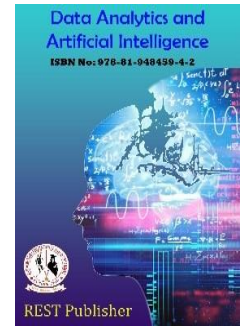




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## **IoT Smart Based waste Collection system for clean India**

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**Abstract:** With tremendous increase in population across the globe the amount of waste which is generated every day is very high by each individual. Some of the waste can be recycled and some cannot. For this purpose, we have proposed a smart garbage system which segregates the metallic, dry and wet waste. the main goal of the system is to develop a sorting system that sorts the wastes automatically. Along with this, the other feature is that it alerts the waste management center through iot system whenever any of the garbage bin is full and also tracks location using gps.therefore, to fix all the abnormalities, we have Proposed this work to maintain hygiene and cleanliness in public places.

### **1. INTRODUCTION**

**General:** In metropolitan or city areas, the clearance of waste management is one of the challenging tasks for the majority of the country all over the world. There is need of a wellorganized waste clearance system is mandatory by keeping green environment . There are many existing expertise mechanism are available for handling as well as managing waste. But, there is lacking for gathering information is a major challenging task. This miscommunication will affect the fast national growth rate in dense suburban area and also it is increasing demand for urban ecological protection. This is a major challenging in waste management system to create a prototype because the lack of coordination among government, people and local authority for shipping and processing waste. Currently the waste gathering is conventional which acquire a lot of labors and is time overwhelming process the universal truth is that wastage of anything is harmful for the society. Still we see wastage of water, electricity etc. In our daily life. The environment is surrounded with natural things but if any calamity or adversity occurs, it distracts the natural environment. The most affecting elements are the water, land, air and noise pollution. Due to this the ozone layer is declining day by day .but the most far reaching municipal solid waste which is very harmful for human beings and  
The other creatures

**Aim:** The aim of the proposed system is to design a garbage collection management system based on providing intelligence to trash cans. To detect the level of  
Garbage bins and alert the system.to track the location using gps module.

**problem statement:** In many of these areas, the garbage bins are not cleaned at regular intervals which means that no proper maintenance is kept in cleaning the bins.to avoid this, smart garbage management and monitoring systems should be adopted.and for the adoption of these smart systems, there should be a paradigm shift towards the “internet of things” i.e. Iot technology.this will help in optimizing the garbage management system and also in reducing the consumption of the fuel by the current system.this project has been implemented using iot technology and has Been proved to be very effective for environmental issues.

**Overview of IOT:** Internet of things (iot) is an ecological unit of associated corporal substance which are reachable during the internet. The ‘thing’ in iot could be a physical devices with sensor capabilities which are capable to send information through ip address and ability to communicate information to base station automatically. this technology helps the object interrelate with inner and outer side, in revolve Involve the choice chosen. Internet of things be able to interact in various system over internet. The objects can embody digitally which can be operated or monitored around the world. This will help the people which can confine extra information from different places which is guarantee for increasing effectiveness and recuperating protection and defence. In this project work bring new direction For integrating iot for green environment by cleaning the waste automatically

**Motivation:** The key motivation is in achieving efficiency in waste management sector at the national level. The organization is inadequate to address the existing identified problems in waste management. There is no community participation towards management of waste and sanitation. An effective guideline must be provided to the public according to the regional requirements and constraints. This job can be done by ngos present in the area. In order to maintain clean and hygienic environment in the area around us, we are using the technology for better garbage Monitoring system.

**Objectives:** The main objectives of the project are:

1. To study the use of iot in garbage monitoring system.
2. To design a systematic garbage monitoring system.
3. To develop a systematic garbage monitoring system.

