste collection fees on waste generators.

In addition to the above rules following measures can be undertaken:

- Urban Local Bodies not only need to be mandated for managing waste but also penalized for use of landfills.
- India needs highly scientific and automated mechanisms of managing the huge volumes of waste. Hence, facilities need to be decentralized to enable efficient management of related activities and save on transportation costs.

As a significant amount of waste will be processed and used up the landfills, they can be used for urban agriculture, thus increasing the quality of the land.

#### VI. CONCLUSION

It can be concluded that proper waste management is the need of the hour, especially in urban areas. If proper rules and techniques are implemented, this can be efficiently done. It can be beneficial as the waste is reused as resources which thus forms a closed loop system where wastes can be converted to resources. Proper waste management can also lead to landfills being used in a more productive way.

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# A Survey of Authentication of RFID Devices Using Elliptic Curve Cryptography

Guided by: Prof. Pankaj Mudholkar

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**Abstract**— RFID is a wireless technology for automatic identification and data capture and it is the core technology to implement internet of things. Because of that, the security issue of RFID is becoming more important. In past, simple mathematical and logical method, hash based schemas and simple PKI schemas were introducing RFID authentication. In this paper, we illustrated the possible security attacks on RFID and three different authentication algorithm of RFID based on ECC. We also described why ECC is the best method among them.

**Keywords**-RFID, Reader, Tag, Backend Server, Authentication, Security, ECC

## I. INTRODUCTION

RFID system is composed of tags, readers, backend sever, and antennas. RFID tags are available in affordable charges, wireless devices which can be communicate with RFID readers [1].RFID architecture shown in below figure which consist tag, reader and back-end server. Tag consist EPC (electronic product code) which store details about tag. Reader is responsible for reading and writing tag information. Back end sever will save all data about tag which are in one group .Communication in RFID network will start on reader broadcast message or query. Communication between tag-reader and reader-server is in insecure channel.

In this paper, we analyzed security attacks possible on RFID, discussed RFID device performance measurement and three authentication method or protocol.

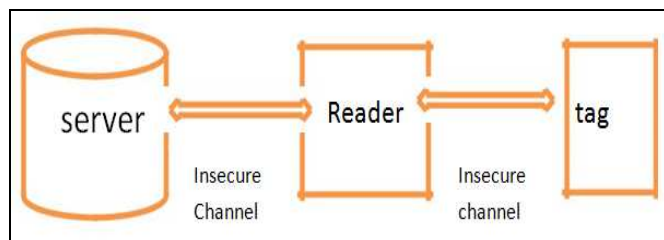


Fig. 1. RFID architecture

### A. Security Attack on RFID

Denial of Service (DOS): In both of wireless and wired communication, there are Denial of Service (DOS) . Once attackers control a large number of fake readers and tags, they

can make the data connection to abuse computational resources, and even use up the resources and network bandwidth [1] .

Eavesdropping: The communication channel between the tag and the reader can be eavesdropped, because the radio frequency channel is not secure communication channel [2].

User privacy: The attacker can monitor the tag using the tag identifier in order to know the user's behavior, when the user identity is linked to a certain tag. Also, the attacker can trace the user location with the tag identifier, when the output of the tag such as the tag identifier is unchangeable [2].

Replay attack: The attacker obtains messages between the tag and the reader by eavesdropping and reuses the message in order to impersonate a legitimate tag or a legitimate reader [2].

Spoofing attack :The attacker impersonates a reader, sends a query to a tag, and then obtains the response of the tag. When the legitimate reader queries the tag, the attacker will send the obtained response to reader in order to impersonate the tag [2].

Cloning attack: An attacker can build a cloned tag which will be interpreted by the reader as the legitimate tag, due to the fact that most tags are not tamper-proof [2].

### B. Performance

RFID schemes cannot use computationally intensive cryptographic algorithms for privacy and security because tight tag cost requirements make tag-side resources (such as processing power and storage) scarce [3].

- Capacity minimization: The volume of data stored in a tag should be minimized because of the limited size of tag memory
- Computation minimization: Tag-side computations should be minimized because of the very limited power available to a tag
- Communication compression: The volume of data that each tag can transmit per second is limited by the bandwidth available for RFID tags [3].
- Scalability: The server should be able to handle growing amounts of work in a large tag population. It should be able to identify multiple tags using the same radio channel [3]. Performing an exhaustive search to identify



individual tags could be difficult when the tag population is large [3].

## II. LITERATURE SURVEY

Authenticity can be achieved by a secure protocol running between RFID tag and reader [4]. To achieve authentication public key cryptography (PKC), non-public key cryptography (NPKC), hash function, hash with random number, simple bitwise operation, AES, HMAC schema can be used. The suitability of PKC for RFID is an open research problem due to the limitation in tag cost, gate area and power consumption. Among PKC algorithms, ECC based algorithms would be the best choice for RFID system due to their small size key and efficient computation. So, ECC is very attractive for small devices like RFID with limited computational capacity, memory and low bandwidth network. In this paper we will discuss three ECC based RFID authentication algorithms.

### A. Secure ECC based RFID authentication protocol with ID verifier

This paper[Liao's schema] proposes an ECC based mutual authentication algorithm that satisfies the essential requirements in RFID system [2].

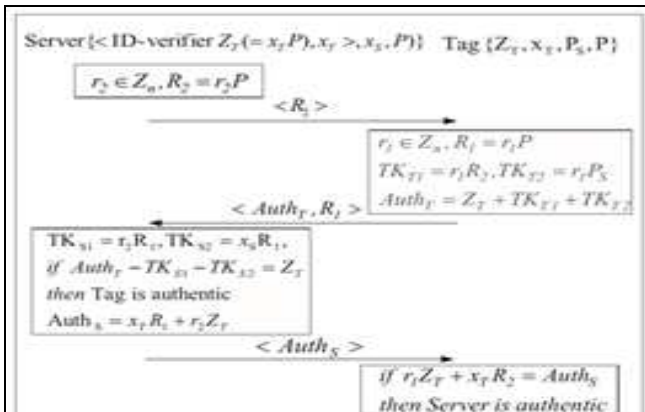


Fig. 2. Liao's schema

In this algorithm tag believes that the ID verifier  $Z_T$  is securely transmitted to the server and vice versa. This algorithm provide Mutual authentication, confidentiality, forward security, scalability. This algorithm resisting replay attack, tag masquerade attack, server spoofing attack, location attack, cloning attack [2].To implement this schema successfully a powerful server device needed [2]. There are also some other schema [3-6] which are more efficient then this schema in tag computational time [2].

### B. Cryptanalysis and improvement of an efficient mutual authentication RFID scheme based on elliptic curve cryptography

This paper is improved version of Chou's protocol [7] based on ECC which is failed to provide mutual authentication and cloning attack [8].

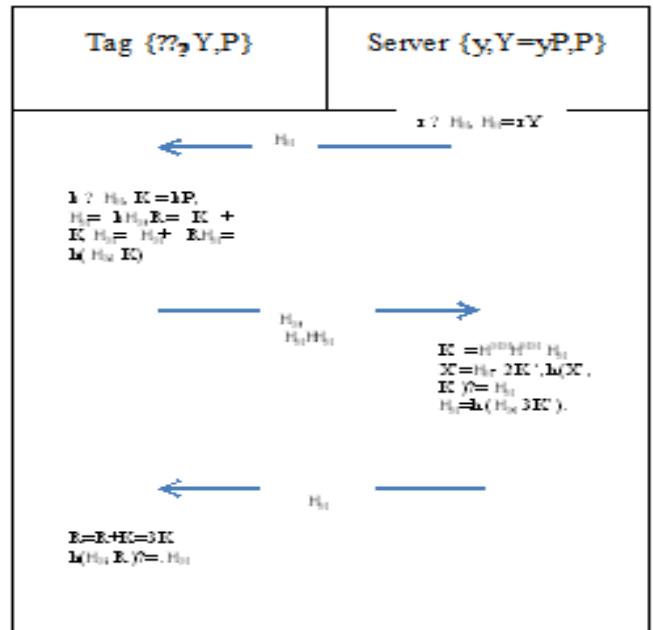


Fig. 3. Chou's algorithm based on ECC [9]

Weaknesses of Chou's schema: Lack of tag privacy, forward privacy and mutual authentication. Farash introduces improved version of Chou's algorithm to achieve mutual authentication and tag privacy [figure 4]. Farash's schema has proof against mutual authentication, tag privacy. Computational cost of Frasah's schema is same as Chou's schema [8].The total computation of schema is very high. To improve this some pre computing technique should use [8].

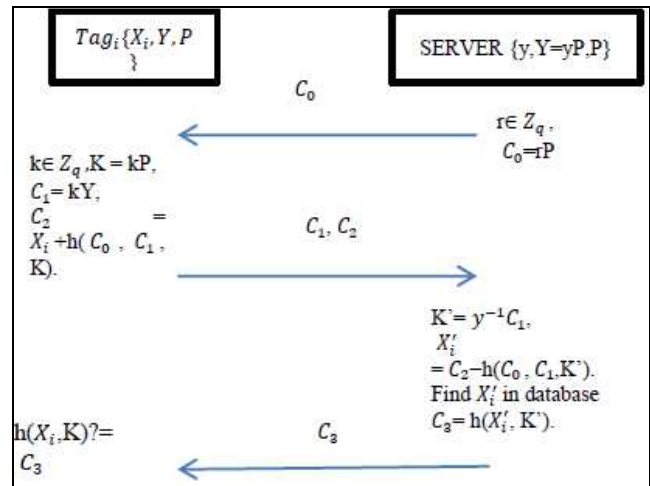


Fig. 4. Farash's authentication

### C. Elliptic Curve Cryptography Based Mutual Authentication Protocol for Low Computational Capacity RFID Systems - Performance

Analysis by Simulations In this paper no reader communication is only happen between back end server and tag. In this, group key is use to perform authentication instead of individual key [9].

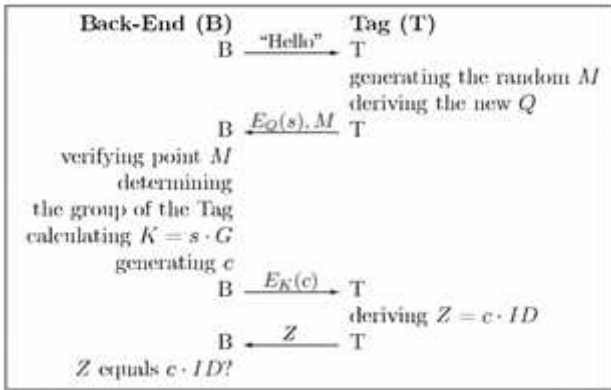


Fig 5. Godor's schema[9]

While in use of 160 bit elliptic curve might be very big and required high computational capacity and strong back-end sever[9]. This paper have implementation in OMNET ++. Godor's schema is acceptable for every attack except DOS . This schema also prove that computational time for 112 bit and 160 bit are almost near.

TABLE 1  
Comparison

Attacks	Liao's	Farash's	Godor's
Mutual authentication	Yes	Yes	Yes
Scalability	-	-	-
DOS	-	-	No
Cloning	-	-	-
Server spoofing	-	-	-
Replay	-	Yes	-

Comparison factor	Liao's	Farash's	Godor's
Computational time	.32 sec	Not measured	.1006(160bit)

### III. CONCLUSION AND FUTURE SCOPE

In the conclusion, three of them are ECC based authentication schema; all are proved more efficient against simple PKI, simple HASH, AES and RSA. All three have much computational time to perform authentication and all three needed high capacity back-end sever. So, in future some pre-computational method can be implemented with ECC.

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# An ATM with an Iris Authentication

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**Abstract—** This paper gives an overview about the automated iris recognition as a biometrically based technology for the personal identification and verification. The main motivation of this stems from the observation that the human iris provides a unique structure on which to base a technology for non-invasive biological assessment.

**Keywords—** Iris Recognition, Fingerprint Recognition, Face detection

## I. INTRODUCTION

Efficiently technology is the collection of techniques, skills and methods people use to improve their surroundings. It is also the knowledge and technique of using the tools and machines to do tasks.

An Automated Teller Machine (ATM) is a specialized computer that makes it convenient to the customers of a financial institution with access to financial transactions in a public space without the need for direct interaction with bank staff. On most modern ATMs, customers are identified by inserting a plastic ATM card that contains a unique card number and some security information, such as an expiration date or CVVC (CVV) into the ATM, with authentication being by the customer entering a personal identification number (PIN), which must match the PIN stored in the chip on the card (if the card is so equipped), or in the issuing financial institution's database. [1]

The problem with the current functioning of the ATM is that if a person forgets his/her ATM PINs then he is not allowed to do the transactions further. Also if a person somehow knows your ATM PIN and manages to steal the ATM card then he can easily access the ATM and remove the money. There has been various ATM card duplication frauds in the recent years. Recently in Kolkata people complained about ATM skimming where fraudsters used the card skimming technique to clone debit/credit cards to withdraw money from remote locations. In order to overcome these problems there is an urgent need to have some powerful authentication techniques which can uniquely verify an individual.

Biometrics is the science and technology of analyzing physical or behavioral characteristics specific to a particular individual in order to be able to uniquely authenticate their identity. It is any means by which a person can be uniquely identified by evaluating and examine one or more

distinguishing biological traits. Unique identifiers include hand geometry, fingerprints, earlobe geometry, retina and iris patterns, voice waves, DNA, and signatures

## II. OVERVIEW

Herein lies a major difficulty involving the trade-off between usability, security and to remember them. Various methods for increasing security, such as regularly changing PINs and passwords, increasing their length, ensuring they do not form words and ensuring all are different, makes them more difficult to remember and, therefore, error-prone. Alternatives to the normal Personal Identification Number (PIN) have additionally been investigated as an example mistreatment photos rather than numbers.

Since these traditional methods rely upon the assumption that the artifact (such as key or card) will be under the security and with the right owner and that the information to activate it will be kept secret. Unfortunately, none of these assumptions can be wholly relied upon. Since today there are many techniques used to breach the security.

Biometric techniques may ease many of the above problems: they can confirm that a person is actually present (rather than their token or passwords) without requiring the user to remember username, password, etc. The goal is to make sure that while this new and secure technology is developing we understand both the system and the user issues associated with it. The motive is to provide a summary of the user-centered aspect to understand attitudes towards, and behavior with, biometrics verification at the Automated Teller Machine (ATM) interface. [2, 3, 4]

### A. Biometrics Technology

The term biometrics refers to any and all of a variety of identification techniques, which are based on some physical or behavioral characteristics of the individual, contrasted with those of the wider population. Unique digital identifiers are created from the measurement of the characteristic and they are distinctive, measurable characteristics used to label and describe individuals.

All the biometrics approach follow a similar operation: firstly a digital template is created during an enrolment process, and then the template is stored in a database. During the verification process, the relevant template is extracted and

compared with the data input, say in the form of a fingerprint, or an acquired iris image, for positive identification.

At the ATM, verification requires a one-on-one match of a template to an acquired image rather than an attempt to match and search against a database of all customers. This implies that the ATM user would still require their access token (card). This would either offer a novel symbol to access the example to verify the user against or within the case of good cards could store the example on the card reducing a number of the info storage problems, each privacy and security primarily based, which surround biometrics. The performance of biometry is measured by victimization applied math techniques to predict their technical accuracy. Two measures, false accept rate (FAR) – the likelihood that the wrong person is accepted and false reject rate (FRR) – the likelihood that a legitimate person is rejected form the basis for comparisons. The problem is that these measures area unit interconnected, as one increases, the other decreases. A second drawback is that the tactic by that the bottom knowledge area unit collected will seriously impact the performance achieved.[8]

Other factors to consider are the size of the template, the speed of enrolment and recognition or verification. It is also necessary to consider failure to enroll and failure to acquire. Failure to enroll refers to those people who either do not possess the biometric or cannot use the system (outliers). In the case of fingerprints this is thought to be as much as 10% of the population and with iris 0.005%. Failure to acquire is where the interaction between the user and the system breaks down due to some issues and the system does not succeed in acquiring an adequate image to validate the person respectively.

### B. Iris Verification

The iris is a thin membrane on the interior of the eyeball. Iris patterns are extremely complex. Patterns are individual (even in fraternal or identical twins).Patterns are formed by six months after birth, stable after a year. They remain the same for life. Imitation is almost impossible. Patterns are easy to capture and encode.

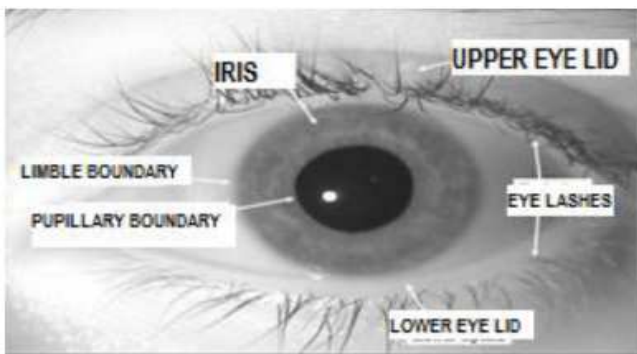


Fig.1. View of an human eye

With iris verification, for application at ATMs, a wide angle camera finds the head of the person to be identified. A zoom lens then targets in on the user's iris and takes a digital photo. A template of concentric lines is laid on the iris image

captured by the camera and a number of specific points are recorded and the information converted into a digital template. This can then be compared with others for verification and identification purposes. [5]

A complete iris recognition technique can be split into four stages: Image acquisition, Segmentation, Encoding and Matching [6]

1) *Enrollment*: The enrollment stage creates a user profile for subsequent authentication activities. Basically, a new user provides multiple biometric reading samples that are combined to form one stored record.

2) *Authentication*: Here a template is created for an individual and then a match is searched for in the database of pre-enrolled templates.

3) *Image acquisition*: One of the major difficulties of automated iris recognition is to capture a high-quality image of the iris while remaining non-invasive to the human operator.

4) *Image Segmentation*: At this stage, the iris is extracted from the eye image. The extracted iris region was then normalized into a rectangular block with constant dimensions to account for imaging inconsistencies.[8]

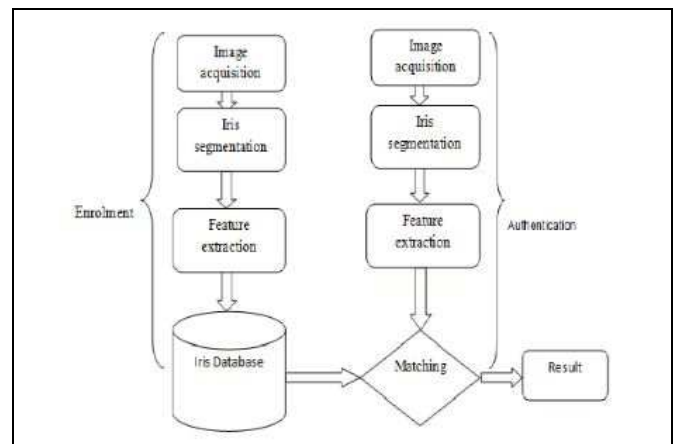


Fig. 2. Architecture of Iris Recognition System

The general interest in iris verification applied to public technology is centered upon its accuracy or reliability, which is much greater than say fingerprints, and the fact that the biometric itself can be acquired without the individual having to come into physical contact with the 'end-point'.

