

APPLICATION OF GSM ON WASTE MANAGEMENT

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Abstract : In this model we have used Internet of Things to monitor the waste throughout the city, along with that we have implemented automatic opening and closing of the bin using HC SR04 ultrasonic sensors, so that to avoid the contact between bin and humans to maintain their health and hygiene. Once the bin is full the ultrasonic sensors sense it and an alert message is sent to the waste picker and displays the percentage of the waste present inside the bin using LCD display. If the waste picker doesn't pick the waste on time then an alternative message is being sent to the higher authorities, if the person is unable to receive messages then messages are sent to an alternative number using GSM module with an interval of 15min. Once the waste is being picked a message is sent to higher authorities about the status of the bin. This system is designed using Arduino UNO, ultrasonic sensors, LCD display and GSM.

Keywords—Arduino Uno R3, HC SR04, GSM Module.

I. INTRODUCTION

India is a 2nd populated country in the world, increasing population also increases waste collection which is a major problem in the current world and India is one country with such a problem, which not only makes it tough to monitor but makes it difficult to manage waste. Proper management system is also one of the major problems regarding waste management. Increasing population has made the problem even worse. IoT is a newly emerging technology in the field of science, which provides a solution for country's major problems via internet. The idea is to have a bin that could monitor itself and help in managing the waste disposal is a suitable idea for all such problems. This paper presents a system where a bin is capable of managing waste and alerting the respected authority about the status of the bin in a real-time scenario. Thus, it provides a solution to the waste management problem in the country.

II. LITERATURE SURVEY

In the current world dustbins are placed on the roadside and dustbins are overflowing. This is due to the increase in the population and improper waste management. This causes damage to the environment and disease to the public. To avoid this situation we designed "Waste Management System Using IOT". In this system bins are placed within the cities and they are connected with GSM module which sends the necessary information regarding the bin to the respected authority.

Municipal solid waste management (MSWM) is one of the foremost environmental issues of Indian cities. Improper management of the waste causes hazards. Many researches and studies are made regarding municipal solid waste and results found the major problems that are attached with the improper municipal solid waste management. The few major problems are evolved because of the medical waste which are not disposed in a proper manner. At the end of the research many provided various suggestions that can solve the problem of the waste management in the cities. [1]

The purpose of this paper is to review the kinds of models presently being employed within municipal waste management and to focus on some major outcomes of those models. This is divided into 2 categories—profit analysis and life cycle assessment. The outcome of the current model serves any one of the problems. But the outcomes of current waste management models that are involved with refinement of the created choice itself. It should think about the economical, social and all 2 aspects of the waste management. [2].

In waste management the IoT components: (1) Arduino UNO R3 (2) servo motor (3) ultrasonic sensors (4) LCD display (5) GSM module are used to create the proposed model. The system handles the case of improper waste management in inaccessible areas of the town. The waste management system assures to provide quality of service (QoS) within the cities. [5]

III. PROPOSED SYSTEM

3.1 BLOCK DIAGRAM OF THE SYSTEM

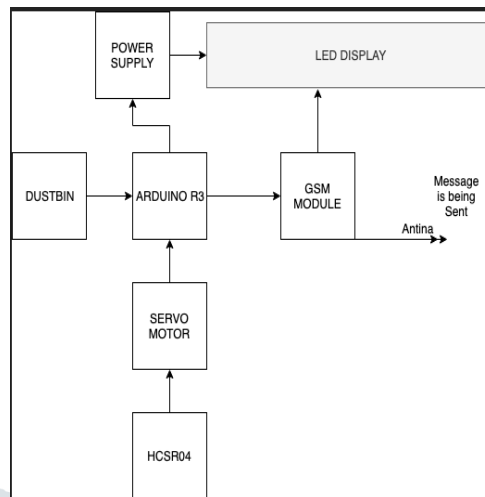


Fig 3.1: Working flow of the model

As depicted in the fig 4.1 circuit is designed using Arduino UNO. The Dustbin is being attached with a ultrasonic sensor which does the major operation. Now the ultrasonic sensor detects the depth of the dustbin, if the dustbin is full a message is being sent to the set of people who are responsible to pick up the waste and even the total percentage of the dustbin is being displayed on the LCD display. Message is also sent to alternative numbers (higher authority) in case the waste is not picked on time. Once the dustbin is cleared message stating bin is empty is sent to the higher authority.

3.2 HARDWARE-IMPLEMENTATION

1. GSM Module: Global System for Mobile communication (GSM) SIM card is inserted inside the mobile device to send and receive the messages using GPRS. The GSM SIM card number is registered with the system. GSM is used to send data from control unit to base unit. We used GSM 800C which supports Quad-band 850/900/1800/1900MHz. I can transmit Voice, SMS and data information with low power consumption.



Fig 3.2.2: GSM Module

2. Arduino: The Arduino Uno is a open-source microcontroller board based on the Microchip ATmega328. It has 14 digital pins and 6 analog pins, and programmable within Arduino IDE(integrated development Environment) via type B USB cable ,it can be powered by USB cable or external 9 volt power battery. It contains a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button.