**Iot Functional Blocks:** An iot system is comprised of a number of functional blocks to facilitate various utilities to the system such as, sensing, identification, actuation, communication, and management presents these functional blocks as described below. device: an iot system is based on devices that provide sensing, actuation, control, and monitoring activities. Iot devices can exchange data with other connected devices and application, or collect data from other devices and process the data either locally or send the data to centralized servers or cloud based applications back-ends for processing the data, or perform some tasks locally and other tasks within iot infrastructure based on temporal and space constraints (i.e. Memory, processing capabilities, communication latencies, and speeds, and deadlines). An iot device may consist of several interfaces for communications to other devices, both wired and wireless. These include

- (i) i/o interfaces for sensors,
- (ii) interfaces for internet connectivity,
- (iii) memory and storage interfaces, and
- (iv) audio/video interfaces.

iot devices can also be of varied types, for instance, wearable sensors, smart watches, led lights, automobiles and industrial machines. Almost all iot devices generate data in some form of the other which when processed by data analytics systems generate leads to useful information to guide further actions locally or remotely, for instance, sensor data generated by a soil moisture monitoring device in a garden, when processed can help in determining the optimum watering schedules. communication: the communication block performs the communication between devices and remote servers. Iot communication protocols generally Work in data link layer, network layer, transport layer, and application layer.

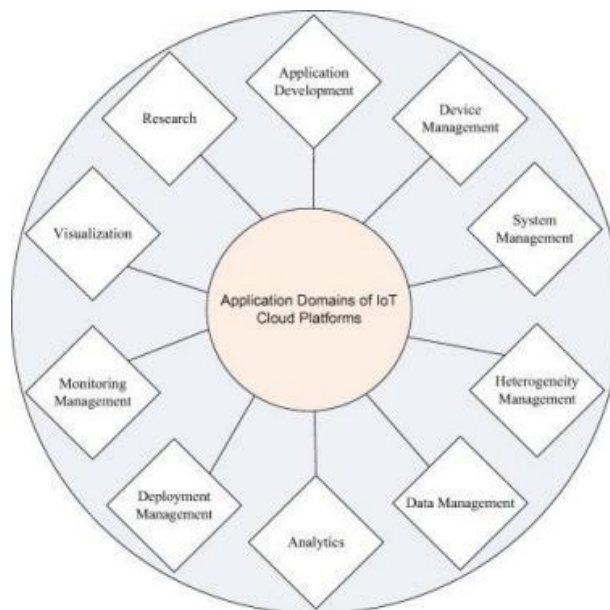
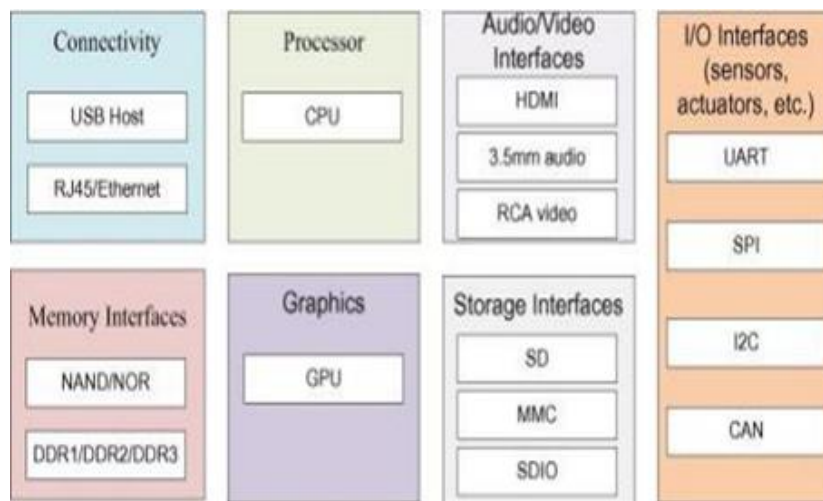
**Services:** an iot system serves various types of functions such as services for device modelling, device control, data publishing, data analytics, and device Discovery.

**Security:** security functional block secures the iot system by providing functions such as, authentication, authorization, privacy, message integrity, content integrity, and data security.

**Application:** application layer is the most important in terms of users as it acts as an interface that provides necessary modules to control, and monitor various aspects of the iot system.

Introduction

**Application Domains:** Iot cloud platforms are designed to be meant for particular application specific domains such as, application development, device management, system management, heterogeneity management, data management, analytics, deployment, monitoring, visualization, and finally research purpose. It is obvious that there are many more platforms currently present in the market, most popular 26 of these are chosen. Further, based on applicability and suitability preferences in several domains the iot cloud platforms have been revisited. 10 different domains are selected based on which most of iot cloud platforms are currently evolving into the IT market. Management wise few technological sectors are envisioned where these platforms do best fit into such as: Device, System, Heterogeneity, Data, Deployment, and Monitoring. Similarly, Analytics, Research and Visualization fields are chosen where rest of the platforms maybe Accommodated.