For example, Axis Bank has taken the first initiative to implement Iris-based authentication. In an announcement the bank stated that Iris recognition gives a 98.2 percent authentication success rate. And this technology could authenticate an individual in just three to five seconds. [7, 9, 10]

### C. Issues and Future work

It is clear that with the on-going development of the iris verification prototypes, there exists a gulf between those general pre-usage attitudes, and subjective opinion following iris-ATM use. Our ability to predict consumer acceptance of new technologies and services requires that we acknowledge

some of the inherent limitations of focus groups and surveys. Whether these are developed with scenarios, or involve grounded discussion, our experiences demonstrate clearly that there is no substitute for 'hands on' experience with functional prototypes that adhere to the contextual attributes of the task to ensure that predicted behavior will be converted into real behavior. The earlier we make the consumers aware with these prototypes of the intended system, the better.

Every biometric device has its own set of usability issues and more work is required to ensure to understand the nature of permanent and transient exclusions to any biometric technology as well as the way to maximize the usability of a biometric to alter it to be utilized among public technology. Biometric technologies don't resolve the usability/security trade off. Biometric devices have to establish fault tolerance limits. Setting these narrowly maximizes security however suggests that the convenience of use may decline.

#### *D. Implementation Issues*

This paper has not addressed many of the issues which will arise during the implementation process which surround biometrics. These issues include establishing an effective enrolment process which educates the user and prevents identity fraud, dealing with those people who cannot use the chosen biometric either temporarily (failure to acquire) or permanently (failure to enroll) and how to deal with false rejects. Effective and real-time processes must be established to deal with these situations only with units.

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# Blockchain and the Internet of Things: The Opportunity of Blockchain in IoT

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**Abstract**— IoT is creating new opportunities and providing a competitive advantage for many businesses in current markets. It touches not just the data, but how, when, where and in which way you collect it. The technologies that have created the Internet of Things aren't changing the internet only, but rather change the things connected to the internet. Blockchain, a form of Distributed Ledger Technology that has been gaining enormous attention in areas beyond its crypto currency roots since more or less 2014. In this paper, we have highlighted the various opportunities and evolutions in IoT Blockchain.

**Keywords**—IoT, Blockchain, Distributed Ledger Technology

## I. INTRODUCTION

Blockchain technology or, also known as Distributed Ledger Technology, is believed to change all aspects of digital business and according to industry experts. Blockchain is now being considered to a bigger deal than the Internet. And if Blockchain and IoT are combined, you have two bigger deals than the Internet who need each other for numerous reasons.

Blockchain has been mentioned by virtually all research firms as a technology that is rapidly accelerating evolution. It is not just about financial services companies. The integration of Blockchain and the Internet of Things is on the agenda for many companies.[1]

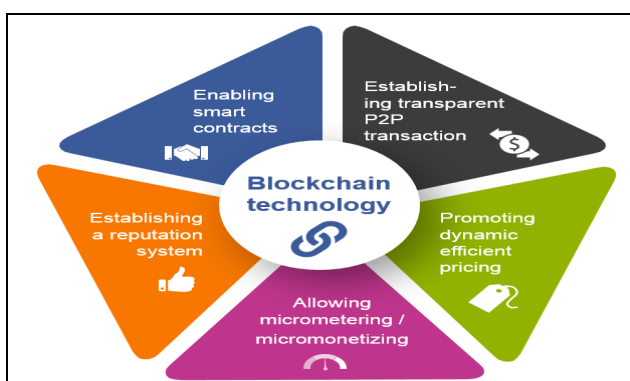


Fig.1. Blockchain Technology

## II. WHY IOT NEEDS BLOCKCHAIN?

The internet of things (IoT) was a hot topic in IT industry a few years ago, with everyone in industry pitching IoT platforms, “smart” products and automated, real-time, interconnected “things” everywhere. Even though IoT is still humming along, the hype has been somewhat curbed as there are high deployment failure rates. Moreover, IoT projects are grappled by IoT-enabled cyber threats like the Mirai botnet.

IoT researchers have warned that three-quarters of all IoT projects will take twice as long as planned to implement. Also, IoT security has been quoted as “a doomsday scenario waiting to unfold.” Needless to say that IoT is hard! Tackling this level of complexity in IoT to the core is required. In today’s increasingly digitalized world that we live in, the ability to make sensors, devices and computational “things” do tasks and day to day functions for us is becoming a necessity. Human beings just cannot manage the huge explosion of data and “interconnectedness” on their own. Building helpful IoT systems that run securely, efficiently and independently has proved incredibly strenuous. Blockchain is showing promise for easing that burden.

Cybercrime that is exploiting IoT devices and networks shows no sign of abatement. Thus identity verification, security and privacy issues remain foundational concerns in IoT deployments. There are vast amounts of IoT data needed to be collected, transferred and delivered in a secure fashion amongst valid stakeholders. The processing of this data now occurs at various layers within architecture to trigger decisions at the right point. [2]

## III. OPPORTUNITIES FOR BLOCKCHAIN IN IOT

The Blockchain model that we know is based on cryptographically secured, immutable distributed ledger technology and consensus helps in enhancing IoT frameworks with advanced automated resource optimization and innate security, thereby providing:

- A distributed system of record which is apt for sharing data across a network of key stakeholders.
- Embedded business terms which are helpful for automating interactions between nodes in the system.



- Verification of identity, hash-based security and provenance authentication.
- Consensus and agreement models for fast detection of bad actors and mitigating threats.

With such features, a Blockchain-enabled IoT deployment can immensely improve overall system health and integrity of devices by allowing them to be able to register and validate themselves against the network. Business logic can be easily executed automatically via smart contracts. And thus, with no central system to attack, threats such as denial of service attacks can be deterred inherently at different layers in the architecture [3]. If you apply a Blockchain model in an IoT network, it can solve a host of real-world digital business issues, including:

#### A. Analytical Model Tracking

This allows the system to record metadata and results about logic that is executed at the edge of the network for the purposes of regulatory compliance. This helps in creating an immutable history of why certain “decisions” were taken during IoT processing.

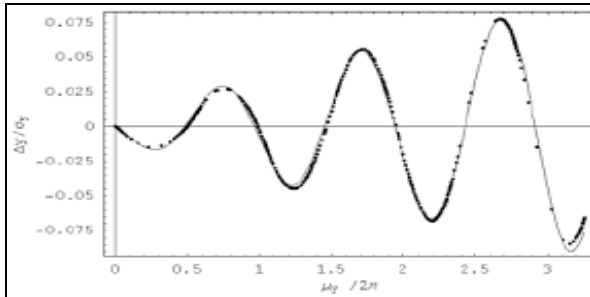


Fig.2. Graph

#### B. Secure Software Updates

This gives the ability to publish software updates as a URL on the Blockchain, also it provides with a cryptographic hash of the update which can be validated by Blockchain-connected IoT devices during the process.

#### C. Payments and Micro-Payments

This allows automated payments to business network participants based on sensor data. It also allows micropayments between devices themselves in certain networks for functions and capabilities — all without human involvement.

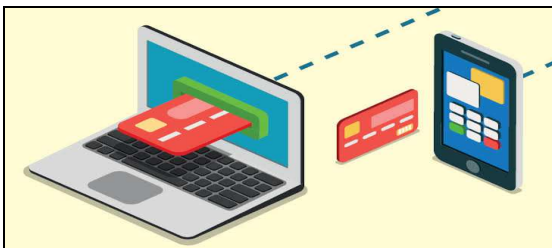


Fig. 3. Payment process in IoT

As Internet of Things applications are distributed it’s only normal that the distributed ledger technology will play a significant role in how devices will communicate directly between each other.


Blockchain is now being designed as a basis for applications that involve transaction and interactions. These applications can include smart contracts or other smart applications that require support of specific Internet of Things processes. This way Blockchain technology can immensely improve not just compliance in the IoT but also provide cost-efficiency

Here's why blockchain is a game changer for IoT


Leveraging blockchain for your IoT data offers new ways to automate business processes among your partners without setting up a complex and expensive centralized IT infrastructure.

**Blockchain's data protection fosters:**


- Stronger working relationship with your partners
- Greater efficiency as partners take advantage of the information provided



Enable IoT devices to participate in blockchain transactions



Reimagine the world's most fundamental business interactions; open the door to invent new styles of



Reduce the cost and complexity of operating sustaining business

Fig. 4. How Blockchain used IoT

## IV. CHALLENGES

There are three categories of challenges that Internet of Things and Blockchain ecosystems participants must address.

#### A. Technology Problem

Here mainly security comes in the picture. It has been made very clear that security needs to be even more looked at. It is extremely important to note that Blockchain is seen as the best way to secure the Internet of Things.

#### B. Operational Challenges

The business model and the practical aspects of using Blockchain in IoT must be considered as this requires many agreements and of course many actors too in a broad ecosystem.

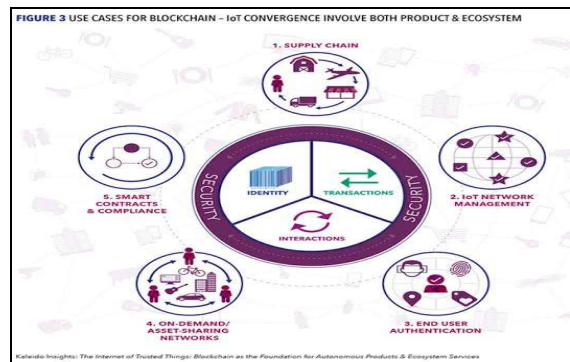


Fig.5. Use cases for Blockchain

### C. Legal Compliances and Issues

There are several responsibility issues in case of actions that are taken by devices, based on a rule that is automatically executed by a Blockchain-based application, triggered by another Blockchain-based application. Moreover there is the mentioned example of smart contracts. As industry experts tell us, contracts are far from easy, even outside this IoT and Blockchain context. [4]

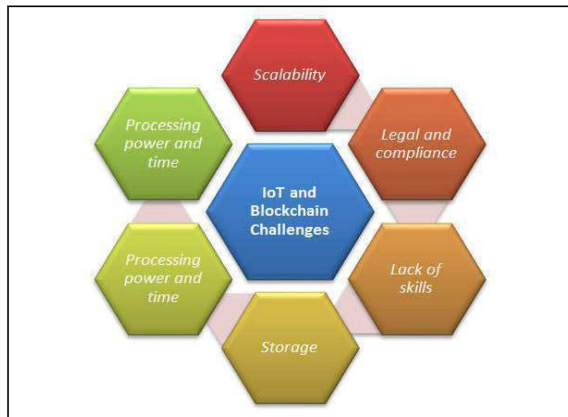
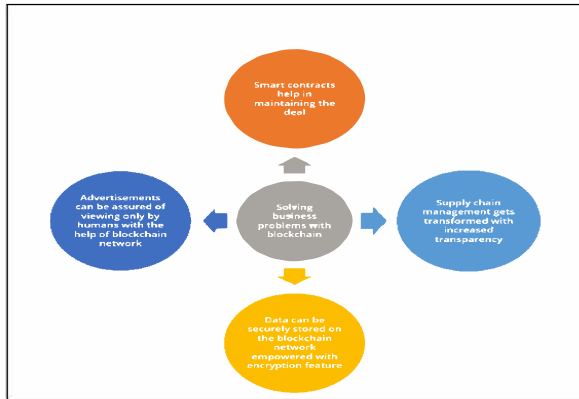


Fig.6. Security and Challenges in IoT

### V. APPLICATION AREAS

Blockchain is being tested in several industries right now. And sometimes we see that in those industries there exist a link between Blockchain and IoT. The main use case of Blockchain in insurance is for smart contracts and the enhancement of several processes such as claims management. Other applications of Blockchain in insurance include fraud management for legally required applications. IoT data and Blockchain can lead to intelligent automated insurance policy applications if implemented successfully [5].

In future scope of Blockchain and IoT, it's interesting to look the combination of Blockchain and the Internet of Things as it's used in insurance and will increasingly move beyond the pure telematics model to the connection of real-time IoT data in various perspectives for various intelligent automated applications of insurance policy.

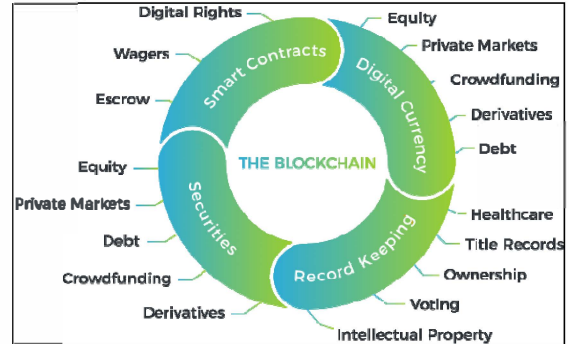


Fig.7. Application areas of IoT

### VI. FUTURE SCOPE

In spite of all this potential benefits of using Blockchain in IoT, applying Blockchain to IoT is not a cure-all for all its problems. Participants wanting to implement this combination need to address the current performance and scalability limitations are incompatible with many IoT functions. External data is needed to be incorporated via trusted "oracles." A new type of Blockchain platform is required that can support the volume of devices that are involved in an IoT deployment. With capabilities that are extended beyond today's common models, we require a hybrid or polyglot architecture, with varying frameworks customized to utilize Blockchain differently at IoT's edge, platform and enterprise layers

### VII. CONCLUSION

As businesses are being constantly grappled with core IoT complexity and security problems, it is now becoming very obvious that Blockchain-based solutions have merit and bring real value to the table. Blockchain is definitely not the answer to everything that ails IoT, but it can definitely play a powerful role in solving some serious issues. It might not save IoT, but it might just improve it.

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# Detection and Disposal of Medical Waste using IoT

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**Abstract**– It is the legal and social responsibility of all the people involved in health-care activities either directly or indirectly for safe and sustainable management of medical waste. This paper discusses how Information Technology (ICT) and Internet of Things (IoT) will help in detection and tracking of medical waste and proper disposal and treatment of the same. The paper highlights the use of ICT and IoT in medical waste management in various countries and aims at implementing the same in India. Use of wireless Radio Frequency Identification (RFID) to track indoor waste and Global positioning System (GPS) for tracking waste outside the premises is being used.

**Keywords** –Medical Waste Tracking, ICT, RFID, GPS.

## I. INTRODUCTION

Any waste generated by health-care activities like hospitals, pathological laboratories veterinary practices or dental offices is known as medical waste. Such kind of waste must be treated differently than any other normal office waste. All medical waste is of different types and hence should be segregated and treated differently. Generally, there are four types of medical waste. General medical waste constitutes approximately 85% of total hospital waste and consists of non-hazardous waste like paper, plastic and office waste. Such waste is disposed and treated normally like any other non-hazardous waste. Infectious Medical Waste pose a risk of infection to humans, animals and environment as a whole. Such waste includes blood-soaked bandages, body parts, surgical waste, sharp waste, cotton swabs and cultures. Every country and their state have certain regulations to be followed for treating infectious waste. Hazardous waste is dangerous but still it is not infectious to humans. Unused sharps come in this category since, they might puncture and harm the human skin. Chemotherapy agents fall into this category. Radioactive waste is a waste that contains radioactive. This waste generates from radioactive therapies for test such as thallium stress tests, and other nuclear medicine therapies to treat cancer patients. Also, pathological waste contaminated in radioactive material is treated as radioactive waste. Radioactive waste constitutes of 5% of the total medical waste [1, 2]. Whenever a patient is being treated, care must be taken to adhere to the rules of proper management of waste. Therefore, to solve human errors in waste management, this paper proposes a solution which is easy as well as affordable

and uses ICT to locate, track and manage medical waste, quickly, efficiently and reduce paper work too [3, 4].

## II. CURRENT METHODOLOGY

Normally, the medical wastes are segregated into different color coded container bins mainly yellow, red, blue and white. Yellow bins normally contain human waste, tissues, and other fluids. They can also contain certain chemicals, blood-soaked sheets, gowns, gloves, etc. Red bins contain contaminated waste that are actually hazardous in nature. IV tubes, catheters, syringes (without needles) and other plastic tubes. These wastes can be recycled since they are all plastic. White bins contain sharp objects that can puncture and harm human skin. Hence, such waste should be disposed of in puncture proof bags and then disposed in white bins. Sharp objects could include needles, blades, scalpels, etc. Blue bins contain various glass materials like beakers, broken test tubes, medicine vials, etc. To ensure proper collection and separation of waste, these bins should be labeled properly and kept together. The example shown below is that of a five-section consignment note with proper figures from a hospital in the United Kingdom [5].

Generally, any strategy controlling for health-care waste should have the following components.

- The consignment note should always be there with the medical waste from the hospital to the site of the disposal. On completion of the journey, the driver or the transporter should complete the section of the consignment note reserved for him and return it to the waste producer. The routing of the consignment note is illustrated in the figures in 1 and 2, respectively [5].
- The transporting organization should register themselves to the waste regulation authority and they should be known by the same.
- Handling and disposal facilities should issue the permission from the waste regulation authority for safe handling and disposal facilitation of medical waste.

### III. NEW METHODOLOGY

Today's healthcare organizations find it difficult to control the costs and hold on to valuable resources as well as providing quality services to its customers and properly manage waste. Healthcare organizations should monitor proper disposal of waste for the sake of the safety of their staff and patients. Existing manual systems require a lot of paperwork and human resources which cannot prevent unsafe disposal of waste. The proposed system uses the ICT to reduce human resources and paperwork by providing an automated system for across-the-board visibility and control throughout the organization and providing safety to the staff and patients from harmful waste.

#### A. In-door Tracking

The most interesting technique to track any medical waste within a healthcare organization is the use of Radio Frequency Identification (RFID) to track indoor garbage such as in waste bins. RFID is an automation method which identifies, stores and retrieves important data through wireless communication channels between Electromagnetic Waves (EMW) transmitters and receivers. RFID has gained much attention and interest in commercially localized systems as they are highly available, cost effective and small footprint [6,7]. RFID tags are color coded so as to match the medical waste bins.

A normal RFID consists of an RFID tag that includes an antenna and a chip, a reader equipped with an antenna and a transceiver, and a workstation to host Middleware and a database. The generic platform of the system is fully integrated solution for expert healthcare systems consisting of a flexible architecture and Application Programming Interfaces (APIs) for multi-system integration. It includes all RFID hardware, software, tags, receivers, repeaters, etc. The system can monitor and track real-time movements, tampering, temperature, humidity of the waste generated by healthcare centers.

The proposed system has both hardware as well as software components. The hardware architecture consists of RFID active/passive tags, RFID tag reader, web and database servers. The web and database server are located at one place or main station within the healthcare centre. The tag readers are distributed within the centre. The tags are programmed as such to contain information of all the items to be tracked, mainly bins and the tags are fixed on the items. Communication between tag readers and web servers is possible via wireless LANs. The software architecture consists of a communication driver which takes care of all the communication functions done at the main station, an API that analyses and handles the data, and a GUI that stores all the information about all the items that are tracked.