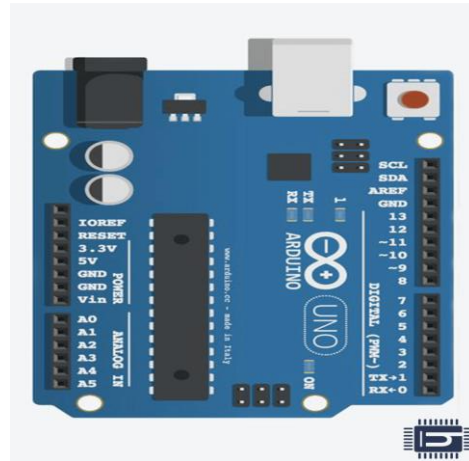


Fig 3.2.3 : Arduino Circuit

3. Ultrasonic Sensor(HCSR04) : Ultrasonic ranging module HC - SR04 provides 2cm - 400cm non-contact measurement function. This includes ultrasonic transmitters(trig), receiver(echo) and control circuit. The basic principle of work: (1) Using IO trigger for at least 10ms high level signal, (2) The Module automatically sends and detect whether there is a pulse signal back. (3) IF the signal back, through high level , time of high output IO duration is the time from sending ultrasonic to returning. Test distance = (high level time×velocity of sound (340M/S) / 2 .

3.3. FLOW CHART OF THE SYSTEM

The flow diagram shows how the dustbin connected with GSM module works .The LCD display screen displays the percentage of the waste inside the bin .Once the bin is full GSM sends an message to the waste picker ,if the dustbin is not cleared GSM sends alert messages to an alternative number(higher authority) regarding the bin status .Once the waste is cleared the GSM again sends the current status to the higher authority.

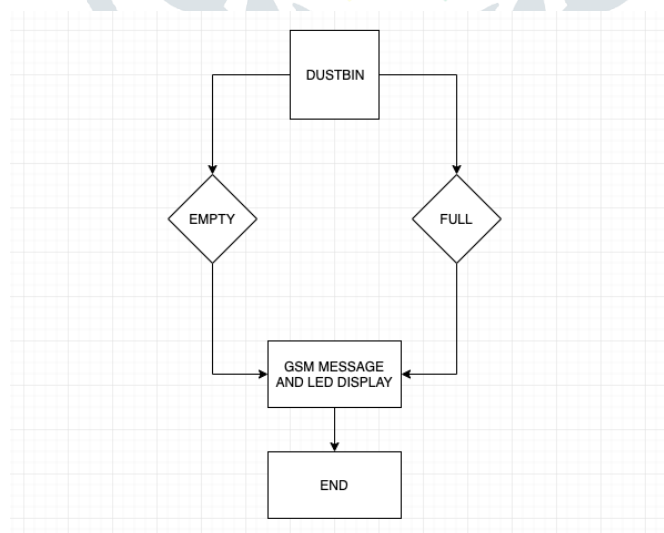


Fig 3.3.1: Flow Diagram

IV. TESTING AND RESULTS

- Register the waste picker according to the area where the Dustbin is being placed
- Message to be sent to the waste picker for on time Pickup
- Faster way to reach the waste picker is through GSM

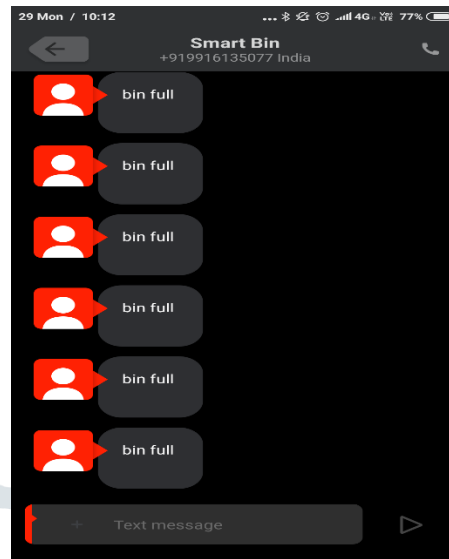


Fig : :Snapshot of the message being sent to the waste picker

V. CONCLUSION

In this project work we proposed complete working model using arduino UNO microcontroller. The programming of the Arduino is done using Arduino IDE and controlled during implementation. Here the smart dustbin provides a solution for the management of the waste in cities. Gsm module is implemented to send messages about the status of the bin in real time. Whenever the bin is full alert message is sent to the pickers about the status of the bin ,by this for some extent we can manage the waste in the cities.

VI. FUTURE SCOPE and APPLICATIONS

In the future scope , We plan to make the dustbin more smart by taking the datasets, which is being uploaded to the cloud and then the data is being analyzed so that we can get to know that how much waste is being put out in that particular surrounding and how the waste could be controlled over. The better the analysis is being done the better the waste is being controlled and monitored.

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VIII. REFERENCES

- [1] Mufeed Sharholy, Kafeel Ahmad, Gauhar Mahmood, "Municipal solid waste management in Indian cities – A review", 2007
- [2] Insung Hong, Sunghoi Park, Beomseok Lee, Jaekeun Lee, Daebeom Jeong, and Sehyun Park, "iot-Based Smart Garbage System for Efficient Food Waste Management", 2014
- [3] Abdoli, S., "RFID Application in Municipal Solid Waste Management System", 2008
- [4] Alexey Medvedev, Petr Fedchenkov, Arkady Zaslavsky, Theodoros Anagnostopoulos, Sergey Khoruzhnikov, "Waste Management as an iot-Enabled Service in Smart Cities", 2015
- [5] FAISAL KARIM SHAIKH; SHERALI ZEADALLY; ERNESTO EXPOSITO , "ENABLING TECHNOLOGIES FOR GREEN INTERNET OF THINGS", 2015
- [6] Shambala S Salunkhe, Madhuri D Yadav, Vrushali V Kulkarni, "IOT Based Waste Monitoring For Smart City", 2017