**FIGURE 1.** Application Domains Of Iot Cloud Platforms

**Iot Framework:** iot frameworks might help support the interaction between "things" and allow for more complex structures like distributed computing and the development of distributed applications. Currently, some iot frameworks seem to focus on real-time data logging solutions, offering some basis to work with many "things" and have them interact. Future developments might lead to specific software-development environments to create the software to work with the hardware used in the internet of things. Companies are developing technology platforms to provide this type of functionality for the internet of things. Newer platforms are being developed, which add more intelligence. Reset is a scalable architecture That allows things to communicate over hypertext transfer protocol and is easily

## 2. LITERATURE SURVEY

**Household waste management system using iot and machine learning:** sonali et al 2020 iot and machine learning based household waste management system for green smart society are aimed to make management of waste from the every apartment of the society more efficient using the most upcoming technology iot. this paper discusses the collection and decomposition of waste in the smart way so that benefit from the waste is maximized and the actual waste is minimized efficiently. discussed the collection and decomposition of waste in the smart way

**Advantages:** if the waste is maximized and the actual waste is minimized efficiently.

**Disadvantages:** need to use more sensor to identify the different types of waste

**Smart waste management system using iot shewale et al 2017:** internet of things (iot) can play an important role. improvement in safety and quality of life can be achieved by connecting devices, vehicles and infrastructure all around in a city. best technological solutions can be achieved in smart cities by making different stakeholders to work together. system integrators, network operators and technology providers have a role to play in working with governments to enable smart solutions. but, building such solutions on an open, standardsbased communications platform that can be continuously used is a challenge. we present a waste collection management solution based on providing intelligence to wastebins, using an iot prototype with sensors. it can read, collect, and transmit huge volume of data over the internet. such data, when put into a spatio-temporal context and processed by intelligent and optimized algorithms, can be used to dynamically manage waste collection mechanism. simulations for several cases are carried out to investigate the benefits of such system over a traditional system

**Advantages:** Provides accurate reports

**Disadvantages:** Need to increasing efficiency

**The use of modern technology in smart waste management and recycling praveen kumar et al 2019:** the key issue in the waste management is that the garbage bin at public places gets overflowed well in advance before the commencement of the next cleaning process. it in turn leads to various hazards such as bad odor and ugliness to that place which maybe the root cause for spread of various diseases. the increase in population, has led to tremendous degradation in the state of affairs of hygiene with respect to waste management system. The spillover of waste in civic areas generates the polluted condition in the neighboring areas. for eliminating or mitigating the garbage's and maintains the cleanness, it requires smartness based waste management system. the need of proper waste management does not end with just collection and proper dispose of garbage. it continues to the level of landfills and the amount that we can possibly recycle. recycling is estimated to be highly useful given that our dependency on raw products reduces, besides the reduction of waste and subsequent landfills. once the recycling is done to sort metals, plastics, and glass articles, the use of biodegradable waste can be extended beyond fertilizers and manure. the metals can be reused and the plastics can be diverted from the landfills, which otherwise leads to choking of the earth. the glass materials can be broken and melted back to form new articles after deep cleaning. this chapter aims to understand the use of machine learning and artificial intelligence in the most potential areas and the ultimate need to completely replace the human interaction

**Iot based smart garbage and waste collection bin m.s.killedar, 2016:** in this paper, 'smart garbage bin' (sgb) enabled with 'internet of things' (iot) is developed. sgb's generally embedded with the ultrasonic sensors used

for sensing the garbage levels, information and communication devices that help in networking, interconnection, and data transfer. the developed bin allows us to monitor the amount of waste filling in it by sending information about its filling status as applicable among these defined test cases 0% or empty, 50% or medium, 90% or nearly full, 100% or full, and threshold crossed or spill over

**Iot based garbage monitoring system meharet al 2019:** in today's busy world time is a vital issue which can't be managed by noticing each and every phenomenon with our tight schedule. so now a day's automatic systems are being preferred over manual system to make life simpler and easier in all aspects. to make it a grand success internet of things is the latest internet technology developed. the number of users of internet has grown so rapidly that it has become a necessary part of our daily life. our matter of concern in this project is development of internet of things-based garbage monitoring system. as the population of world is increasing day by day, the environment should be clean and hygienic for our better life leads. in most of the cities the overflowed garbage bins are creating an obnoxious smell and making an unhygienic environment. and this is leading to the rapid growth of bacteria and viruses which are causing different types of diseases. to overcome these situations efficient garbage collection systems are getting developed based on iot. various designs have already been proposed and have advantages as well as disadvantages. this paper is a review of garbage monitoring system based on iot.