#### B. RFID Patient and RFID Radioactive Material Tracking

The use of radioactive materials has increased in healthcare centers due to increasing number of patients suffering from cancer and tumors which require radiotherapy to kill cancer cells within the body. When radioactive waste is disposed without proper care and treatment, the waste can pose hazardous to the staff as well as other patients. People have witnessed serious accidents caused by radioactive radiation in

<b>London Waste Regulation Authority</b> Waste Control Division Hampton House, 20 Albert Embankment London SE1 7TJ Telephone 071-587 3056		Serial Number <b>50/155050</b>
<b>CONSIGNMENT NOTE FOR THE CARRIAGE &amp; DISPOSAL OF HAZARDOUS WASTE</b> (Dept. of the Environment/Health Office/Quarantine Office)		Originator's Reference
<b>PRENOTIFICATION COPY</b>		
<b>Producer's Certificate</b> <b>A</b>	(1) The material described in B is to be collected from: _____ and (2) taken to _____ Signed _____ Name _____ On behalf of _____ Position _____ Address _____ Telephone No. _____ Date _____ Estimated date of collection _____	
<b>Description of the Waste</b> <b>B</b>	(1) General description and physical nature of waste (2) Relevant chemical and biological components and maximum concentrations (3) Quantity of waste and size, type and number of containers (4) Process(es) from which waste originated	
<b>Carrier's Collection Certificate</b> <b>C</b>	I certify that I collected the consignment of waste and that the information given in A(1) & (2) and B(1) and (3) is correct, subject to any amendments listed in this space: I collected this consignment on _____ at _____ hours Signed _____ Name _____ Date _____ On behalf of _____ Vehicle Reg. No. _____ Address _____ Telephone No. _____	
<b>Producer's Collection Certificate</b> <b>D</b>	I certify the information given in B & C is correct and that the carrier was advised of appropriate precautionary measures. Signed _____ Name _____ Telephone _____ Date _____	
<b>Disposer's Certificate</b> <b>E</b>	I certify that Waste Disposal Licence No. _____ issued by _____ County/District Council, authorises the treatment/disposal at this facility of the waste described in B (and as amended where necessary at C) Name and address of facility _____ This waste was delivered in vehicle (Reg.No) _____ at _____ hours on (date) _____ and the carrier gave his name as _____ on behalf of _____ Proper instructions were given that the waste should be taken to _____ Signed _____ Name _____ Position _____ Date _____ on behalf of _____	
<b>For use by Producer/Carrier/Disposer</b>		

Fig. 1. Example of a consignment note used in the U.K.

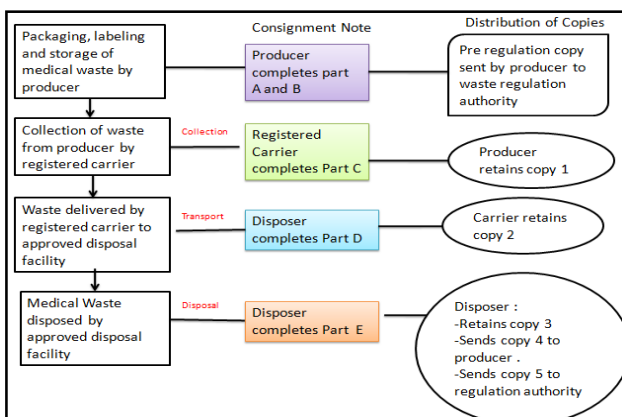


Fig. 2. Route of the consignment note taken



countries like Brazil in 1988 where four people died and 28 were seriously injured, Mexico and Morocco in 1983, Algeria in 1978. These accidents have been documented and researched upon. Radioactive waste comes in all the three states; solids, liquids and gases, but 80-85% waste comes in liquid waste. The radioactive materials are used for analytical procedures, body organ imaging, and tumour and cancer treatment. Radioactive materials need to be treated cautiously and with care. Hence, they are tracked by the proposed system from the moment the radiotherapy department receives them, uses them and disposes them.

The number of patients getting treated and admitted to the healthcare centres have increased considerably and hence it becomes difficult for the medical staff to properly keep a check on all the patients. The system shall regulate automatic tracking of the patients in such huge healthcare centres. Not only this ensures proper service being provided to the patients, but the system also keeps tracks of the location of the medical staff. The staff is tracked to enhance their efficiency at work and to protect them from certain threats. There are many healthcare facilities that use RFID technology but their software is limited to the hardware that is used. The proposed system closes this major gap. It includes a powerful parameterization tool, enabling the implementation of the RFID tracking project easily without any risky specific developments. Being an end-to-end RFID tracking software solution or system and at the same time open to any RFID hardware, the proposed system significantly reduces any total cost of RFID medical waste tracking implementations, without compromising on the RFID hardware selection and without taking any risk.

### C. Out-door Tracking

We have studied so far that since healthcare centres like the hospitals produce a lot of waste and they are responsible for the proper disposal and treatment of the waste. The proposed system has the Global Positioning System (GPS) tracking capabilities that enable to easily monitor the proper disposal of waste right from their transportation [8]. The GPS tracking system is cost-effective that provides real-time location of the medical waste, mapping and reporting of the same just like the GPS of any other device or vehicle. The system enables the hospitals and other healthcare centres to control their waste management system effectively and efficiently so that they can provide proper services to the patients and ensure their safety. In order to reduce the running cost of the system, the centres have to get the RFIDs and GPS recycled/reused.

### D. Statistical Module

By using the proposed system, each medical waste container is labelled, scanned, located, tracked and documented from “cradle-to-grave”. Therefore, it can be used to track the amount of medical waste generated by each department of a healthcare centre. A statistics data analysis module of the system enables the system administrator to estimate and predict any harmful or improper disposal of waste, and also estimating the proper amount of the waste produced and disposed in a particular period.

### E. Policy Enforcement

Policies are enforced properly when using this proposed system for the management of the medical waste in healthcare facilities. Without an evolution exercise, organizations may find that certain policies are actually impeding people’s ability to get their work done; often an increase in the number and severity of violations is an indicator that policies need to be adjusted.

## IV. DISCUSSION

Lack of knowledge and awareness of the harmful effects of the medical waste, inadequate training of the staff for the waste treatment and management, absence of smart or proper systems to detect and dispose the medical waste, inefficient financial and human resources to manage the waste as well as the least importance and attention given to the topic are the most frequent problems related to the healthcare waste [9, 10]. Many countries do not have proper regulations, or do not care to enforce them [11, 13]. The main and essential issue is taking over the responsibility for handling and disposing the waste. According to the “polluter pays” principle, the responsibilities lie with the waste producer, mainly the medical staff of any healthcare centre or the establishment involved with such related activities.

To seek achievement in proper disposal and treatment of the medical waste, estimating the financial costs required for the same should also be taken into account or should be considered. Improvements in healthcare waste management rely on building a comprehensive system, addressing responsibilities, allocation of resources, handling and disposal. The proposed system provides services like RFID tags, RFID reader, GPS, database management, third party integration, user permission and more. This guarantees robust performance of an architecture. It is highly scalable and evolves users’ needs. The proposed system can be used in small scale as well as large scale facilities. The system is an open system with exhaustive APIs which easily integrates itself with the currently running system of the centre. This a fresh, new approach to the management of medical waste. It reduces the overhead of the unnecessary paperwork, the harm that the waste can cause to the staff and the patients as well as the surroundings as a whole. The system is also highly cost-effective, providing an end-to-end solution to the waste management.

## V. CONCLUSION

The biomedical waste management needs utmost attention and care to minimize the potential risk of spread of diseases to the general public. In order to optimize the biomedical waste management, the new ICT system that is proposed has the various advantages. Tracking different types of waste, even hazardous ones in real-time, tracking and locating more thousands of waste items, segregation of waste in real-time. Ensuring that the wastes are properly getting separated and collected into different categories before being treated, Has real-time rule-based alerts to notify the staff of any radioactive and hazardous waste. Making sure the waste is stored far away from the populated areas within the healthcare centre to avoid

infection. Ensuring that the waste is stored away from the food storage area. A proper engineered design, also ensuring real-time checking of the temperature of the waste produced, also producing regular reports. Increases the sense of responsibility and awareness amongst the public about the biomedical waste management. Enhances the productivity and efficiency of the waste management staff. Reduces the manual work, so that the staff can concentrate on providing proper services to the patients and give more attention to the customer problems. Must have an alert system to alert the staff if there is any problem with the hardware or software of the system. This system works 24/7. It locates, tracks and maintains the statistics data of the same.

The proposed system ensures that the biomedical waste management leads to hazard-free environment of the healthcare facilities. It ensures that the such an automation of the system proves to be a boon to the facility, to the general public and the environment as a whole. This will also help to make everyone realize that how IT is important in every walks of life and how it eases our work and enhances the productivity and development of the mankind.

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# Green Computing: Approach to Green IT

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**Abstract**— Green computing can also be termed as Go-Green practice that assists lessening the carbon foot-print. Green computing facilitates us to a secure, safe and sound environment for the mankind. With rising energy cost and growing environmental concerns, GREEN COMPUTING is receiving more and more attention. Software and system architectures (in terms of concurrency patterns) play a crucial role in both computing and telecommunication systems, and they have been analyzed for performance, reliability, maintainability, and security. Yet, little work on analysis based on the amount of energy that the CPU/processor will consume has been reported. Since most communication systems have to run 24/7 (e.g., most server farms, servers in a Cloud computing infrastructure), the energy consumption of a system based on a specific software architecture is of great importance. Green Computing practices entail crafting, mechanizing, employing and disposing of computers proficiently with negligible impact on the atmosphere.

**Keywords**—*Green Computing, Cloud Computing, Energy Consumption*

## I. INTRODUCTION

Green computing is the practice of using computing resources efficiently. Modern IT Systems comprises of complicated networks both software and hardware level. Green computing is the utmost requirement to protect environment and save energy along with operational expenses in today's increasingly competitive world. It's also important to study about what kind of energy gains and operational gains can be achieved. Hence, analysis of the gap between what we have today and what we'll have to do is essential in order to achieve the benefits of green computing. It is true that Green Computing cannot be implemented in one day but every big change begins from small initiatives. For example a user must set the power option in a computer in economic mode or the computer should go to sleep mode when the user is not using the computer at all. When a user going away from the PC for more than a few minutes then the computer should go to stand-by mode and the monitor should goto standby mode or it may switch off automatic to save appreciable amount of energy. In recent years, companies in the computer industry have come to realize that going green is in their best interest, both in terms of public relations and reduced costs. Green computing or green IT, basically concerns to environmentally sustainable computing or IT. The GCI has promoted five core technologies for green computing and they are Cloud Computing, Grid

Computing, Virtualization, Green Data Center and Power Optimization. Data center is the major source of energy consumption. It consumes an incredibly large amount of energy, i.e. It consumes 50 times more the energy per square foot than the energy consumed by companies. As a consequence it discharges a huge amount of heat and detrimental gases that brings impairment to environment and human. According to an American survey, the energy consumption of the data center all over the world will double in next few years. Green computing can reduce this problem by introducing energy-efficient computing. Industries and Companies are increasingly focusing on developing and using such devices. Mobile phones are better than computers – green computing. A ccomputer is used for Surfing Internet, chat, gaming, social networking, downloading, desktop computing including documents, spreadsheets or presentation making or just watching photos and videos. On the other hand a mobile phone is capable of doing all these, rather sometimes more than the traditional phones. The mobile phones have faster processors, more ram, faster wireless Internet connectivity and larger memories. Mobile Phones consume very low power. VIA Technologies, a Taiwanese company that manufactures motherboard chip sets, CPU's, and other computer hardware, introduced its initiative for "green computing" If everyone takes into account green computing then our world of computers will have as little a negative impact on our physical world as possible and that is what green computing is all about. This paper describes need of the green computing and future of the green computing. The primary objective of such a program is to account for the triple efficiently bottom line. In the present world all most every person is using computer. Every office is computerized and every one can use the computer for their own purpose. But most of the users are not aware about the harmful effects of the computers. The computers emit carbon dioxide harmful gases. The energy consumption by various computing devices is also plays a main role towards our harmful environment. In the present paper the authors have made an systematic study on various issues and challenges of green computing and finally how one can implement green computing methodology in educational institution or in commercial environment.[1, 2]

## II. GREEN COMPUTING

Green Computing is the catchphrase of current era. It is in reality a part of Green Technology and it is our social

responsibility to practice it. The concepts of Green have to be introduced right from Design phase to Disposal phase of a product. It is a study and implementation of eco-friendly computing. At a time where business runs 24/7, there is an obligatory need to collect, store and analyze the large amount of data generated in business. All this comes at a cost for both business and environment because this big amount of data is stored in Data Centers and Data Warehouses. Data center use so much power to run the servers that house these data and releases so much heat which has to be cooled down so that servers are not affected by this heat. So the actual problem here is to reduce the amount of energy consumption.[2]

### III. WHY GREEN COMPUTING

Green IT and in particular, green computing, are two ways the information and communications technology community is working to address those problems. With the explosive growth of Internet-enabled cloud computing and high-performance computing centers, IT's energy consumption and sustainability impacts are expected to continue climbing well into the future. Efforts are underway in both industry and academia, however, to address it. As demand for computing and communication continue to grow, servers, networks, and data centers will consume more and more energy. For example, IT resources in the US now consume more than 1.5 per cent of total electricity consumption. Power consumption of US data centers in 2006 was 1.5 per cent of the total energy consumed, and at a cost of more than US \$4.5 billion. Figure-Implementation of green computing Today, the green communications concept focuses mainly on developing energy-efficient communication techniques for networks. Three main approaches are suggested for power management in communication networks: do less work, reduce operating speed, and turn off idle elements. Doing less work means optimizing processes so that the system executes fewer operations and thus uses less energy. Decreasing operation speed could prevent redundant resource use from the mismatched speed of sub processes. Finally, shutting down idle network components and links can obviously reduce energy dissipation. The total energy consumption by servers, computers, monitors, data communication requirements and cooling systems for data centers is steadily increasing. Each PC in use generates about a ton of carbon dioxide every year. As energy crisis depends and the resources deplete, we need to seriously think about making substantial changes in our lifestyle for energy conservation. Green computing is one way of dealing with the energy crisis. It is possible to reduce carbon emissions, save energy and protect the environment as a whole with this approach. Green computing is the practice of using computers and related technology in an environmentally responsible manner. It aims at radically changing the way we go about computing, using the electronic devices and following strict energy conservation guidelines, so as to minimize the damage caused to the environment by computers. This activity is not just limited to saving electricity, but also takes a holistic approach towards environment-friendly use of computers. Devising innovative and environment-conscious techniques for energy generation is also one of its aspects. Though computers are the wealth of knowledge, they also have obvious problems such as causing pollution, producing e-wastes and increasing the Green House

Gases. Employing Green computing not only alleviate these problems but also has additional benefits such as :

- It reduces the energy consumption and thereby saving energy.
- It is environmentally responsible and eco-friendly.
- It reduces the detrimental effects of computing and its resources.
- It facilitates energy-efficient computing and increases productivity.
- It implements the concepts of Recycle and by this means reducing the e-waste. [4,5,6]

### IV. GREEN COMPUTING TECHNIQUES

Saving power is the main objective of Green Computing and that is also with minimum impact to the environment. It is about how to reduce the power consumption of the monitors to save energy, increase the life time of the product and also to make it efficient. "Faster processors use more power, because they use too much power and their waste heat increases temperature for which air conditioning necessary, especially in server farms--between the computers and the HVAC. The field of green computing as "the study and practice of designing, manufacturing, using, and disposing of computers, servers, and associated subsystems such as monitors, printers, storage devices, and networking and communications systems efficiently and effectively with minimal or no impact on the environment. Some of the proposed methods are as follows:

#### A. Virtualization

Virtualization is a technology that is a step towards Green Computing. It is the most prevalent priority of Green IT. It provides a layer of abstraction called Hypervisor, which lies on the computer hardware. Hypervisor is a software program that focuses on logical view of computing rather than physical view and this allows it to run multiple Operating Systems on a single machine. Virtualization can be applied to core computing devices namely CPU (Processor), Storage (Hard Disk), Networking (Connection) and Memory (RAM). The commonly used Virtualization technique is Server Virtualization, but the focus has turned towards to Desktop Virtualization too. While Server virtualization is matured, Desktop virtualization is still under investigation. Industries view Virtualization as a Capital- Cutback scheme. Server Consolidation plays a major role in Industries and 80% of Industries are taking up projects that support Server Consolidation. A. Server Virtualization: In simple terms, Server Virtualization is reducing the number of Servers required and to increase the utilization of servers. Server Virtualization saves around 60%-90% of energy. Despite the fact that 90% virtualization is possible in theory; in practice only 60% is feasible. Reducing the server footprint reduces the power consumption and thereby reducing the cooling requirement. A supplementary benefit to Virtualization is Load Balancing, which balances the load among the servers available. Server Virtualization is achieved through Redundancy. Each server is backed up by 1 backup server. Initially, the backup server

count was high. It was later reduced to 3 and now to 1. At the moment, in more sophisticated organization, only one backup server is sufficient to backup n number of servers. This 1-backup server technique is reliable. Server virtualization is the sweet spot and priority of Industries. Consider a scenario where a Multi-level Industry has 2 data centers housing 4000 servers. This server count is huge enough to backfire on your budget. The industry made a smart move towards Server Virtualization and Virtualized 1500 servers. Now these 1500 servers alone will play the role of 4000 servers. This means that only 40% of the entire infrastructure has to be maintained now. This truly reduces the cost of computing and maintaining. In addition, the utilization of servers increased to 10%-16% and 60% reduction in networking is a side-benefit. In two more years, the industry will be able to virtualizes 80% of servers thereby doubling the benefits and profits. In my next paper, I shall talk about Server Virtualization in depth. B. Desktop Virtualization: Though desktop virtualization is still under investigation, it has already found its way into IT industry. It shares the same pros of server virtualization like saving energy and reducing power requirement. In desktop virtualization, all desktops in the enterprise are made to run in Data center and the computation is pushed out to the desktop. Thin clients are an alternative to normal desktop computing. [7,8,9,10]

### B. Conserve Energy

Activating the power management features on your computer saves energy and money while helping the environment. Your computer's SLEEP and HIBERNATE settings are two of the most effective ways for you to make your computer more environmentally friendly.

1) *Sleepmode* : Allowing the monitor to fall asleep after idling for some time Period is another easily employed method for improving energy efficiency. When a monitor falls asleep or enters a "stand by" mode, it enters a low power consumption state. It saves 60-70 percent of electricity. The monitor screen will be blank, with no light emitting from it.

2) *Hibernate mode*: The hibernate mode goes one step further than standby mode by completely powering off the computer. Invoking the hibernate mode causes the memory state to be saved onto the hard disk before powering down. When coming out of hibernate mode, the computer restores the memory state, returning the computer to its pre-hibernate state.

A desktop computer will consume approximately 3 watts in hibernate mode vs. 5 watts for standby A disadvantage of the hibernate mode is that it takes slightly longer to enter and exit hibernate than standby, the result of saving and restoring the memory state to and from the disk.

3) *System Standby Mode*: Standby is a mode the computer, monitor, or other device enters when idle for too long. This mode helps conserve power when a computer or computer device is not in use without having to sacrifice the time it would take to turn off and on the computer. When in Standby, the computer or monitor has a solid of flashing light, indicating that there is still power but the computer is in Standby. To resume, wake, or wake up a computer in Standby mode move the mouse, press a key on the keyboard, or press

the power button on the computer without holding it down for more than a few seconds.

## V. E-WASTE MINIMIZATION

By replacing petroleum-filled plastic with bio plastics or plant-based polymers, which require less oil and energy to produce than traditional plastics and developing solutions against a challenge to keep these bio plastic computers, cool so that electronics won't melt them. Landfills can be controlled by making best use of the device by upgrading and repairing in time with a need to make such processes (i.e., up gradation and repairing) easier and cheaper. Avoiding the discarding will not only control e-waste out of dumps but also save energy and materials needed for a whole new computer. Power-sucking displays can be replaced with green light displays made of OLEDs, or organic light-emitting diodes. Use of toxic materials like lead can be replaced by silver and copper making recycling of computers (which is expensive and time consuming at present) more effective by recycling computer parts separately with an option of reuse or resale. Computer systems that have outlived their particular function can be repurposed, or donated to various charities and non-profit organizations.[9,10]

## VI. GREEN INITIATIVES

### A. Upgrade with Efficient Components

Upgrading inefficient components inside of a computer can improve a computer's overall efficiency, although higher cost is sometimes a prohibiting factor, with component upgrades sometimes requiring other prerequisite components to be replaced first. A more cost effective alternative to component upgrades is to deliberately seek the greenest computer available when it comes time for replacement.