**Iot based garbage monitoring using arduino anwar et al 2018:** an electronic monitoring system with gsm, which sends sms to the supervisor informing that the dustbin is completely filled.

**Smart dustbin-an efficient garbage monitoring system monika et al 2016:** people are getting more active in doing all the things possible to clean their surroundings. various movements are also started by the government to increase cleanliness. we will try to build a system which will notify the corporations to empty the bin on time. in this system, we will put a sensor on top of the garbage bin which will detect the total level of garbage inside it according to the total size of the bin. when the garbage will reach the maximum level, a notification will be sent to the corporation's office, then the employees can take further actions to empty the bin. this system will help in cleaning the city in a better way

**Advantages:** accurate sensing and location service

**Disadvantages:** issues in affordability, its maintenance and also its durability

**Smart garbage monitoring system for waste management yusof et al 2018:** this project presents the development of a smart garbage monitoring system in order to measure waste level in the garbage bin in real-time and to alert the municipality, in particular cases, via sms. the proposed system is consisted by the ultrasonic sensor to measure the waste level, the gsm module to send the sms, and an arduino uno which controls the system operation. it supposes to generate and send the warning messages to the municipality via sms when the waste bin is full or almost full, so the garbage can be collected immediately

**Advantages:** Handles all the communication between the involved people

**Disadvantages:** use of camera increases the cost of the system, compared to using sensors

**Iot based smart garbage alert system using arduino uno sathish et al 2016:** this paper proposes a smart alert system for garbage clearance by giving an alert signal to the municipal web server for instant cleaning of dustbin with proper verification based on level of garbage filling. this process is aided by the ultrasonic sensor which is interfaced with arduino uno to check the level of garbage filled in the dustbin and sends the alert to the municipal web server once if garbage is filled. after cleaning the dustbin, the driver confirms the task of emptying the garbage with the aid of rfid tag. rfid is a computing technology that is used for verification process and in addition, it also enhances the smart garbage alert system by providing automatic identification of garbage filled in the dustbin and sends the status of clean-up to the server affirming that the work is done.

**Advantages:** proper verification based on level of garbage filling

**Disadvantages:** use of rfid is not recommended, system can work without rfid too

## SYSTEM ANALYSIS

**existing system:** in the existing system of garbage collection, different id was provided to each bin so that it could be easier to detect that which is bin is full and ready to be emptied.the project is divided into two sections one being the transmitter section and other the receiver section.the transmitter section consists of a microcontroller and sensors which check the level of the garbage and the data is passed onto the system with the help of the rf transmitter, then rf receiver receives the data and sends it to the client associated so that the bin can be emptied quickly

### Disadvantages

- lack of information about the exact collecting time and area.
- improper monitoring, tracking the trucks and trash bins that have been collected in realtime.
- there is no quick way to respond to client's complaints about uncollected waste
- rf does not support long distance communication.

**Proposed System:** we have proposed a smart garbage system which segregates the metallic, dry and wet waste. the main goal of the system is to develop a sorting system that sorts the wastes automatically. along with this, the other feature is that it alerts the waste management center through iot system whenever any of the garbage bin is full and also tracks location using gps.

### Advantages

- full transparency.
- eliminating the cost of unnecessary collections.
- reducing your organization's carbon footprint.
- seeing data in real time, 24/7.
- having remote diagnostics.
- resizing the workforce.
- identifying cost-effective routes.
- improving process efficiency.

## 3. SYSTEM DESIGN

### System Block Diagram

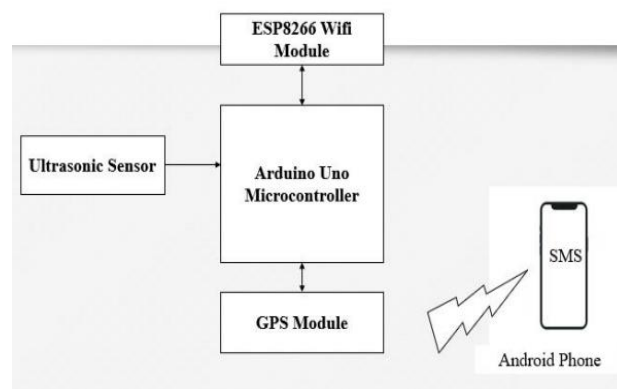


FIGURE 2. Block Diagram

**System Design:** the proposed garbage collection system monitor all the waste bins of the defined area and update which bins need to be emptied in any cycle of collection of the waste. moreover, it also has an efficient routing system showing the most optimized path for collecting wastes from the selected bins. it enables real-time monitoring of the waste level, odor and waste condition of the bins. the system can also monitor the temperature and humidity of the bins. depending on these factors it can be decided which bins are ready for collection. fig. 1 depicts the whole proposed system. the garbage collecting system are equipped with an embedded system which acts as iot edge nodes

### Applications

- it reduces the environmental pollution.
- real time based cleaning the garbage container.
- it can be used in smart cities.
- it empowers clean and green city programs.
- it makes our system transparent between the municipal corporations.

**smart garbage collection system:** the smart garbage collector is a specially designed method to dispose the garbage in a smart way which solves the social issues of hygiene in the country. the iot technology is slowly emerging in all the fields of city administration. garbage collection ensures that a program does not exceed its memory quota or reach a point that it can no longer function. it also frees up developers from having to manually manage a program's memory, which, in turn, reduces the potential for memory-related bugs. a garbage collection has the following phases: a marking phase that finds and creates a list of all live objects. a relocating phase that updates the references to the objects that will be compacted. a compacting phase that reclaims the space occupied by the dead objects and compacts the surviving objects.



### Types Of Garbage Collector

- serial garbage collector.
- parallel garbage collector.
- cms garbage collector.
- g1 garbage collector.
- z garbage collector.

**Types Of Garbage Collection:** garbage is classified based on its source into three - domestic wastes, municipal wastes, and industrial wastes. domestic wastes are the wastes from our houses. municipal wastes are the wastes from schools, offices, roads, and shops. industrial wastes are the wastes discarded from industries and small factories.

**Five ways to manage the garbage:** take a look at these simple ways in which waste can be efficiently managed at home.

- limit the use of plastic.
- segregate the waste
- reduce the use of paper
- say yes to composting
- plan your meals in advance
- invest in good-quality clothes
- pay your bills online.

**Main two types of garbage:** waste are of two types, biodegradable and non-biodegradable. Biodegradable biodegradable waste includes kitchen waste, agricultural waste, human and animal waste, which can be decomposed by the biological action of living microorganisms. however, non-biodegradable wastes are those which cannot be decomposed biologically. it includes plastic, metal, glass etc.

**Biodegradable:** wastes are waste materials easily degraded or broken down naturally by factors such as biotic (bacteria, fungi, plants, animals, etc.) and abiotic (ph, temperature, oxygen, humidity, etc.). this process enables complex substances to be broke down into simpler organic compounds which subsequently fade into the soil. this is a natural process that could be prolonged or rapid and poses little risks to the environment. these waste

materials could be termed green waste; including food waste, paper waste, and biodegradable plastics such as found in municipal solid waste. other examples of biodegradable wastes include sewage, manure, sewage sludge, human waste, waste from various slaughterhouses, hospital waste, dead animals, and plants. biodegradable waste could be said to be recyclable or reused; furthermore, bio-waste recycling may also directly contribute to climate protection. they are generally known as useful waste. recycling is one of the current waste management strategies having great benefits for the environment.