### B. Download software

Instead of buying software on disks in plastic packaging, try to download it from the web. Downloading software saves the materials, packaging, manufacturing and transport costs of a tangible copy and electronic downloads are often cheaper than their counterparts sold in the shops.

## VII. CONCLUSION

Neither Green Computing nor Green IT is just a new style; they are newer technologies that promise to provide environmental friendly computing. Corporate are moving not only for image but also to alleviate their budget problems. Though many newer techniques and technologies are mounting every other day, Server Consolidation is the top priority among corporate. To get an enhanced advantage, Industry should spotlight on reorganizing their datacenter infrastructure. The main objective of this technology is to reduce the energy consumption of computer related products. Green computing represents a responsible way to address the issue of global warming by adopting green computing, business leaders can contribute the environmental stewardship and protect the environment while also reducing energy and paper cost. So green computing is a mindset that asks how we can satisfy the growing demand for Network computing without putting such

pressure on the environment. There is an alternative way to design a processor and a system such that we don't increase demands on the environment, but still provide an increased amount of processing capability to customers to satisfy their business needs. Green computing is not about going out and designing biodegradable packaging for products. Now the time came to think about the efficiently use of computers and the resources which are non-renewable. It opens a new window for the new entrepreneur for harvesting with E-waste material and scrap computers.

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# Online Shopping in India - A Study on Recent Trends

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**Abstract-** Online Shopping or Internet shopping consists primarily of distribution, buying, selling, marketing, advertising and servicing of products with the help of internet and other computer networks. India is witnessing the tremendous growth in online shopping. This paper studies about recent scenario and trends in online shopping in India, such as popular categories of product, preferred way to pay for online shopping. Today's online shopping platforms provide many offers to consumers which attract consumers which consequently drives their business. The paper also delves into problems in online shopping like quality, security etc.

**Keywords—** Online shopping, Consumers, Security

## I. INTRODUCTION

Online or Internet Shopping: It's a type of web based business in which customers can purchase merchandise or administrations straight from the vender utilizing a web program. Different terms utilized for web based shopping are e-shopping, web shopping. Online Shopping was invented by Michael Aldrich in the year 1979 [1]. In 1980, Redifon's Office Transformation was propelled by him, which empowered the merchants, suppliers, consumers and operator to interface with the corporate framework over the web and portable exchanges electronically. In June 1999, K Vaitheeswaran and five of his friends with V S Sudhakar, Vipul Parekh, Hari Menon, V S Ramesh and Sundeeep Thakran founded India's first online departmental shop. The website Fabmart.com was unveiled in September 1999 which then tendered only music CDs for sale. Concerning February and October 2000, the website introduced extra categories including books, movies, watches, and groceries [2]. Today, online shopping has come to be the booming Waste Generation industry in India, some of marketplace leader's in India are Amazon.com, Flipkart.com, Myntra.com, Jabong, Snapdeal etc.

## II. ONLINE SHOPPING IN INDIA

India has an internet users base of about 450 million as of July 2017, 40% of the population. Notwithstanding being the second-largest userbase in world, only behind China (650 million, 48% of population), the infiltration of e-commerce is low related to markets like the United States (266 million, 84%), or France (54 M, 81%), but is growing at an unprecedented rate [3].

In 2016, about 69 million consumers purchased online and the number is expected to cross 100 million by 2018 with the rise of digital communities, better organization in terms of

logistics, broadband and Internet-ready devices to meet the demand in e-Commerce. In 2018, mobile commerce will become more important as most of the companies are shifting to m-commerce [4]. With increasing internet use, e-Commerce is growing in India and is becoming most used for commercial transactions. The Indian E-commerce is expected to surpass the USA to become second largest E-commerce market in the world.[5] The retail sector (which is one of the largest item in e-Commerce) is expected to increase by 60 percent to reach \$1 trillion by 2020, with the overall retail market to grow 12 percent annually [6,7].

For understanding the growth in online market in India can be seen from given below figure.

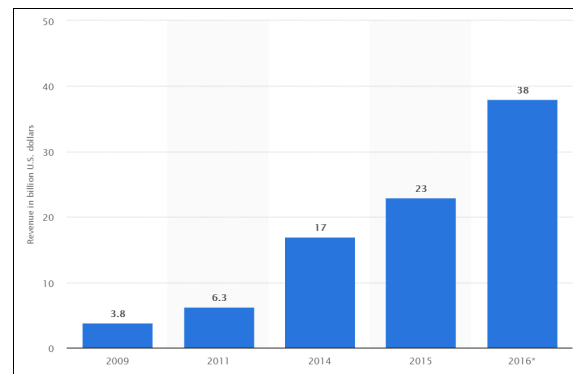


Fig.1. Online retail sales in India from 2009 to 2016 (in billion U.S. dollars) [8].

### A. Trends of Online Shopping in India

As would be expected, the 5 metros in the country are also the top 5 spenders in the country [9].

Table 1: Online retail sales in India city wise

City	State	% of total orders
Bangalore	Karnataka	14.12%
Delhi	Delhi	11.65%
Mumbai	Maharashtra	6.98%
Hyderabad	Andhra Pradesh	5.73%
Chennai	Tamil Nadu	4.12%

And from this, you can see that the top amongst these is South India (Bangalore, Hyderabad and Chennai) as compared to the North. Currently there are approximately 1.2

million transactions per day in ecommerce retailing. Given below is the split of sectors according to popularity:

- Electronics: 47%
- Apparel: 31%
- Home and Furnishing: 8%
- Book: 7%
- Baby Products: 2%
- Beauty: 2%
- Other: 7%

The leading online stores in India can be found from the figure given below.

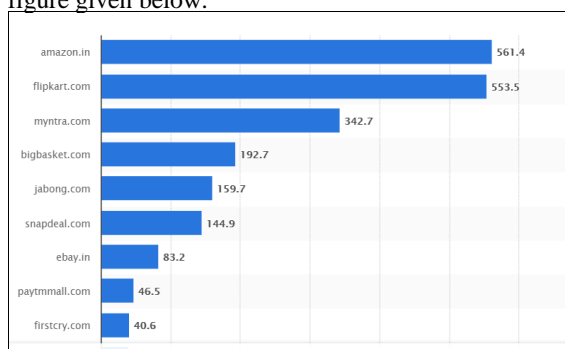


Fig.2. Leading online stores in India in 2017, ranked by net e-commerce sales (in million U.S. dollars) [10]

Amazon leads the ecommerce market share, with Flipkart following closely behind.

### B. Drivers of Online Shopping in India

Multiple factors are driving online shopping in India [11, 12, 13, 14]. Few of them have been discussed here.

1. Increased access to internet services has made it possible to make their purchase online. Better and faster 4g services have boosted the accessibility.
2. Abundant choices of shopping sites provide wide range of products and services.
3. Online shopping operates on a huge scale and thus the products are offered at discounts. For e.g. Amazon great Indian Festival, Flipkart's Big Billion days etc.
4. Behavior of Indian Consumers has also changed over the years. Consumers are not only using internet for booking their air, movie or railway tickets, but are purchasing a number of other products such as mobiles, home décor, apparels, and electronics.
5. Busy Lives leave people with less time to visit markets, malls or other conventional stores. Online shopping has made buying things very easy.

6. Online shopping this day's provide various facilities such as exchange or return policy which are very useful.
7. Marketers are using social platforms like Facebook, Twitter, Google plus, to promote their products which lead's in consumer having information. This has increased online shopping as these platforms are very famous.
8. Special cash-back policies offered by online shopping websites.
9. 24 hrs Customer Care services by many shopping websites helps solving customer queries. As a result customer's trust is gained.
10. Better and safer online banking services helped in gaining trust of consumers who earlier hesitated in sharing their details with shipping online.
11. Various pages on Facebook and Instagram offers stylish and latest clothing, footwear, fashion accessories, bags, mobile accessories and various products at affordable price which has made online shopping famous among the young consumers.

### III. PROBLEMS IN ONLINE SHOPPING IN INDIA

Issues hindering growth of online shopping in India are discussed here [15, 16, 17]

#### A. Quality issues

The most concerning issue while purchasing things online is that you have no certification of an item's quality. With the volume of merchandise web based business organizations handle nowadays, it can be very troublesome for them to direct quality keeps an eye on every single one of the items they're offering. Furthermore, the issue of getting the right size remains a genuine disadvantage for purchasing attire and footwear on the web. Sizes change from brand to mark, and since you can't experiment with the items previously getting them, choosing the size is dependably a bet.

#### B. Delivery and logistics

One uncertainty that continually turns up while shopping on the web is the point at which the request will be conveyed. Conveyance faculty regularly turn up at our homes when we're grinding away or out some place as there's no real way to settle a specific vacancy for the conveyance to occur. This same issue exists while returning items.

#### C. Digital payment failures

Regardless of whether a client is paying by credit/check card, net banking, or one of the few computerized wallets that exist today, the disappointment of advanced installments dependably lingers overhead while making on the web exchanges. A wavering web association or a specialized glitch regularly brings about the payable sum being charged from a client's record without being credited to the offering party. What's more, recovering this sum is definitely not a brisk procedure; one needs to advise the site and afterward stick

around 7-10 days before the sum is discounted to their ledgers. However, this circumstance is consistently enhancing as the area is concentrating more on cashless exchanges and clients are getting more educated about making installments on the web.

#### D. Additional charges

How many times has it happened that you've spotted a great deal on a product and when you're one click away from purchasing it you noticed an additional shipping charge. This is commonplace on all e-commerce sites when your order amount isn't high enough to qualify for free shipping. And even when it is, sometimes these shipping charges are added on each individual product (if you're buying multiple products of course) and not the collective order.

#### IV. LACK OF SECURITY

Cyber security, or more precisely the lack of it, is a major problem on the internet today. E-commerce sites record important customer data like name, phone number, address, and bank details. If these sites don't implement stringent cyber security measures, your data is at risk of falling into the wrong hands who can then wreak havoc on your bank account. Most of the big players in online shopping certainly have the best-in-class security measures to protect their customers' details, but the same can't be said about the countless smaller sites who may not have the expertise to do so.

#### V. CONCLUSION

E-shopping is becoming popular now days. Even though some problems are identified from the online shopping, still it is convenient and beneficial. The factors viz., quality, discount, simple payment methods, less expensive are the factors influenced the online buyers and account for consumer satisfaction. India's online market is increasing year by year and it expected to rank second in ecommerce worldwide. Recent trends in online shopping in India are people are spending high on apparels and mobile phones. Attractive offers from online shopping companies are attracting Indian consumers. While the quality, lack of security, additional

charges problems still exist. We can conclude online shopping India is here to stay and will be unstoppable in coming years.

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# Smart Waste Collector

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**Abstract—** This project emphasis on design and fabrication of the waste collector over water. India is a country with culture and different religious festivals which sometimes causes pollution among which water pollution is major. To overcome the problems regarding the waste which is accommodated in the rivers and lakes, app controlled boat can be used. The boat will be incorporated with rods and nets attached to it. The boat will also be equipped with solar panel, camera and SONAR sensors to detect any collisions path.

**Keywords—** Sonar Sensor, Solar Panel, Beacon Device

## I. INTRODUCTION

Plastic is the general common term for a wide range of synthetic or semi synthetic organic solid materials suitable for the manufacture of industrial products. Plastics are typically polymers of high molecular weight, and may contain other substances to improve performance and / or reduce costs. Plastic is one of the few new chemical materials which pose environmental problem. Polyethylene, polyvinyl chloride, polystyrene is largely used in the manufacture of plastics. Tons and tons of plastic waste in the form of bottles, bags and other containers are routinely discarded into the sea. All the plastic wastes are trapped in fishing net and fisherman has to manually remove it. which is similar to drawing water from the well.[1,2]

## II. EXISTING SYSTEM

The existing system is completely a mechanical based project. It is a stationary system, simply kept in the sewage area to collect the wastes passing over it. The chain and sprocket is used for rims movement, which has fitted fins to collect the wastes from the sewage. The rotation of the chain along with the rims will push the boat in forward direction, the floating wastes are collected between different sizes of fins and put off the wastes in the bin that is placed at the backside of the system.[3,4]

## III. PROPOSED SYSTEM

### A. Objective

- The objective of the proposed project is to design and fabricate an automated boat for waste cleaning in the rivers, oceans etc.

- Cleansing of lakes and rivers can be done with ease without harming human life.
- The collected waste can be used more efficiently in other domains like road fills and creation of composts.

### Features

- The boat will be incorporated with rods and nets attached to it.
- The boat will be equipped by a 360° camera to keep a track on boat.
- Boat will be automated by an application to run with Bluetooth beacon device, motor and as a backup Solar panel can be used.
- Complex shaped objects are detectable and the distance is calculated through sonar sensor.

### B. Advantages

- The boat will be automated so there is no need for human to be in that boat.
- This proposed system is to minimize or overcome the problem faced while using manually operated machine.
- It is very useful for small as well as big lake, rivers where waste is present in large amount. Environment friendly system.

### C. Components Required

- Sonar sensor
- 360 degree tracking camera
- Plastic sensor
- Magnet
- Solar panel
- Boat
- Net
- Android Device
- Beacon device. [5,6]

## IV. WORKING

The boat is handled by A BLE Beacon Technology with Android application which is an IOT implementation. The nets attached to it collects the waste floating on water and after the nets get fully occupied with waste, it closes in the forward direction and the boat is brought back at the starting point. A 360° camera is used for tracking the route of waste collector

and the obstacles are detected by sonar sensors. The waste collector has a motor which runs on fuel and has the option of using solar energy in absence of fuel.[6,7]

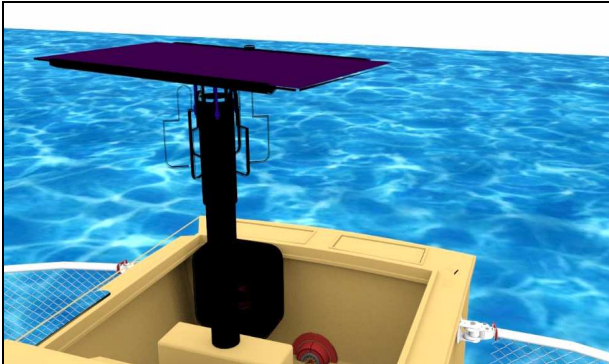


Fig.1. Top View of Boat

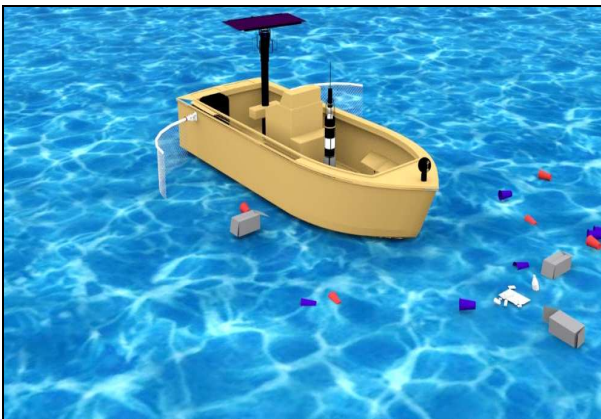


Fig. 2. Front View of Boat

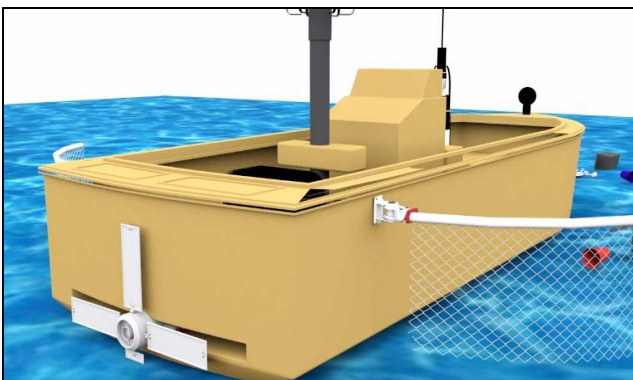


Fig.3. Back View of Boat

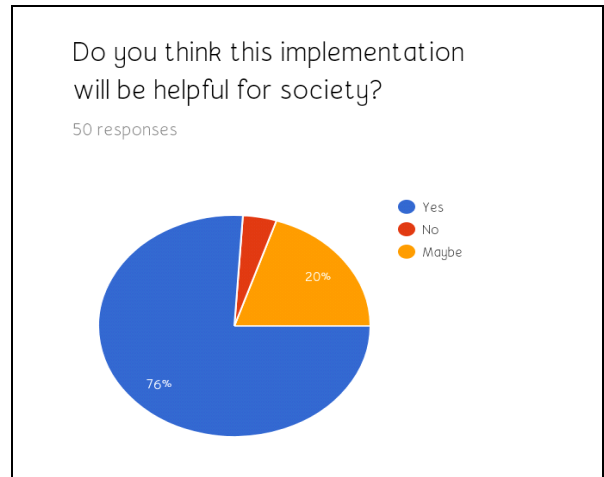


Fig.4. Survey Statistics-I

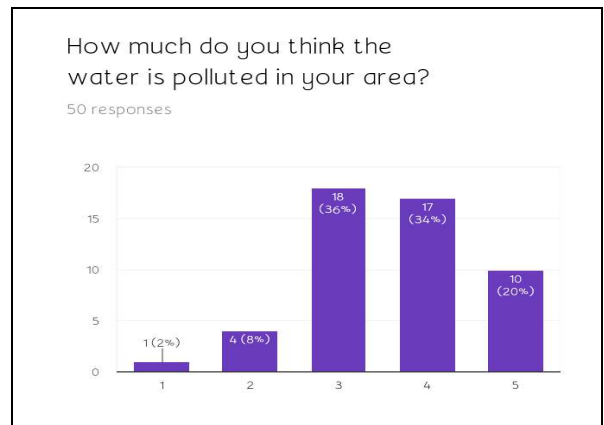


Fig.5. Survey Statistics-II

## V. FUTURE SCOPE

The machine can be designed for deep cleaning. Garbage which is collected from this process can be converted into energy and that energy can be used for engine of the boat instead of solar energy and wind energy. Capacity of the machine can be increased for cleaning big rivers and lakes. Provisions for cleaning waste which is settled on the bottom can be implemented with the help of sonar. Drones can be used with this project to increase the usability and scope of the project which can help reach places which are not reached by the boat. The collected waste can be further sorted with the help of sensors which will do a basic sorting of the waste.

## VI. CONCLUSION

The main benefit of this methodology is intended to be an increased likelihood of securing the human life by involving technology in jointly creating a "smart world" that combines scientific with environmental knowledge, and which then allows meaningful experiments. It also benefits to the

environment and it is the major step towards the “Swatcha Bharat” initiative which can ease the collection of waste by saving time and human intervention. Significant research effort has been expended in the development of 3D model of waste collector. This objective is attainable, and offers a radical innovation for waste management.

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# A Study on Agricultural Waste Management and It's Impact

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**Abstract**— Agriculture is one of the main domain sector for our country, as this domain has many different aspects of the production and their waste management techniques. This paper will discuss about what are the different sectors in agriculture domain are available in market and what type of waste products are being produce with the help of ICT. It gives a broader context in the procedures which are available to handle the waste as a part of traditional and technical approaches.

**Keywords**—Agriculture, Waste Management, ICT

## I. INTRODUCTION

India is an agricultural based country. Farmers are the back bones of our nation. In early days farmers were using locally available natural materials like after harvest trashes, weeds, cow dung etc. as manure. This will give them a better quality product. As that process also produce certain waste product as an agricultural waste. [1]

Agricultural waste, which includes both natural (organic) and non-natural wastes, is a general term used to describe waste produced on a farm through various farming activities. These activities can include but are not limited to dairy farming, horticulture, seed growing, livestock breeding, grazing land, market gardens, nursery plots, and even woodlands. Agricultural and food industry residues refuse and wastes constitute a significant proportion of worldwide agricultural productivity. It has variously been estimated that these wastes can account for over 30% of world wide agricultural productivity. [2]

## II. AGRICULTURE WASTE

Plant wastes can be left in place for natural habitation or used as firewood. Stubble can enhance soil structure and reduce erosion due to rainfall. Burning tree, plant and stubble is an appropriate management practice where impacts are controlled. Air quality may be affected by the smoke and impact on human health. [3]

### A. Poultry Houses Waste:

Poultry rearing has always been an integral component of livestock production system in India. Poultry production in India has taken a quantum leap in the last four decades, emerging from an entirely unorganized and unscientific farming practice to a commercial production system with state-

of-the-art technological interventions. Indian commercial poultry sector has advanced remarkably due to a scientific approach adopted by the industry and an enabling environment created by the Government.[4]

### B. Slaughter Houses Waste:

A slaughter house is a facility, where animals are butchered /killed for consumption as food products.[5] Slaughterhouse wastes are a potential reservoir of bacterial, viral, prior and parasitic pathogens, capable of infecting both animals and humans. Which will allow them in order to compare three different methods of disposal of the waste products generated from the slaughtering of animals in abattoirs.[6]

### C. Harvest waste:

Harvesting is the process of gathering a ripe crop from the fields. Reaping is the cutting of grain or pulse for harvest, typically using a scythe, sickle, or reaper. [7] The post-harvest sector includes all points in the value chain from production in the field to the food being placed on a plate for consumption. Postharvest activities include harvesting, handling, storage, processing, packaging, transportation and marketing. [8]

### D. Fertilizer Waste

Farming operations can contribute to nutrient pollution when not properly managed. Fertilizers and animal manure, which are both rich in nitrogen and phosphorus, are the primary sources of nutrient pollution from agricultural sources. [9] The amount of a fertilizer that dissolves and reacts with the soil can be estimated using some form of extraction. [10] Excess nutrients can impact water quality when it rains or when water and soil containing nitrogen and phosphorus wash into nearby waters or leach into ground waters.

### E. Soil Waste:

Solid waste means any garbage, refuse, sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility and other discarded materials including solid, liquid, semi-solid, or contained gaseous material, resulting from industrial, commercial, mining and agricultural operations, and from community activities, but does not include solid or dissolved materials in domestic sewage, or solid or dissolved materials in irrigation return flows or industrial discharges. [11] Hence it is require to have a

Solid waste management approach in this phase, As Waste management is all about how solid waste can be changed and used as a valuable resource. Solid waste management should be embraced by each and every household including the business owners across the world Industrialization. [12]

#### F. Agro-Industrial Waste:

Agricultural wastes (AW) can be defined as the residues from the growing and processing of raw agricultural products such as fruits, vegetables, meat, poultry, dairy products and crops [13]. Agricultural wastes can be in the form of solid, liquid or slurries depending on the nature of agricultural activities. Furthermore, agricultural industry residues and wastes constitute a significant proportion of worldwide agricultural productivity. Although the quantity of wastes produced by the agricultural sector is significantly low compared to wastes generated by other industries, the pollution potential of agricultural wastes is high on a long-term basis. This book discusses the characteristics, types and management options for agricultural wastes. [14]

### II. AIMS AND OBJECTIVES

- To study the Agricultural Waste their Impact and Categories of approaches in order to handle it.
- To study the type of agricultural waste being product on forming.
- To know the Approaches follow in order to handle the waste.
- To find whether farmers are know about Government Schemes and techniques launches for the Agricultural waste management.

### III. REVIEW OF LITERATURE

A study was conducted by Neeti Vijaykumar in “farm waste to fuel” state that, Agricultural waste is a by-product that is used in some places as fodder for animals. But a majority of farmers do not realize its potential — the waste is thrown into ditches and fire set to it. This practice only adds to air pollution and is harmful for the environment in general. But a recent development, spearheaded by scientists from the Department of Biotechnology in India, could turn this waste into treasure. Science Minister Harsh Vardhan inaugurated a new kind of bio fuel plant [15]. Dr. Şadi Yazıcı, Mayor of “Istanbul Tuzla Municipality in their work” state that, For realizing the main municipality tasks like cleaning and waste collection, we acted in parallel with the idea of creating a smart city by using EvrekaSoft, in other words, with a Smart Innovation Technology [16]. As Jens Malmodin conducted a study on the Greenhouse Gas Emissions and Operational Electricity Use in the ICT and Entertainment & Media Sectors. The positive and negative environmental impacts of information and communication technology (ICT) are widely debated. The results indicate that for the ICT sector, operation leads to more GHG emissions than manufacture, although impacts from the manufacture of some products are significant. [17]

### IV. METHODOLOGY

This research work in order to understand different type of Waste is being produce in Agricultural Sectors and Different methodologies & techniques. To collect the data Survey based methodology is used to collect the opinion and views of varieties of agricultural domain in order to collect the quality value information for the presented research paper.

This literature review does not support sufficient data to understand the use and awareness of Information Technology amongst agriculture waste in the Indian scenario. Hence, Quantitative approach was implemented to understand the same. This survey method was used to get data. Where a Questionnaire and Face-to-face Interviews were conducted to get appropriate information from the respondents from the affiliated research work. The specific candidates are selected to do the survey on the allotted Area to collect the up to date review of farmers.

### V. IDEAL APPROACHES ON AGRICULTURE WASTE MANAGEMENT

The first goal of any waste management system is to maximize the economic benefit from the waste resource and maintain acceptable environmental standards. To be practical, the system must also be affordable and suitable to the operation. If wastes are not properly handled they can pollute surface and groundwater and contribute to air pollution. Most people think of manure first when they think of farm waste. While manure is an important component, farm waste in a livestock operation can also include waste forage, dead stock, and silage effluent and milk house waste. In horticultural operations, culls, diseased product, wash line sediment and processing plant wastes are common by-products.

#### A. Livestock and Poultry Waste Management

- 1) Discusses waste management in the livestock and poultry sectors.
- 2) Emphasis is placed on manure management, feedlot and pasture management, milk house wastes and dead stock disposal.

#### B. Horticultural Waste Management

- 1) Discusses potato, other vegetable and fruit wastes.
- 2) Highlights the environmental concerns associated with handling wastes.
- 3) Suggests acceptable options for disposal.

#### C. Farm Plastics

- 1) Discusses the best management practices for handling farm plastics in both the livestock and horticultural sectors.

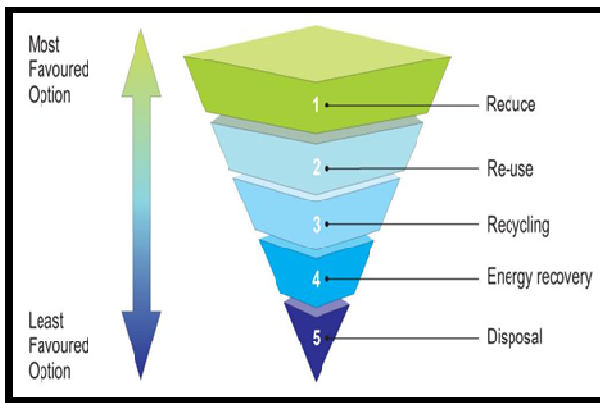


Fig.1. Approaches of Waste Management

#### D. Categories on waste management

The study on this domain, gives a reach features to handle the waste in agriculture, As Growth of ICT in today's era has lead to increase in method to waste management. That Government & Private sectors are actively contribute on waste handling approaches includes residential and commercial wastes in city and rural areas in either organic or chemical form of waste including wastes like solid waste, Plant Waste, Poultry & Slaughter houses, Fertilizer waste and Harvest waste etc. [19]

### VI. RECYCLING AND CONSERVATION

#### A. Energy conservation and renewable energy

As a responsible corporate citizen, ITC has made a commitment to reduce dependence on energy from fossil fuels from the reusable waste. As substantial progress has been made in enhancing the renewable energy portfolio and during 2016-17 over 43% of ITC's total energy requirements was met from carbon neutral fuels such as biomass gases. As a responsible corporate citizen, ITC has made a commitment to reduce dependence on energy from fossil fuels. Substantial progress has been made in enhancing the renewable energy portfolio and during 2016-17 over 43% of ITC's total energy requirements was met from carbon neutral fuels such as biomass, and wind and solar. [20]

#### B. Water conservation

With water scarcity increasingly becoming an area of serious concern, Research continues to focus on integrated waste water management including water conservation and harvesting initiatives at its units - while also working towards meeting the water security needs of all stakeholders at the local watershed level. These include adopting latest technologies to reduce fresh water intake and increase reuse and recycling practices, best practices to achieve zero effluent discharges, rainwater harvesting, etc. [21]

#### C. Greenhouse gases and carbon sequestration

ITC's Social and Farm Forestry initiatives enabled sequestration of over twice the amount of Carbon Dioxide emitted by its operations. Besides mitigating the impact of increasing levels of GHG emissions in the atmosphere, these initiatives help greening degraded wasteland, prevent soil erosion, enhance organic matter content in soil and enable ground water recharge.

The greenhouse gas (GHG) inventory of ITC for the year 2016-17 compiled as per the ISO 14064 standard, has been assured, as in the earlier years, at the highest 'Reasonable Level' by a third party assurance provider.[22]

#### D. Waste recycling

Advance tools & techniques in this domain has made significant progress in reducing specific waste generation through constant monitoring and improvement of efficiencies in material utilization and also in achieving almost total recycling of waste generated in operations. In this way, ITC has prevented waste reaching landfills and associated problems such as soil and groundwater contamination and GHG emissions, all of which can impact public health. [23]

ITC's commitment to provide a safe and healthy workplace to all has been reaffirmed by the significant reduction in the number of accidents and several national and international awards and certifications received by various units. The Company's approach is to institutionalize safety as a value-led concept with focus on inculcating a sense of ownership at all levels and driving behavioral change leading to the creation of a safety culture.

ITC incorporates established engineering standards in the design and project execution phase itself for all investments in the built environment, with a view to ensuring the highest levels of safety besides optimizing costs. Environment, Health & Safety audits before commissioning and during the operation of units are carried out to verify compliance with standards. [24]

### VII. WASTE RESOURCES INNOVATIVES ON REUSABILITY

The agricultural sector is confronted with the major challenge of increasing production to feed a growing and to handle the Agricultural waste products [25]. Agriculture is now one of the most important sectors in the Indian economy. In order to further develop this sector, technology has become one of the main components. Typically, dealing with the agriculture sector with its waste can entail difficulties relating to a number of factors. Consequently, to overcome such problems, farmers are being encouraged to adopt technology that suits their farm waste. This will aims technology usage among farmers, and the benefits that can be gained from various methods & technology. Moreover, this will explain the factors affecting technology usage in an agricultural waste Management sector in India consists of the production, processing, and waste management of crops, livestock and their waste. [26]





Fig.2. Agriculture and their Waste Sectors

A farmer who has access to the most current information about his farming must always be far ahead of those who lack information. Consider a farmer who has problem to solve in crop protection and waste management [27]. The continued increase in ITC for Agricultural waste to make a greater usage of it by recycling , generating energy, Bio gas, Fuel oils, fertilizer etc. the results in intensified application and efficacy in the agriculture and their waste sectors.[28]

### VIII. RESULTS AND DISCUSSION

A study from various research work, agricultural domain's & informative sites survey data was collected. A view of farmers from different domain of agriculture has review. This will give a broader context of all categories of waste, which is being produce in Agricultural domain and Approaches the people tends to follow to handle the waste. A total of 1000 Farmers (72.80%) demonstrated that what approaches, they are tends to follow for recycling unused plant to usable food items, & fertilizer , waste water as to refine water, organic waste to biogas approach, and other fuel conservative methods etc. While only 170 Farmers (27%) Not using efficient waste management Approaches. It was also found that most of the farmers using those Schemes & techniques for managing their waste have got the better to reuse, recycle & to reduce it.

**Q. What type of agricultural waste is produce on your farms?**

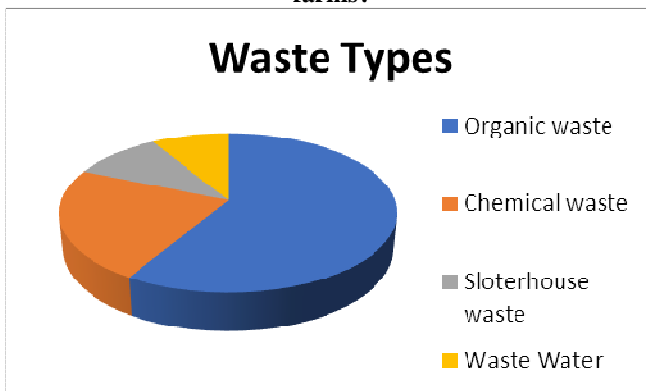


Fig.3. Agriculture and their Waste Sectors

As per the survey data in the agricultural sector various categories of waste was producing, on which each of them can be Utilize for many sectors as Fuel, Energy, Bio-gases, & fertilizers, etc, with the implementation of ICT as those waste can be of Organic waste, Chemical waste, Slaughterhouse waste, & waste water.

**Q. What Approach do you follow for waste management?**

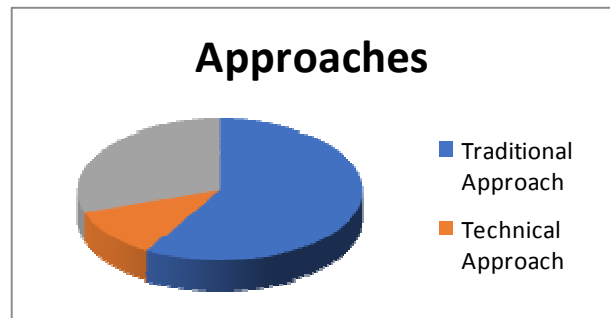


Fig.4. Waste Management Approaches

Based on the current survey information, it is state that 62% of the people are tends to follow Traditional Approach for their waste management in the agriculture sector. As of 12 % of people are go for the Technical Approach for that domain and approximate 32% of people follow both type of approaches in order to handle their agricultural waste.

**Q. Are you aware of any Government schemes for Farmers in agricultural waste management?**

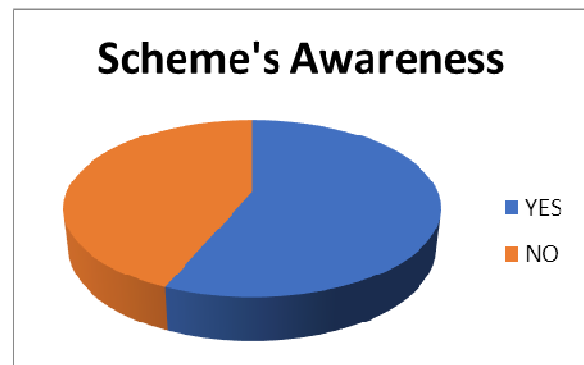


Fig.5. Scheme Awareness

The study also states the Awareness of the Government schemes & ICT for the waste management is approximate of 56.22% of farmers that uses it on their agricultural domain and for the other farm related works. The graph depicts that 43.88% of the farmers are Unaware and don't know using the applications of ICT from the government. As, most of the local farmers are doing their farming on their own.

## IX. CONCLUSION AND SUGGESTIONS

After the detail research on the all aspects of the ICT and what are the Impact in the Agricultural domain for all sectors of waste that are being produce in every agricultural process. This can be effectively handle by the implementation of ICT , that can greatly help the people to manage the agricultural waste in much more efficient manner and can also get the affective alternative for Fuel, Bio-Gas, Energy etc. with the provided set of Tools, Technologies, Methodology,& Ideas of ICT for this. Which result in greater management of Agricultural waste that the farmers can expect. The government also tries to promote effective waste management for the beneficial of the environment and energy production. As the government also launches many beneficial schemes, systems for them but the ground reality is that it is still not reachable to the people who need such approaches.

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# IoT based Smart Security and Monitoring System for Farms

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**Abstract**— In the real world, many farmers face problem in monitoring their farms. The farmers have more difficulties to monitor all the farms at the same time. Hence the project is developed to monitor the farms in the field using the concept of IoT( Internet of things ). Temperature level, soil moisture and water level are monitored according to the readings of these sensors and the pump is switched on to provide adequate water to the fields. Here all the data's are parsed into the server and are able to monitor the plants continuously and easily able to monitor the health of farms. By using the IoT, the development time gets reduced and thus time for monitoring the farms. Also need not to worry about the health of crops and the readings are displayed in the server automatically through the wireless network. The pump can be switched ON or switched OFF from any part of the world using the concept IoT (Internet of Things). Moisture sensors sense the soil moisture content and switch on or off the pump according to the readings displayed in the web page. Temperature sensor sense the heat in the atmosphere, according to the climate, the switch will be automatically ON/OFF motor.

**Keywords**—IoT, Sensors, Wireless network

## I. INTRODUCTION

Agriculture sector being the backbone of the Indian economy deserves security and hence an agricultural product needs security, monitoring and maintenance at very initial stage. These challenges should be taken into consideration. The combination of traditional method with software technologies like Internet of Things and Wireless Sensor Networks can lead to agricultural development. Keeping this scenario the concept "Internet of Things" have been tested and analyzed based on the device and is capable of analyzing the sensed information and then transmitting it to the user. This project can be used to control and monitor the agricultural fields from remote location. This proposed system is oriented to provide smart irrigation and delivering real time notification based on information analysis and processing without human intervention. There are number of other factors that decrease the productivity to a greater extent.[1]

Hence automation must be implemented in agriculture to overcome these problems. So in order to provide solution to all such problems, it is necessary to develop an integrated system which will take care of all factors affecting the productivity in

every stage. But complete automation in agriculture is not achieved due to various issues. Though it is implemented in the research level it is not given to the farmers as a product to get benefitted from the resources. Hence this paper deals about developing smart agriculture using IoT and given to the farmers.[2,3]

## II. METHODOLOGY

In this section, available methods involve in monitoring and security system can be applied to agriculture field has been discussed. Internet of Things fundamentally helps in mechanization. It acts like an interfaces between physical object around us. Electronic gadget like microcontroller implanted inside physical object carries on like a genuine question and begins conveying. As per number of things associated with internet will surpass no .of individuals on earth in not so distant future. Cisco Internet Business Solution Group examinations that aggregate associated things will reach 50 billion out of 2020. Essentially major objective of IoT is to interface everything around us and empower consistent correspondence between them with exceptionally least human intercession. It centers association whenever, anyplace with anything.[3,4]

In terms of security aspect IR/PIR sensor is used to identify the animals and human entry in the field and buzzer is used in altering them. While looking in terms of monitoring aspects the presence of water in the well is monitored and then the moisturizing level of the soil and the temperature of the surroundings are monitored. These values are monitored by using controlled based on temperature and moisture level. The water level in the well is stated in two states as F (full/water present) and E (Empty state). If the water level is monitored as empty instead of pump motor is used for water extraction. In case of intruder the farmer will be alerted through webpage. Here when the intruder arrives the buzzer will be alarmed to scare the animals and give initial level of security. Then by using WIFI Module the values are stored as the data are updated for every minute.[4]

## III. SIMULATIONS AND RESULTS

Proteus 8 is one of the easiest simulation software for various applications and circuit diagram of microcontroller. It has almost all microcontrollers and electronic equipment



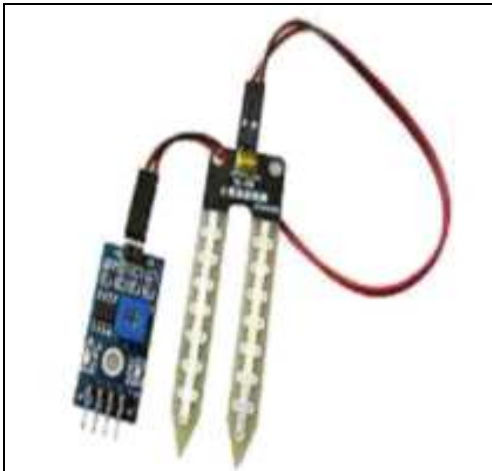


Fig. 4. Soil Moisture Sensor

Soil moisture sensor is a sensor which senses the moisture content of the soil. The sensor has both the analog and the digital output. The digital output is fixed and the analog output threshold can be varied. It works on the principle of open and short circuit. The output is high or low indicated by the LED. When the soil is dry the current will not pass through it and so it will act as open circuit. Hence the output is said to be maximum. When the soil is wet, the current will pass from one terminal to the other and the circuit is said to be short and the output will be zero.[5,6,7,8]

#### B. Software Implementation

The Webpage that is designed using PHP server and UI design of the webpage is done using HTML and CSS styling is done using Bootstrap files. UI designing consists of three pages based on the application. The first page is Log in page. It consists of username and password. The list of users to access the webpage and the password for the respective users are stored in MySQL database. The server is contained with data from MySQL database that was named here as IoT. The second page consists of list of fields that need to be accessed and are represented by the diagrammatic images. The third

page consists of details of the monitoring sensors values and the status of the pump is embedded into the table.