**non-biodegradable:** material which can be not be decomposed by the natural organism is called nonbiodegradable waste. e.g. metals, plastic, bottles, glass, poly bags, chemicals, batteries etc. but as these are readily available, convenient to use, and low cost, they are toxic, pollution-causing and are not considered as eco-friendly to the environment. many measures are taken, concerning the use of non-biodegradable materials. the three 'r' concepts which say reduce, recycle, reuse is in trend, which explains the use of non-biodegradable materials. as we already discussed that these substances do not decompose or dissolve easily so they can be recycled. and reuse

### Difference between biodegradable and non-biodegradable

#### biodegradable

- the degradation process in biodegradable waste is fast
- biodegradable waste is decomposed and degraded by microbes or microorganism
- biodegradable waste is not collected but is used up in a short time
- biodegradable waste has become part of biogeochemical cycles and give
- back quick turnover
- biodegradable waste can be used to generate energy as compost and biogas

#### nonbiodegradable

- the degradation process in non-biodegradable waste is slower than in biodegradable
- non-biodegradable waste cannot be decomposed by microbes or naturally
- non-biodegradable waste is often collected
- most of the non-biodegradable waste can never enter biogeochemical cycles very slow and more harmful for the earth
- non-biodegradable waste can be separated and recycled but the process is very costly

## 4. SYSTEM DESCRIPTION

**Hardware requirement:** hardware specifications are arduino micro controller, esp8266 wifi module, ultrasonic sensor, gps module

**Arduino microcontroller:** the arduino uno is a microcontroller board based on the atmega328. it has 14 digital input/output pins (of which 6 can be used as pwm outputs), 6 analog inputs, a 16 mhz ceramic resonator, a usb connection, a power jack, an icsp header, and a reset button. it contains everything needed to support the microcontroller; simply connect it to a computer with a usb cable or power it with a ac-to-dc adapter or battery to get started. the uno differs from all preceding boards in that it does not use the ftdi usb-to-serial driver chip. instead, it features the atmega16u2 (atmega8u2 up to version r2) programmed as a usb-to-serial converter. board has the following new features: pinout : added sda and scl pins that are near to the aref pin and two other new pins placed near to the reset pin, the ioref that allow the shields to adapt to the voltage provided from the board. in future, shields will be compatible both with the board that use the avr, which operate with 5v and with the arduino due that operate with 3.3v. the second one is a not connected pin, that is reserved for future purposes. atmega 16u2 replace the 8u2. "uno" means one in italian and is named to mark the upcoming release of arduino 1.0. the uno and version 1.0 will be the reference versions of arduino, moving forward. the uno is the latest in a series of usb arduino boards, and the reference model for the arduino platform; for a comparison with previous version 2.2 schematic & reference design the arduino reference design can use an atmega8, 168, or 328, current models use an atmega328, but an atmega8 is shown in the schematic for reference. the pin configuration is identical on all three processors. 2.3 summary microcontroller - atmega328 operating voltage - 5v input voltage - 7- 12v (recommended) input voltage (limits) - 6-20v digital i/o pins - 14 (of which 6 provide pwm output) analog input pins - 6 dc current per i/o pin - 40 ma dc current for 3.3v pin - 50 ma flash memory - 32 kb (atmega328) of which 0.5 kb used by bootloader sram - 2 kb (atmega328) eeprom - 1 kb (atmega328) clock speed - 16 mhz 2.4 power the arduino uno can be powered via the usb connection or with an external power supply. the power source is selected automatically. external (non-usb) power can come either from an ac-to-dc adapter (wall-wart) or battery. the adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. leads from a battery can be inserted in the gnd and vin pin headers of the power connector. the board can operate on an external supply of 6 to 20 volts, if supplied with less than 7v, however, the 5v pin may supply less than five volts and the board may be unstable. if using more than 12v, the voltage regulator may overheat and damage the board. the recommended range is 7 to 12 volts.



**esp8266 wifi module:** 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.



**ultrasonic sensor:** an ultrasonic sensor is an instrument that measures the distance to an object using ultrasonic sound waves. an ultrasonic sensor uses a transducer to send and receive ultrasonic pulses that relay back information about an object's proximity. ultrasonic sensors are used primarily as proximity sensors. they can be found in automobile self-parking technology and anti-collision safety systems. ultrasonic sensors are also used in robotic obstacle detection systems, as well as manufacturing technology. 5.1.4 gps module gps modules contain tiny processors and antennas that directly receivedata sent by satellites through dedicated rf frequencies. from there, it'll receive timestampfrom each visible satellites, along with other pieces of data. gps is module that receives a certain location from a satellite. gps is a good method for finding a location when outdoors. several gps satellites can be used in the gps module.in this section, we will try to access a location from a gps module.