#### V. CONCLUSION

This proposed work is made to help the farmers and make their harvest economical by helping them in security purpose travelling side, college and for every bodies etc. By this work, the wastage of water and the consumption of power by motor can be reduced so that they are conserved for the future use. This system provides complete monitoring action of sensors in fields that is very easy to control the field. It also provides huge security to the plants.

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# Cloud Security Using Multilevel Encryption Algorithms

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**Abstract**— Cloud generally relates with a set of hardware, storage of network, services, interfaces which are needed to combine and deliver the service for computing. The job of cloud is to give the administration to conveyance of programming, and capacity of information on web dependent on client request. As a result of these administrations distributed computing has turned into a critical stage for organizations to assemble their frameworks upon. With developing exposure of distributed computing, related vulnerabilities or dangers are likewise expanding in light of the fact that cloud administrations are regularly conveyed by outsider. In this way, security of the data in the cloud is the real issue for a cloud client. In this paper, the proposed work plan is to dispense with the worries in regards to information protection utilizing multilevel cryptographic calculations to upgrade the security in cloud according to alternate point of view of cloud clients.

**Keywords**—*Hardware, Framework, Vulnerabilities, Information Protection, Clouds*

## I. INTRODUCTION

In the cloud computing there is no compelling reason to store information in the work area or settled area PC. You can store the information in a server and you can get to the information in any remote area utilizing of the web topology [1]. Cloud computing gives a lot of information can be effortlessly put away in the cloud. The benefits of utilizing distributed computing are: i) lessen equipment and upkeep cost ii) availability around the world iii) flexibility and highly automated process. Cloud is likewise utilized as a business answer for capacity. It gives an immense measure of capacity in all divisions like Government, Enterprise and so on. Aside from government and venture one can likewise accomplish capacity of their own information on cloud. So there is a need to ensure cloud information against unapproved access, modification or denial-of-service and so on. To secure the cloud means secure the user's databases hosted by the cloud provider [2].

Information cryptography chiefly is the scrambling of the content of the data such as text, image, audio, video etc to make the data unreadable, undetectable or meaningless during transmission or storage is named Encryption. The principle point of cryptography is to deal with information secure from intruders. The contrary procedure of getting back the first information from scrambled information is Decryption, which re-establishes the first information. To encrypt information at cloud storage both symmetric-key and asymmetric-key algorithms can be utilized [3].

## II. CHALLENGES AND ISSUES IN CLOUD COMPUTING

Current cloud environment is associated with numerous challenges as follows:

### A. Malicious Insiders

This threat impact on the organization is considerable. Member of cloud provider has access to data stored by customers on cloud [4].

### B. Data Integrity

Guaranteeing the honesty of the data (transfer, stockpiling, and recovery) truly implies that it changes just in light of approved exchanges. A common standard still does not exist [6].

### C. Account and Service Hijacking

This danger happens because of phishing, fraud and programming vulnerabilities. In this type attacker can get access to critical areas onto the cloud from where he can take permit and stealing important data resulting in compromise of the provision, integrity, and also confidentiality to the services [5].

### D. Insecure APIs

Anonymous access, reusable tokens or password, clear-text authentication or transmission of content, inflexible access controls or improper authorizations, limited monitoring, and logging capabilities etc security threats may occur to organizations if the improper set of interfaces and APIs are used [5].

### E. Governance

Governance implies management and oversight by the organization over procedures, standards and policies for application development and knowledge technology service ability, conjointly as a result of the design, implementation, testing use, and look of deployed or engage services [5].

## III. EXISTING SECURITY SYSTEMS

To secure the cloud security goals of the data include three points namely. Confidentiality, Integrity and availability (CIA). Encryption is used two types of algorithm symmetric and asymmetric algorithm. In the symmetric algorithm it uses private key for encryption and the same key is used for

decryption. And asymmetric it uses the public key for encryption and private key is distributed to all using of the private key decrypt the data [7]. There are following kinds of Cryptosystem:

- Symmetric (private) key cryptography
- Asymmetric (public) key cryptography
- Hash Functions

#### A. Symmetric Key Cryptography

In symmetric key cryptography same key is utilized for both encryption as well as decryption. This type of cryptography is fast that is it has higher speed of encryption and decryption. The size of the resultant cipher text is almost same as that of the original plain text. This is basically used for encryption and decryption process that is for confidential purposes and cannot be utilized for digital signatures that is non-repudiation and integrity check [8].

1) *Data Integration Standards*: DES is a block-cipher. It uses the 56 bit key and 64 bit blocks DES features a advanced set of rules and information. It has quick hardware implementations and slow code implementations. DES takes 64 bit plain text and creates 64 bit cipher text at cryptography aspect. It uses 2 permutation initial permutation and final permutation and 16 Feistel rounds. Each spherical uses totally different 48 bit spherical key [7].

2) *Advanced Encryption Standards*: AES is symmetric key block cipher. AES is non Feistel cipher. AES encrypting information with block size 128 bit. It uses 10, 12, or 14 rounds. The key size is also employed in the AES 128,192 or 256 bits. AES operates 4\*4 columns matrix is called as state [9].

3) *Triple-DES (3DES)*: It uses three 56-bit keys and performs three encryption/decryption passes over the block [10].

4) *DESX*: In DESX it combining 64 extra key bits to the plaintext before secret writing, effectively will increase the key length to a 120 bits [11].

5) *RC2*: A 64-bit block cipher using variable-sized keys designed to interchange DES. The key size was limited to 40 bits [11].

6) *RC4*: A stream cipher using variable-sized keys [11].

7) *RC5*: A block-cipher supporting a spread of block sizes (32, 64, or 128 bits), key sizes, and number of encryption passes over the data [11].

#### B. Asymmetric Key Cryptography

In asymmetric key cryptography one of the key is utilized for encoding and the other one is utilized for decoding process. It basically makes use of receiver's public key for the process of encryption. It is slower as compared to symmetric key cryptography in terms of speed of encoding and decoding. The size of the cipher text produced is greater than the original plain text. It can be utilized for both encryption, decryption and also for digital signatures [12]. RSA is Asymmetric encryption algorithm it means that public key is distributed to all for encryption and private key is used to decryption. The key size is 1024 bits. In the RSA modular exponential is used for encryption and decryption. It uses two exponents a and b where a is public key and b is private key [13].

#### C. Hash Functions

A cryptographic hash function is a mathematical function which changes a numeric value input to some compressed output numeric value. In this the input can be of any arbitrary length but the output produced always has a fixed length. Message digests or Hash value is the name given to those values which are returned by the hash functions [14]. MD5 is basically a message digest algorithm which was developed by Ron Rivest. It generates 128 bit message digest. In this algorithm the input text is basically processed by means of 512 bit blocks and the generated output is four sets of 32 bit blocks each [15]. Secure hash algorithm (SHA) is basically used with the input message whose length is less than 264 bits. It was basically designed so that it is impossible to find the original plaint text message if the message digest is given and also impossible to find two messages having similar message digest [16].

## IV. PROPOSED SYSTEMS

Nowadays Cyber Criminals can easily access data storage. In Personal Cloud Storage vital information, files and records square measure entrusted to a 3rd party, that allows information Security to become the most security issue in Cloud Computing. In Cloud Storage any organizations or individuals information is keep in and accessible from multiple distributed and connected resources that comprise a cloud. To provide secure communication over distributed and connected resources authentication of keep information becomes a compulsory task.

The proposed system is designed to maintain security of data files stored in cloud. This proposed system is a combination of two different security algorithms to eliminate the security challenges of Personal Cloud Storage. We have taken a combination of algorithms like: DES and RSA. DES (Data Encryption Standard) is a symmetric key algorithmic program, during only one key is used for both encryption/decryption of data. Whereas RSA is an asymmetric key algorithm, the algorithm that uses different keys for encryption and decryption purposes [17]. A user can upload data files such as text, pdf etc in Personal Cloud Storage. While uploading file DES and RSA Encoding schemes are used to encrypt data. The Block Diagram of proposed work at multilevel encryption is shown in figure 1.



### A. Encryption :

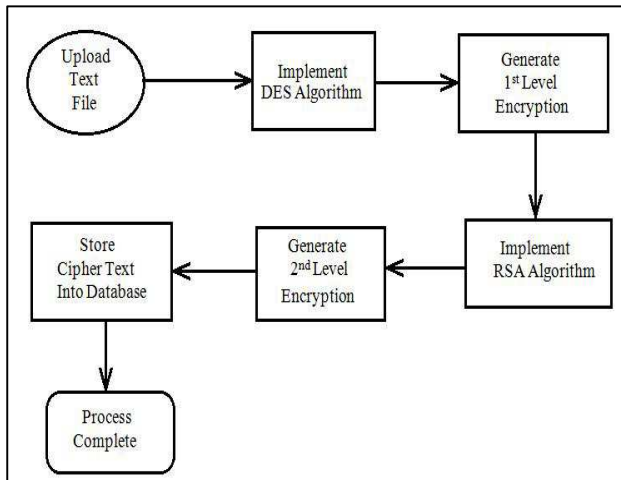


Fig. 1. Block diagram of multilevel encryption.

As shown in figure 1, the steps of Multi-level encryption will be as follows:

- Upload the file.
- Apply DES algorithm [18]. The first level encryption is generated using DES algorithm.
- Now apply RSA algorithm [19] on encrypted output of DES algorithm to generate second level encryption.
- Once the data is encrypted using RSA algorithm, it will be stored in Database of Cloud Storage.

And while downloading file inverse DES and RSA algorithms are used to decrypt data. The Block diagram of proposed work at multilevel decryption is show in figure 2.

### B. Decryption :

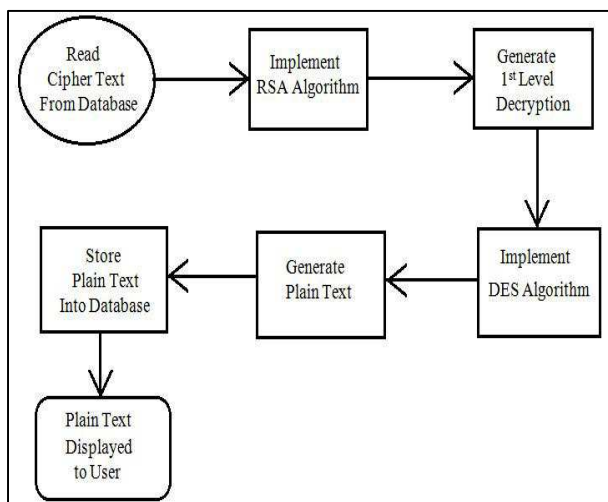


Fig. 2. Block diagram of multilevel decryption.

As shown in figure 2, the steps of Multi-level decryption will be as follows:

- Inverse DES and RSA algorithm are used to decrypt data.
- First apply the inverse RSA algorithm [19] (decryption scheme) using private key. This will generate first level of decrypted data.
- Next apply the DES decryption algorithm [20] on first level decrypted data.
- DES algorithm of decryption will generate plain text.
- Plain text will be displayed to the user.

### V. CONCLUSION

Cloud computing is the arrangement of assets or services given through the web to the clients on their interest by cloud specialist co-ops. Since every single association is moving its information to the cloud, implies it utilizes the capacity benefit given by the cloud supplier. Accordingly it is required to ensure that information against unapproved access, adjustment or forswearing of administrations and so on.

Encryption algorithms play an vital role in data security on cloud. But these existing cryptographic algorithms are single level encryption algorithms. Cyber criminals can easily cracked single level encryption. Hence we propose a system which uses multilevel encryption and decryption to provide more security for Cloud Storage. In this, only the authorized user can access the data. If some intruder (unauthorized user) tries to get the data directly from the database, he must have to decrypt the data at each level which is a very difficult task. It may be expected that multilevel encryption will provide more security for Cloud Storage than single level encryption.

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# ARTICLES



# Biomedical Cutter

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**Abstract—** "Cleanliness becomes additional necessary once piousness is unlikely". The current article aims to check the Medical Waste Management assessment, the method of managing the medical waste: management of medical waste, segregation, storage, and disposal of medical wastes publicly and personal hospitals. The results reveals that the, health care facilities privately and governmental hospitals still struggle with unsuitable medical specialty wastes management that has not received enough concern. In the surveyed hospitals, there's lack in implementing coaching courses regarding health care waste management. With the help of this research we have come across that we need to inform public about the degradable biomedical waste and properly segregate it. Hazards associated with poor biomedical waste management and shortcomings in the existing system were identified. The development of waste management policies, plans, and protocols area unit suggested, additionally to establishing coaching programs on correct programs on correct waste management for all health care staff.

**Keywords—**Assessment, Medical Waste Management, Segregation, Disposal, Biomedical Waste Management

## I. INTRODUCTION

The treatment and disposal of medical waste from hospitals has been of growing concern in recent times. This is because of the risky nature of those wastes and also the potential threat to unfold deadly diseases to humans and different living organisms. To characterize and quantify these wastes, a study was dispensed to establish the generation of medical specialty wastes from hospitals. Medical care is extremely necessary for our life, health and upbeat. But the waste extracted from medical practice can be harmful, poisonous and even deadly because of their high potential for diseases transmission. The concern for hospital waste management was increase in infectious diseases and indiscriminate disposal of waste in worldwide. Medical waste has been known by the North American country Environmental Agency because the third largest glorious supply of hydrocarbon air emission and contributor of concerning 100 percent of mercury emissions to the environment from human activities. In this previous few decades the generation of medical specialty waste has increased; management of medical waste continues to be a serious challenge. Biomedical waste is generally extracted from hospitals, health care teaching institutes, research institutions, blood banks, clinics, laboratories, veterinary institutes and animal houses etc. G.S.R.343(E) whereas the Bio-Medical Waste (Management and Handling) Rules, 1998 was published vide notification number S.O. 630 (E) dated the 20th July, 1998, by the Government of India in the Ministry of

Environment and Forests, gave a regulatory frame work for management of bio-medical waste generated in the country; And also to implement these system more effectively and to improve the collection, segregation, processing, treatment and disposal of these bio-medical wastes in an environmentally sound management and plummeting the bio- medical waste generation and its impact on the environment, the Central Government reviewed the accessible rules.[1,2]

Bio Medical Waste handling is a dangerous waste action which requires a high standard of preparation. It calls for specific training that depends on the nature of the work in the hospital, the hazard and worker experience, and also the responsibilities of individual workers states Manyele and Anicetus [1,2]

## II. PROCESS OF MANAGING THE MEDICAL WASTE

### A. Segregation

The segregation method cut back the toxicity and also the volume of the waste, it makes easier to move the waste. Segregation method depends on the number, composition and also the disposals. Below given is the symbol which is used to display that the dustbin present is of bio hazard waste. [3,4]



Fig.1. Symbols for bio - hazard waste

### B. Separating

The collected medical waste from medical centers, infectious, pathological waste and sharps will be placed in different containers and labeled biohazard, uniform color for each type of medical waste. The size of the containers depends on the volume of waste generated in the center. [3,4]

### C. Packaging and labelling

Packaging the medical waste in uniform color code bags and labeling the waste. [3,4]

**D. Common Storage**

Segregated medical waste stored in the common storage point. [3,4]

**E. Transportation**

The medical waste will transported from the common storage point to common Bio-Medical waste treatment facility storage point. [3,4]

**F. Treatment**

The process of incineration will destruct the waste by burning it at elevated temperature, which will remove the hazardous, reduce the value of the waste and convert to ash. Incineration process suits for pathological and sharp wastes. Auto-claving process will kill bacteria and infectious material in the biomedical waste, it will be considered as noninfectious and go for landfill. The shredding machine is used to destroy waste such as syringes, scalpels, vials, glass, plastics, blades etc, it will shape or cut waste into small pieces, so that waste unrecognizable and safe to disposal recycling and landfill. [3,4]

**III. LITERATURE REVIEW**

Hospital medical waste was collected by improvement personnel World Health Organization picked up the medical waste from utterly totally different departments and transported it manually to a brief cargo area wherever the hospital waste was unbroken before being taken to the ultimate disposal place as most of your time general waste are mixed with medical waste, and this area was poorly sanitized and not secure. Stated steps for safe management of bio medical waste are handling, segregation, mutilation, disinfection, storage, transportation and final disposal of the medical waste .[1,2,3,4]



Fig.2. Bio Medical Waste Management

**IV. ANALYSIS AND INTERPRETATION**

Background information about the study respondents given in the table below :

Table 1. Distribution of Respondents based on Socio Demographic factors

Demographic	Variables	Government	Private	Total
<b>Gender</b>	Male	35	35	70
	Female	35	35	70
	<b>Total</b>	<b>70</b>	<b>70</b>	<b>140</b>
<b>Field of Work</b>	Doctor	20	24	44
	Nurse	30	20	50
	Laboratory Technician	5	5	10
	Quality Management	2	1	3
	X Ray Technician	1	2	3
	Pharmacist	4	7	11
	Cleaner	3	5	8
	X-Ray Doctor	1	2	3
	Anesthesia Technician	1	1	2
	Administrative	3	3	6
	<b>Total</b>	<b>70</b>	<b>70</b>	<b>140</b>
<b>Working Experience</b>	1-3 Years	17	30	47
	4-7 Years	33	24	57
	8 Years & Above	20	16	36
	<b>Total</b>	<b>70</b>	<b>70</b>	<b>140</b>

The study involved different categories of health workers at hospitals who supposed to deal with medical waste directly, as 31% of respondents are doctors, 36% nurses, 8% Pharmacist, 7% Laboratory Technician while the other 18% of respondents were distributed among Quality Management, X-Ray technician, Cleaner, X Ray Doctor, Anesthesia

**V. POTENTIAL IMPLICATIONS OF BIO-MEDICAL WASTE**

Biomedical waste causes risk to healthcare workers, waste handlers and Public. Improperly contained contaminated sharps pose greatest infectious risk associated with hospital waste. There is also theoretical health risk to medical waste handlers from pathogens that may be aerosolized during the compacting, grinding or shredding process that is associated with certain medical waste management or treatment practices. Physical (injury) and health hazards are also associated with the high operating temperatures of incinerators and steam sterilizers and with toxic gases vented into the atmosphere after waste treatment. There may be increased risk of nosocomial

infections in patients due to poor waste management. Improper waste management can lead to change in microbial ecology and spread of antibiotic resistance. Non-Hazardous Waste: This constitutes about 85% of the waste generated in most healthcare set-ups. This includes waste comprising of food remnants, fruit peels, wash water, paper cartons, packaging material etc. [4,5]

## VI. SEGREGATION OF MEDICAL WASTE

The medical waste must be segregated from the general waste because medical waste cannot be disposed like the general waste. In medical waste different types of medicines, drugs, cottons, needles etc. are present which cannot be decomposed or burn. The implementation of the Color Code dustbin's for the bio medical waste is used in many hospitals and pharma company but sometimes its also lacks in doing the work properly. Because the medicine's at last get dumb together at a common place which not good because every medicines are not the same. So sometimes this "Colorful Dustbin's" may not help you in proper distribution. [6]

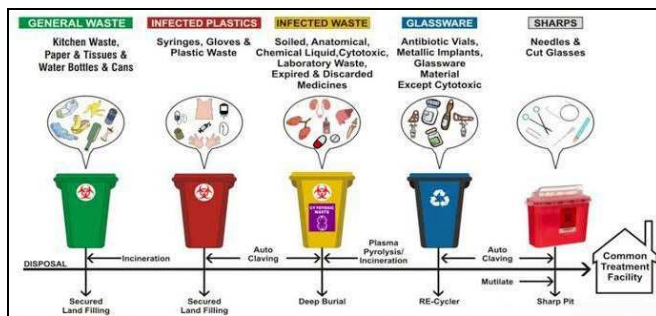


Fig. 3. Segregation of Hospital Biomedical Waste

We should treat medical waste in a better way using following processes [6,7,8,9]:

### A. Chemical processes:

These processes use chemicals that act as disinfectants. Sodium salt, dissolved bleaching agent, peracetic acid, oxide, dry inorganic chemical and gas square measure samples of such chemicals. Most chemical processes square measure water-intensive and need neutralizing agents.

### B. Thermal processes:

These processes utilizes heat to disinfect. Depending on the temperature they operate, it's been classified into 2 classes, that square measure Low-heat systems and High-heat systems. Low-heat systems (operates between ninety three - 177oC) use steam, hot water, or radiation to heat and cleanse the waste. Autoclave & Microwave are low heat systems.

1) *Autoclaving*: Autoclaving could be a low heat thermal method and it uses steam for medical aid of waste. Autoclaves square measure of 2 varieties looking on the tactic they use for removal of air pockets. They are gravity flow autoclave and vacuum autoclave.

2) *Microwaving* : Microwaving could be a method that disinfects the waste by dampish heat and steam generated by microwave energy.

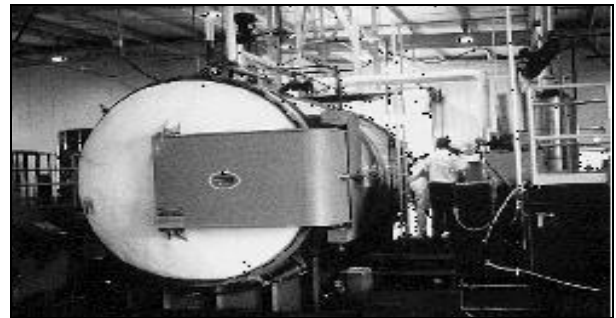


Fig.4. Thermal Processing

High-heat systems use combustion and heat plasma to cleanse and destroy the waste. Incinerator & Hydroplaning are high heat systems which burn on high amount of the heat and destroy the medicines.

### C. Disposal of Sharp Materials:

Blades and needles waste when medical aid ought to be disposed in circular or rectangular pits.



Fig.5. Disposal of Sharp Materials

Such pits will be mamma and lined with brick, masonry, or concrete rings. The pit ought to be coated with a significant concrete block that is penetrated by a galvanized steel pipe protrusive regarding one.5 m higher than the block, at intervals internal diameter of up to 20 mm. When the pipe is full it will be sealed utterly when another has been ready the same process of the disposal will be done.

### D. Radioactive Waste from Medical Establishments:

It may be hold on beneath fastidiously controlled conditions till the amount of emission is thus low that they'll be treated as different waste. Special care is required once recent instrumentation containing hot supply is being discarded. Expert advice should be taken into account.

Waste containing mercury, all thanks to breakage of measuring instruments and different activity instrumentation .



Proper attention ought to be to the gathering of the spilled mercury, its storage and causation of a similar back to the makers. Must take all measures to make sure that the spilled mercury doesn't become a part of medicine wastes. Waste containing capable or quite 50 ppm of mercury could be a venturesome waste and therefore the involved generators of the wastes as well as the health care units square measure needed to dispose the waste as per the norms.[10,11,12]

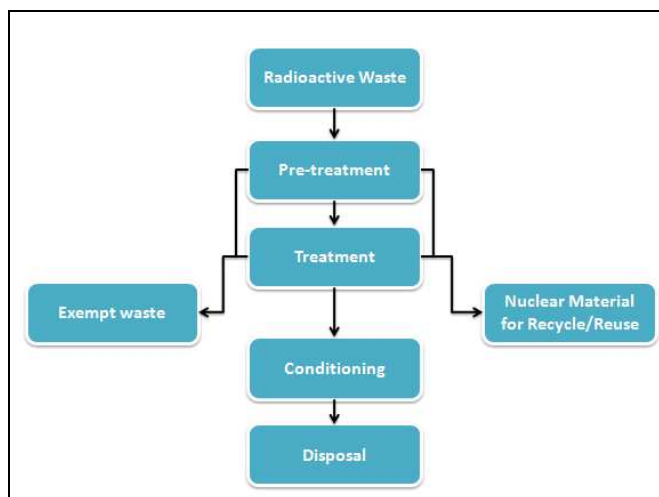


Fig.6. Radioactive Waste Disposal

### VII. SUGGESIONS AND CONCLUSIONS

This study exposed that medical waste management has not received sufficient consideration in both private and governmental hospitals; hence there is inadequate and inefficient isolation, collection, transportation and storage of biomedical waste. The Ministry of Health ought to a pay a lot of attention towards policies for the disposal of waste and correct management to confirm improvement and adequacy

within the medical waste management practices. Moreover there's have to be compelled to be incorporated into regular employee coaching, continued education, and management analysis processes for systems and personnel. Every health care facility ought to have a waste management unit to noticeably handle the waste management apply. Cleaners, Nurses and Sanitary workers handless should be properly trained. Sorting of wastes at supply mistreatment the color-coded system ought to seriously apply. Government ought to make sure that hospital facilities have smart and functioning incinerators or give a central incinerating facility wherever these waste might be taking to and treated before final disposal. Further study will be conducted based on storage issues and transport of Bio medical waste.

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# Heart Attack Detection by Heartbeat Sensing using IoT

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**Abstract**— We all know heart attack can kill your life in three attempts but now a days it can be dangerous in first attempt also. Checking our health regularly on daily basis , we can detect so many different diseases by detecting them previously. Many people among us lose their life because of heart attack. This is because of their diet, age, less physical activity and many other factors. Heart attack is not easy to detect, to overcome and help our society from heart diseases and attack, there is a system which will help to decrease the death rate and early detection a heart attack. In this article, we discussed how system is implemented by a heart beat monitoring and heart attack detection system using the Internet of Things (IoT). The sensor is then interfaced to a microcontroller that allows checking heart rate readings and transmitting them over Internet. The user may set the high as well as low level of heart beat limit. After setting these limits, the system starts monitoring and also alerts for lower heartbeats. For this the system uses two circuits. One is the transmitting circuit which is with the patient and the other is the receiver circuit which is being supervised by the doctor or nurse. The system makes use of heart beat sensor to find out the current heart beat level and display it on the LCD screen.

**Keywords**—Heart Attack, Sensor, IoT, Heart Rate Reading

## I. INTRODUCTION

A heart attack happens when there is a sudden complete blockage of an artery that supplies blood to an area of your heart. A heart is a muscle, and it needs a good blood supply to keep it healthy. As we get older, the smooth inner walls of the arteries that supply the blood to the heart can become damaged and narrow due to the build-up of fatty materials, called plaque. When an area of plaque breaks, blood cells and other parts of the blood stick to the damaged area and form blood clots. A heart attack occurs when a blood clot completely blocks the flow of blood and seriously reduces blood flow to the heart muscle. This also results in patients experiencing chest pain. As a result, some of the heart muscle starts to die. The longer the blockage is left untreated, the more the heart muscle is damaged. If the blood flow is not restored quickly, the damage to the heart muscle is permanent. A heart attack is sometimes called a myocardial infarction (MI), coronary occlusion or coronary thrombosis. The Internet of things is the network of devices, vehicles and home appliances that contain electronics, software, actuators and connectivity which allows

these things to connect , interact and exchange data. IoT involves extending internet connectivity beyond standard devices such as desktops, laptops, smart phones and tablets, to any range of traditionally dumb or non-internet-enabled physical devices and everyday objects. Embedded with technology, these devices can communicate and interact over the internet and they can be remotely monitored and controlled.



Fig.1. Use of Internet connectivity in IoT

The definition of IoT has evolved due to convergence of multiple technologies, real time analytics, machine learning, commodity sensors and embedded systems. Traditional fields of embedded systems, wireless sensor networks, control systems, automation (including home and building automations ) and others all contribute to enabling the IoT. The term IoT, often called Internet of everything, was 1st introduced by Kevin Ashton in 1999 who dreams a system where every physical object is connected using the Internet via ubiquitous sensors. The IoT technology can provide a large amount of data about human, objects, time and space. While combining the current Internet technology and IoT provides a large amount of space and innovative service based on low-cost sensors and wireless communication. IPv6 and Cloud computing promote the development of integration of Internet and IoT. It is providing more possibilities of data collecting, data processing, port management and other new services. Every object which connects to IoT requires a unique address or identification with IPv6. There are so many people in the world whose health may suffer because they do not have proper access to hospitals and health monitoring.[1, 2]

In 2013 the Global Standards Initiative on Internet of Things (IoT-GSI) defined the IoT as " the infrastructure of the information society ". The IoT allows objects to be sensed and/or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit.[2]

## II. PROPOSED SYSTEM

These days we have an increased number of heart diseases including increased risk of heart attacks. Our proposed system users sensors that allow to detect heart rate of a person using heartbeat sensing even if the person is at home. The sensor is then interfaced to a microcontroller that allows checking heart rate readings and transmitting them over internet. The user may set the high as well as low levels of heart beat limit. After setting these limits, the system starts monitoring and as soon as patient heart beat goes above a certain limit, the system sends an alert to the controller which then transmits this over the internet and alerts the doctors as well as concerned users. Also the system alerts for lower heartbeats. Whenever the user logs on for monitoring, the system also displays the live heart rate of the patient. Thus, concerned ones may monitor heart rate as well get an alert of heart attack to the patient immediately from anywhere and the person can be saved on time.

The following figure shows system architecture and flow chart of the some existing systems.

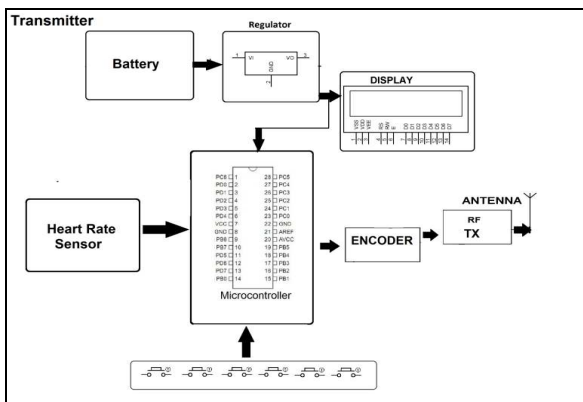


Fig.2. Transmitter

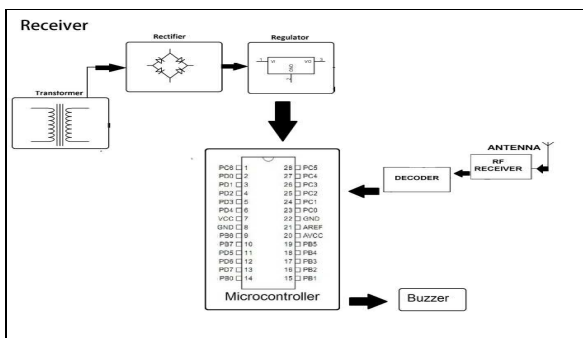


Fig.3. Receiver

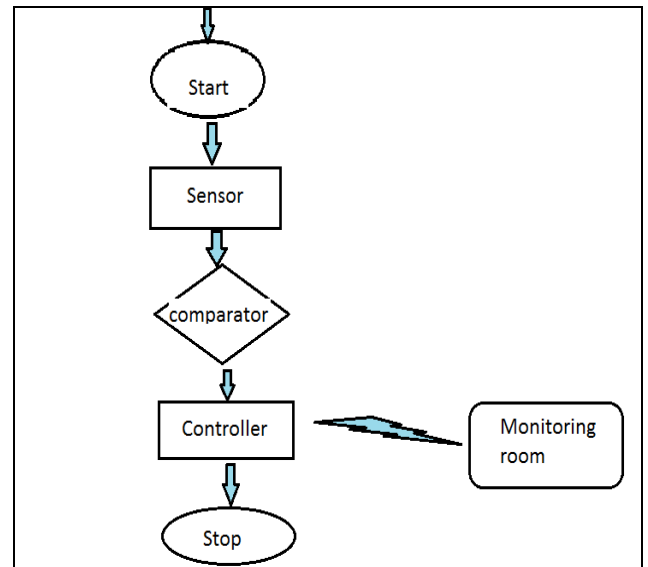


Fig.4. Flowchart of Proposed System

## III. WORKING MECHANISM

This system Heart Attack Detection by Heart Rate Monitoring Project helps to inform if a person is about to have a heart attack. This system does this by detecting the heart beat level and informs as soon as the heart beat level does not fall within the permissible limit. Thus this system can be used to save life of many people as this system alerts the doctor about the patient's heart beat level. For this the system uses two circuits. One is the transmitting circuit which is with the patient and the other is the receiver circuit which is being supervised by the doctor or nurse. The system makes use of heart beat sensor to find out the current heart beat level and display it on the LCD screen. The transmitting circuit includes AVR family microcontroller interfaced to LCD screen and this transmitting circuit is powered by 12V transformer. Similarly, the receiving circuit includes AVR family microcontroller and RF receiver and also has a 12V transformer. The receiver circuit also includes LED light and a buzzer which are used to alert the person supervising the heartbeat rate of the patient and turns on the LED light and buzzer as soon as the heartbeat level of the patient does not fall within the normal heart beat level set.

This system uses two circuits. (a) Transmitting circuit (b) Receiver circuit . The sensor shines a light lobe (a small very bright LED) through the ear and measures the light that gets transmitted to the Light Dependent Resistor. Amplified signal gets inverted and filtered, in the Circuit. In order to calculate the heart rate based on the blood flow to the fingertip, a heart-rate sensor is assembled with the help of LM358 OP-AMP for monitoring the heartbeat pulses. When System powered ON, IR Tx starts emitting Light with 100% intensity towards blood cells. Light reflect back to Rx with "100% - x" from it. This 'x' value is our Heart beat rate. All data will send directly to server room so in case of any emergency fast action can be perform. A Heartbeat sensor is a monitoring device that allows one to measure his or her heart rate in real time or record the heart rate for later study. It provides a simple way to study the heart function. When the sensor is working, the beat LED

flashes in units on with each heartbeat. This digital output can be connected to the microcontroller directly to measure the Beats per Minute (BPM) rate. Temperature sensor is analogue quantity with the range 0-135 degree. All the data can detected by sensor and give display which is LCD of 16\*2. Simultaneously we these data goes on server and display on control room. We make this system universal for all the hospital rooms. Operator can seat in single place and able to monitor all the patients.[3,4,5]

#### IV. COMPONENTS

Heartbeat sensor provides a simple way to study the function of the heart which can be measured based on the principle of psycho-physiological signal used as a stimulus for the virtual- reality system. The amount of the blood in the finger changes with respect to time. Heart beat sensor is used to measure the pulse rate of heart in digital output. LED is used to detect the heart rate. The normal heart beat range is 78 bpm. This provides a direct output digital signal .[3,5,6]

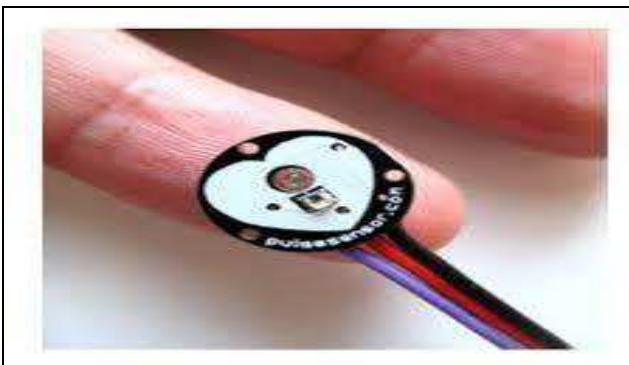


Fig.5. Heart Beat Sensor

LM35 sensor is used to measure the temperature of the human body. The LM35-series devices are precision integrated-circuit temperature sensors, with an output voltage linearly proportional to the Centigrade temperature. [3,4,5,6]



Fig.6. Temperature Sensor

The Pressure sensor is used to measure the systolic and the diastolic pressure level using the device. It is measured in millimeter mercury (mmHg). Blood pressure changes from minute to minute. [5,6,7,8]



Fig.7. Pressure Sensor

The ESP8266 WiFi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor.

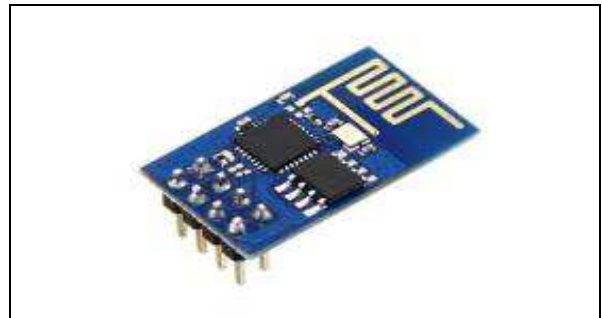


Fig.8. WiFi Module

Atmega 328 is an eight (8) bit micro-controller. It can handle the data sized of up to eight (8) bits. It is an AVR based micro-controller. Its built in internal memory is around 32KB. It operates ranging from 3.3V to 5V. It has an ability to store the data even when the electrical supply is removed from its biasing terminals. [5,6,7,8]

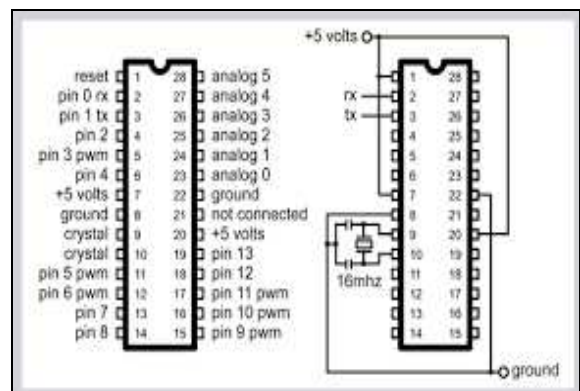


Fig.9. Atmega 328

#### V. BENEFITS

- Portable Systems
- Save risk of heart attack as you can check the same at home

- Affordable System
- Temperature and Heart beat monitoring by single device
- All Patients monitored by single person seating in Server room.
- This system also helps for Hospital monitoring system.