**arduino ide:** arduino is a prototype platform (open-source) based on an easy-to-use hardware and software. it consists of a circuit board, which can be programed (referred to as a microcontroller) and a ready-made software called arduino ide (integrated development environment), which is used to write and upload the computer code to the physical board. arduino provides a standard form factor that breaks the functions of the micro-controller

into a more accessible package. arduino is a prototype platform (open-source) based on an easy-to-use hardware and software. it consists of a circuit board, which can be programmed (referred to as a microcontroller) and a ready-made software called arduino ide (integrated development environment), which is used to write and upload the computer code to the physical board. the key features are:

- arduino boards are able to read analog or digital input signals from different sensors and turn it into an output such as activating a motor, turning led on/off, connect to the cloud and many other actions.
- you can control your board functions by sending a set of instructions to the microcontroller on the board via arduino ide (referred to as uploading software).
- unlike most previous programmable circuit boards, arduino does not need an extra piece of hardware (called a programmer) in order to load a new code onto the board. you can simply use a usb cable.
- various kinds of arduino boards are available depending on different microcontrollers used. however, all arduino boards have one thing in common: they are programmed through the arduino ide. the differences are based on the number of inputs and outputs (the number of sensors, leds, and buttons you can use on a single board), speed, operating voltage, form factor etc. some boards are designed to be embedded and have no programming interface (hardware), which you would need to buy separately. some can run directly from a 3.7v battery, others need at least 5v.



FIGURE 3. arduino ide

arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or ide (integrated development environment) that runs on your computer, used to write and upload computer code to the physical board. arduino is an open source computer hardware and software company, project, and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical world. the project's products are distributed as open-source hardware and software, which are licensed under the gnu lesser general public license (lgpl) or the gnu general public license (gpl) permitting the manufacture of arduino boards and software distribution by anyone. arduino boards are available commercially in preassembled form, or as do-it-yourself (diy) kits. arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (i/o) pins that may be interfaced to various expansion boards (shields) and other circuits. the boards feature serial communications interfaces, including universal serial bus (usb) on some models, which are also used for loading programs from personal computers. the microcontrollers are typically programmed using a dialect of features from the programming languages c and c++. in addition to using traditional compiler toolchains, the arduino project provides an integrated development environment (ide) based on the processing language project.

**Embedded C:** embedded c is a set of language extensions for the c programming language by the c standards committee to address commonality issues that exist between c extensions for different embedded systems. historically, embedded c programming requires nonstandard extensions to the c language in order to support exotic features such as fixed-point arithmetic, multiple distinct memorybanks, and basic i/o operations. embedded programming embedded refers to the combination of hardware and software. embedded systems programming is the programming of an embedded system in some device using the permitted programming interfaces provided by that system. embeddedjava is an example of a development environment for programming embedded systems that will execute java programs. arduino is a very minute part of embedded systems, in fact we can call it as an application product of embedded system. arduino is just any other microcontroller board, with a specifically designed api and software which makes programming it very easy. arduino is just a drop of water in embedded system ocean.

## 5. CONCLUSION

in the entire world, waste management is a major challenging one. if it is not properly dispose or cleaned which will causes lot of deceases and spoil the green environment. there is need of new mechanism to properly dispose the waste. in our project, we have developed an efficient garbage collection system . technology is been used to provide better garbage disposal methods in urban areas. we have used sensors to indicate if the bins are filled or empty. when filled a truck driver receives a message to clean the bin. this system is eliminating the currentday status about the bins which are the most of the time laying in apathetic situation regarding full of garbage without being cleaned. we have also developed an android application through which the user can find abin near him to throw the trash. this creates a direct connection where every citizen is doing his part in maintain a clean environment around him . a web server is also been setup through which the municipal authorities also get information about the bins in their area.

## FUTURE SCOPE

this model is developed with the aim to keep environment clean and green. it can be enhanced further in many ways. following are its future scope:-the scope for the future work is this system can be implemented with timestamp in which real- time clock shown to the concern person at what time dustbin is full and at what time the waste is collected from the smart dustbins.if this system is used to monitor dustbins in larger areas, android app with dustbin locator can be developed so that person can track nearest bin and its status.a small grinder can be used along with a wet waste bin to make pieces of organic waste substances so that it will be decomposed rapidly.employing camera sensor for image processing of the cleanliness of the roads and penalizing persons not throwing the garbage properly in the bin.

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