## VI. CONCLUSION AND FUTURE SCOPE

These days, we have an increased number of heart diseases including increased risk of heart attacks. Our proposed system users sensors that allow to detect heart rate of a person using heartbeat sensing even if the person is at home. The sensor is then interfaced to a microcontroller that allows checking heart rate readings and transmitting them over internet. The user may set the high as well as low levels of heart beat limit. After setting these limits, the system starts monitoring and as soon as patient heart beat goes above a certain limit, the system sends an alert to the controller which then transmits this over the internet and alerts the doctors as well as concerned users. Also the system alerts for lower heartbeats. Whenever the user logs on for monitoring, the system also displays the live heart rate of the patient. Thus concerned ones may monitor heart rate as well get an alert of heart attack to the patient immediately from anywhere and the person can be saved on time. In our proposed research, we tried to propose a complete paper for detecting heart attack using two ways. However, we have some plan about this research. Time of India, a leading newspaper in India published that “Researchers in the United States, within the next decade.

Heart Microeconomic Microchip will be set in blood vessel of human body. The smart phone will collect data and send the information to us”. Researchers are trying to implement their requirements of Microchip for uses of the technology in smart phone. We will try to use this technology in future. If this technology will developed then we can detect heart blockage through this technology by our project

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# A Study of Blockchain Technology

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**Abstract**— Block chain is a decentralized transaction and data management technology developed first for bit coin crypto currency. Block chain has become a new frontier of venture that has attracted of banks, governments and other business corporations.

**Keywords**—Blockchain, Crypto Currency, Business

## I. INTRODUCTION

Block chain innovation can improve the fundamental administrations that are basic in exchange back. At its centre, block chain depends on a decentralized and conveyed record display. By its temperament, this is more hearty and secure than the exclusive, unified models which are presently utilized in the exchange environment. Block chain innovation makes a reasonable, decentralized record of exchanges the disseminated record which permits the substitution of a solitary ace database. It keeps an unchanging record everything being equal, back to the starting purpose of exchange. This is otherwise called the provenance, which is basic in exchange fund, enabling money related circumstances to audit all exchange steps and lessen the danger of extortion. [1]

Block chain has known to be people in general record for all exchanges and settled the twofold spend issue by consolidating distributed innovation with open key cryptography .Actually course, there is a stringent arrangement of guidelines that administer how to check the legitimacy of the square and sure that the square won't be adjusted or vanish. The calculation and the computational foundation of making, embedding and utilizing the squares are considered as the block chain innovation.[1]

## II. OVERVIEW

A Blockchain stores value, for instance, money. A famous example of a money-block chain is Bit coin. Block chain is an innovation that utilizes disseminated databases, math and cryptography to record exchanges. Consider it a framework made out of numerous monsters bookkeeping record databases all adjusted with indistinguishable exchange data. Each new money related exchange gets replicated or stacked in succession like Lego squares. This implies it is for all intents and purposes difficult to hack since it is important to hack a huge number of databases. A decent relationship to block chain is Napster, the distributed music sharing organization during the 1990s.

### A. Why Blockchain Become Popular?

Currently, the global financial system is enormous, but it is very cumbersome to transfer money. While you can send an email around the world in a second, transferring money can take days or even weeks to arrive at its destination. Financial intermediaries are required to transfer any sum of money, each of which takes a service charge. These financial middlemen are more often the victims of fraud than the rest of the economy, which results in greater regulation and higher costs for all parties involved. Block chain will reduce the number of middlemen while increasing security, both of which will reduce costs. Block chain will increase the velocity of money, which will increase cash flow and capital investments.

### B. What does Blockchain means for Banks?

Blockchain presents a twofold edge sword for banks. From one perspective, it could conceivably spare banks billions in real money by drastically lessening handling costs. Banks are salivating at the chance to diminish exchange costs and the measure of paper that they procedure. Actualizing block chain would make banks progressively productive and profitable. Santander, a bank situated in Spain, put the potential investment funds of block chain at \$20 billion every year. On the other hand, the chance to begin a save money with lower costs has pulled in numerous new fine tech new businesses to the market. Banks are likewise supporting their wagers by straightforwardly putting resources into fine tech new companies. As per KPMG, in 2016, funding financing to worldwide fine tech organizations achieved a record \$13.6 billion while by and large interest in fine tech organizations totaled \$24.7 billion. [2,3]

## III. TYPES OF BLOCKCHAIN

There is two types of block chain discuss in paper Permissioned and Permission less block chain.[

### A. Permissioned Blockchain

Permissioned blockchains must be approved by proprietors. Just confided in validators take an interest in accord. These confided in validators are not unknown, so a proof isn't fundamental any longer. A case of a confided in validator is government. Permissioned blockchains can be conveyed yet don't need to be. In the event that it isn't appropriated, at that point the block chain is said to be all in all correct to see and send exchanges.



A Permissioned blockchain is said to be open when everybody can see the block chain. An open permissioned blockchain is dispersed yet at the same time controlled by the proprietors and approved clients. [4,5,6]

**B. Permissionless Blockchain**

In permission less block chains, each client takes an interest in the agreement maker. Since each client is mysterious in this chain, it is important to have confirmation that guarantees us that another square is legitimate in the chain.

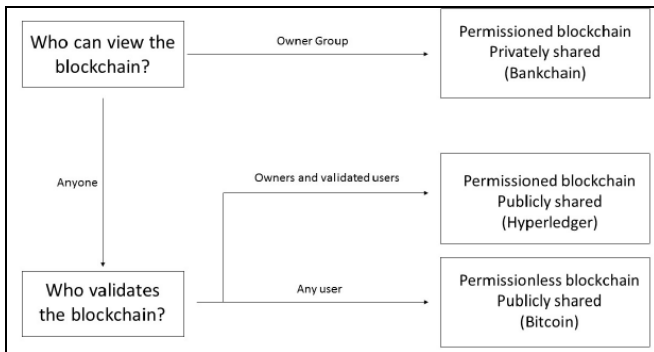


Fig.1. Application of Block chain

There is a diverse of applications of block chain technology .we summarize several typical applications of block chain. We roughly categories the applications of the block chain into finance, IoT, public and services, reputation system and security and privacy. [4,5,6]

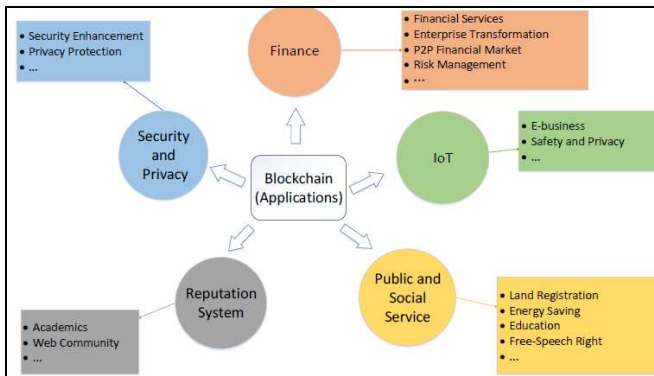


Fig.2 . Representative application domains of Blockchain

**C. Finance**

The emergency of block chain systems such as Bit coin and has brought a huge impact on traditional financial and business services. Block chain technology could be applied to many areas including clearing and settlement of financial assets etc. In addition to evaluation of financial and business services, block chain can help traditional organizations to complete the enterprise transformation smoothly. Consider an example of postal operators .Block chain could also help build a P2P financial market in a secure and reliable way. Noyes explored way of combining peer-to-peer mechanisms and multiparty

computation protocols to create a P2P financial MPC (Multiparty corporation) Market. [4,5,6]

**D. Internet of Things (IoT)**

Internet of things (IoT), one of the most promising information and communication technologies(ICT),Is ramping up recently. IoT is proposed to integrate the things into the internet and provide users with various services. The typical killer applications of IoT include the logistics management with Radio Frequency Identification(RFID) technology, smart home, e-health, smart grids. Maritime Industry, etc. Zhang and wen ( 2015) propose a new IoT E-business model and realize the transaction of smart property based on block chain and smart conduct. In this model, distributed autonomous corporations(DAC) is adopted as a decentralized transaction entity. People trade with DACs to obtain coins and exchange sensor data without any third party.[4]

**E. Public and Social Services**

One of the typical block chain applications in public services is the land registration in which the land information such as the physical status and related rights can be registered and published on block chains. Besides, any changes made on the land, such as the transfer of land or the establishment of a mortgage can be recorded and managed on block chains consequently improve the efficiency of public services. Block chain is originally devised to enable currency transactions to be carried out in trust less environment. However if we regard the learning and teaching process as the currency, block chain technology can potentially be applied to the online educational market. [4,5,6]

**F. Reputation System**

Reputation is an important measure on how much the community trusts you. The greater your reputation, the more trustworthy you are regarded by others. The reputation of a person can be evaluated on his or her previous transactions and interactions and interactions with the community. There is a rising number of courses of personal reputation records falsification. For example, in e-commerce, many service-providers enroll a huge number of fake customers to achieve a high reputation. Block chain can potentially solve the problem. [4,5,6]

**IV. ADVANTAGES OF BLOCKCHAIN**

**A. Zero percentage of Fraud**

Since block chain is an open source ledger, each and every transaction will be made public and hence there will be no chance of fraud taking place. The virtue of the block chain system will be constantly monitored by miners who keep an eye on all kinds of transactions around the clock.

**B. No Government Interference**

The government or any financial institution has absolutely zero control on virtual currencies that are based on the block chain technology whatsoever. Hence there will be no meddling with by the governments.



### C. Instant Transactions

The virtual currencies/digital currencies that are based on block chain offer transaction times that are 10 X faster than the usual bank ones. For instance, if a transaction has made to some person who has a different bank account then it will take minimum two days for the transaction to complete. However, block chain transactions will be usually completed in just a few minutes.

### D. Improved Financial Efficiency

The block chain technology lets individuals and companies make transactions directly to the end user without involving any 3rd-parties. This greatly enhances the financial efficiency in every nation and lets people be less dependent on financial institutions and/or banks. Not only will this save a lot of money for people in terms of fees but also other related expenses with utilizing banks.

## V. DISADVANTAGES OF BLOCKCHAIN

### A. Extremely Volatile

The virtual currencies that are based on block chain technology are highly subjected to extreme volatility. Of course, one good example for that is the fluctuating prices of Bit coin that vary from day to day. One of the reasons behind that extreme volatility is that both the decentralized block chain technology and the virtual currencies are extremely new to the market. Which means that the companies, investors, governments, and other groups adopting or not adopting them will greatly affect the volatility.

### B. Crime

Because of the anonymity that exists in decentralized block chain and virtual currencies which rely on them, they have become a second home for all illicit transactions. One good instance for that is "Silk Road," a digital black market. People utilized this platform to purchase things like illicit transactions using block chain-based virtual currencies. Nonetheless, the

FBI shut this place down after learning its existence. Even it was shut down, many people still think that this decentralized technology is too attractive to lawbreakers.

### C. Problems for Non-Tech Savvy

Storing virtual currencies that are block chain-based are a big headache for people who are not-so tech savvy. Usually, secured storage is easy for users who are familiar with technology. As a matter of fact, it can be accomplished simply via buying "Cold storage" wallets like Trezor. Nevertheless, people who cannot handle technology might face a problem with creating a Bitcoin or Ethereum wallet and then transferring coins from a digital wallet to a cold storage wallet.

## VI. CONCLUSIONS

Block chain innovation's numerous ideas and highlights may be extensively extensible to a wide assortment of circumstances. These highlights apply not simply to the prompt setting of money and installments or contract property and all budgetary market exchanges however past to portions as different as government, wellbeing, science, education, financial improvement, distributing, workmanship and culture and potentially much more extensively to empower orders-of-extent bigger scale human advancement.

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# Generating Compost from Wet Waste

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**Abstract**— India faces major natural difficulties related with waste age and deficient waste accumulation, transport, treatment and transfer. Current frameworks in India can't adapt to the volumes of waste produced by an expanding urban populace, and this effects on nature and general wellbeing. The difficulties and obstructions are noteworthy, however so are the chances. This article is about a global course on wet waste for urban areas. A need is to move from dependence on waste dumps that offer no natural security, to squander administration frameworks that hold valuable assets inside the economy. Squander isolation at source and utilization of particular waste handling offices to isolate recyclable materials has a key job. Transfer of remaining waste after extraction of material assets needs built landfill destinations and additionally interest in waste-to-vitality offices. The potential for vitality age from landfill through methane extraction or warm treatment is a noteworthy chance; however a key boundary is the lack of qualified designers and ecological experts with the experience to convey enhanced waste administration frameworks in India.

**Keywords**—Compost, Waste Management, Landfill

## I. INTRODUCTION

In Mumbai, there are total 73% of garbage waste which consist of food waste out of which only 5% is segregated and rest is dumped into the dumping ground. "Three-fourths of the city's total waste has been demarcated as organic-wet waste. When this mixes with other forms of dry waste such as plastic, debris and cloth, the process of decomposition takes much longer and as a result, the suppressed methane that is generated at dumping grounds easily ignites fires," said a senior civic official from solid waste management (SWM) department. According to a report by the SWM department, only 14,000 of an approximate 2,65,000 housing societies, buildings and gated complexes across the city's 24 wards segregate waste. "While only 5% waste is segregated, less than 2% is composted privately," said the SWM official adding that new SWM rules from 2016 make it mandatory for societies and institutions to segregate waste at source or pay a penalty. The recyclable plastic waste is still not in use all the low cost that can't be decomposed are burned in either way to reduce the composition of the waste.[1, 2, 3]

## II. METHODOLOGY

To survey the current fertilizer receptacles (family also, Industrial), different fertilizing the soil procedure, recognizing

downsides in the current manual containers and procedures. Completing an ethnographic inquire about concentrating on item consider, showcase study and client ponder wherein meeting will be led with client to comprehend the disadvantages of the current fertilizer container. In light of the information gathered in writing review and ethnography investigate, Quality Function Organization (QFD) outline is characterized and dependent on the QFD and writing study, ethnography information, Product Design Specifications (PDS) is structured. To create ideas, create 3D models dependent on the item structure particulars, and pick the last idea dependent on the weight positioning technique. To develop a full scale working prototype bins for through their kitchen and then to carry out the validation to identify the success rate of product and collect the suggestions from user.[2, 4]

## III. DESIGN CRITERIA

### A. Frequency of Use

The vegetable waste will be carried out every day and the process will be carried in once a week.

### B. Product Handling

Must be handling by a person who we will guide them the flow of the system and later on the compost generated can be sell in market that depends on the society.

### C. Product Location

The product will be located in the basement or small location to make the compost and the collection of waste container will be provided with the duct connected to the kitchen.

### D. Product Size

The Size will be 6m long and 4m wide and 2m width of the container.

### E. Visual Permeability

The want to not experience squander inside one's kitchen or family unit characterizes the visual penetrability parameter of the society Composter. The real procedure of fertilizing the soil would be outwardly imperceptible while the interface will give all the required data in a simple to appreciate way to the client.

**F. Odour Free**

The compost machine will be cleaned internally after the compost generated.

**G. Low Noise**

As there are grinder which are going to shred the products so the noise wont we that loud .

**H. Easy to Use**

Once a society personnel gets understand how to use this system then it's easy to use. [4,5,6]

In both rich nations and poor countries, 59% of the gathered strong waste is arrive filled and just 1% is just treated the soil. In rich nations, 13% of waste is dumped in lanes and in poor nations, 33% is dumped in roads. Around 64% of the waste produced is Organic waste and 5% is paper squander. Others are Inorganic misuse of 31%, which can be reused if appropriately isolated. Larger part of the strong waste is created in houses; it records to around a large portion of the aggregate waste gathered. Among them nourishment squander records to 21% of aggregate waste and plastics records to 18% which can be reused. Around 78% of the waste produced is nourishment squander. Other 18% of the waste is inorganic waste. By and large, if the natural waste gathered from the houses can be maintained a strategic distance from, around half of the aggregate strong waste can be evaded landfilled and burned. [1,2, 5,6]

**IV. COMPOST BIN MODEL AND DESIGN**

Before designing the compost bin the society must have a duct and a container where the entire waste can be segregated and collected into the container.

The container must be approximately 15-20 kg. Figure-1 shows the view of the container. The second unit is the composting machine which will be of 8000 litre and in 6mx4m in size and 2m width. Internally there are grinder (Figure-2 shows the image of the grinder) which will crush the waste into pieces and along with the system few water and grass/leaves/Biogas substances needed can be added into the system to make the compost moisture and quality based compost.[6, 7, 8, 9]



Fig.1. Container of 15-20 kg



Fig.2. Grinder

The process will be like there must be a segregated system which will be connected into the kitchen and the user will throw the waste through the duct and will get collected into the container. If the container gets full then the container will automatically get replaced by another container like it will be in rotation of the container. Then there must be a person to carry the waste and pour into the machine. The process of generation of compost will be done after 7-8 days. There must be 2500 volts DC supply to the system and a App which will notify the handler that the compost is ready please collect it will also notify whether the moisture is low in the system using soil and moisture sensor. If the moisture becomes low we can add biogas or dry leaves to maintain the quality. [6, 7, 8 , 9]

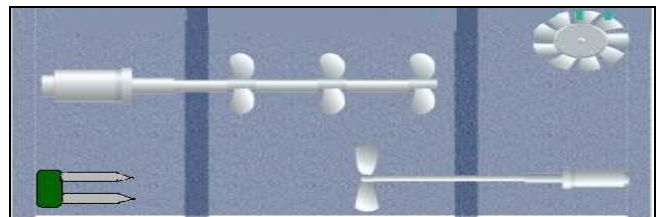


Fig.3. Internal Representation of System

Following is the product design specification in Indian scenario:

Table 1. Product Design Specifications

Sr.No	Factors	Specifications
1	Area of usage	Indian Society
2	Existing	Daily dumps, Eco bins
3	Size	6x4x2 mm
4	Shape	Organic
5	Weight	20-40 kg
6	Process	Grind, Soil and Moisture Sense
7	Performance	Semi-automatic
8	Expected Lifespan	Lifetime
9	Quality and Manufacturer	Mass Production
10	Cost	3-4 Lakhs INR
11	Safety	Safe and easy to use

## V. RESULT AND DISCUSSION

The compost machine include various build in component like sensors and various material is inputted to improve the quality of the mixture and from that compost generated can be maintained by inserting the air into the tightly closed vacuum and the gases generated can be made as an insolvent. The grinder will let the mixture crumble into pieces and the sensor will let the user know the quality and then the resultant compost can be separated into different containers.

## VI. CONCLUSION AND FUTURE SCOPE

This product will play a very important role in the future of green IT and profit the society by selling the compost into the market. There might be certain problems if the composting issue arises then the engineers will be available to help to improvise the quality of the system by making certain changes into the sensor like much more quality one sensors to be applied into the system.

Based on few of the suggestions suggested by the users for future improvements of the compost bins, below are some of the future scopes of the compost bin. The gases which are generated can be collected into a can through the pipe as an outlet from the machine. More aadvancements into the technology will be like auto cleaning of the duct using piston water supply within the container.

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Thakur Institute of Management Studies, Career Development and Research was established in the year 2001 with a clear objective of providing quality technical education in tune with international standards and contemporary global requirements, offering 3 years postgraduate degree in Master of Computer Applications (MCA). The Institute is recognized by the AICTE norms and is affiliated to the University of Mumbai.

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