

An Efficient Approach for the Management of Municipal Solid Waste

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Abstract:- We often see garbage bins or dustbins placed in public places in our cities overflowing which adds to the ugliness of the area and odor spread at the same time. To overcome these situations an efficient smart garbage management method has to be developed. A GSM based smart bin can be used to prevent all of these scenarios to which all the phone numbers of the official handling this section will be added. The status of the dustbin will be displayed on the screen when it reaches 75% and in the filled condition which is visible to the residents and an alarm message is sent to the officials also sometimes during rainy season the bin is filled up with water gives a nasty smell, to avoid this we use a rain sensor to identify the rain and our system automatically closes the bin. Normally the garbage will be collected in the morning or in the allotted time, in case of deviations, an alert message will be sent to their higher officials. However, during a festival or a function, a lot of garbage is created by the people which fills up and overflows causing a few of issues. This system now on identifying the condition sends a warning message regarding the garbage to the concern officials to take necessary actions like either cleaning or placing an extra bin. In our proposal system we use ultrasonic sensor, buzzer, servo motor, LCD, MEMS sensor, rain sensor and arduino board which is equipped with analog and digital input/output pins. Therefore, the automatic garbage fill alerting system makes the garbage collection more efficient, which will effectively make our dustbins and also cities smart at the same time.

Keywords: solid waste, ARDUINO UNO, sensors, GSM, clean environment.

I. INTRODUCTION

Population has been growing at an exponential rate in the post the 21st century, extra and greater human beings are migrating from one place to another in pursuit of higher residing possibilities. [1] The life-style of the people, in these recent years has undergone a drastic change. Population explosion, growing levels of urbanization and the alerting way of life of the human beings have resulted in issues aplenty [2] one of the predominant problems it has promoted is the growing ranges of waste generation. It also leads to causes of germs, insects, microorganism and viruses breed on this garbage and can end result in the unfold of more than a few diseases. Inefficient waste administration methods have been given upward thrust to the possibility of such types of problems. In the typical waste management schemes, cleaners are assigned to empty the waste bins at a specific time of the day [3]. Such a method has a lot of disadvantages. It is inefficient and time consuming. At a particular time of packing containers and empty them. Since there is no foundation for this time that the authorities pre-decide for the cleaners go to an

empty the bins

, it is quite viable that both the bin nonetheless has room for waste disposal at that precise factor of time or bin has already been crammed a lengthy time again and the rubbish has overflowed in the vicinity, thereby giving upward jab to the opportunity of unfold of bacteria and viruses borne ailments [4]. Thus this waste management approach is no longer at all appropriate one and there is much scope for improvement. With the thinking of clever cities gaining floor duration the world, a massive range of responsibilities want to be fulfilled. The world nowadays is advancing at very speedy space, with technologies evolving and new innovations springing up, efficient options have been developed to assist tackle the problems confronted through human beings in the herbal environment. With the world populace increasing, however this improvement comes with its very own needs, most importantly want for sustainable development of cities [6].

II. METHODOLOGY

This project focuses on environmental management in order to make a clean India with GSM technology (i.e.) smart bin, briefly it includes the rain sensor to reduce odour, fall detection (MEMS sensor). In case the bin reaches the initial decline level of 75% the ultrasonic sensor will indicate the level which will be displayed in the LCD [4]. Here GSM plays an efficient role. Servo motor is used for closing the bin if rain fall occurs and it fills completely. A self-compacting bin with integrated rubbish level sensor. A user-friendly /interactive server side web application and well-integrated software and hardware system for effective waste management.

The Smart Bin, unlike any other bin, is equipped with a network of sensors, each of which is capable of providing specific information for real-time waste bin monitoring. An arduino UNO board is used in the system to achieve automation. The board serves as the central processing unit, controlling the sensors' interaction and synchronization. The Ethernet shield/Wi-Fi shield is a small device that is used. In addition to the Arduino for internet access and assist in the transmission of real-time data. What happens if someone fails to dispose of trash? use the bin and must instead use a different bin that hasn't been emptied yet.

The bin has a LCD display that shows the Fill Percentage, Date, and Time when it reaches the certain level such as 90% also the lid of the bin will close automatically .

II.2. RAIN SENSOR



Fig.:2.2 Rain sensor

A rain device or rain switch may be a shift device activated by rain fall. Whereas it rains, the detector is used to closes the lid of bin that is employed to avoid the nasty smell.[5]

II.3. SERVO MOTOR



Fig.:2.3 Servo motor

Servomotor is a rotary actuator or linear that allows for precise control of angular or linear position, velocity and acceleration.[11]

II.4. GSM



Fig.:2.4 GSM (Global system for mobile communication)

GSM Module or a GPRS Module is additionally a chip electric circuit that is ready to be a accustomed establishes communication between a mobile device or science system. Protocols for (2G) digital cellular network used by mobile devices like mobile phones and tablets.[2]

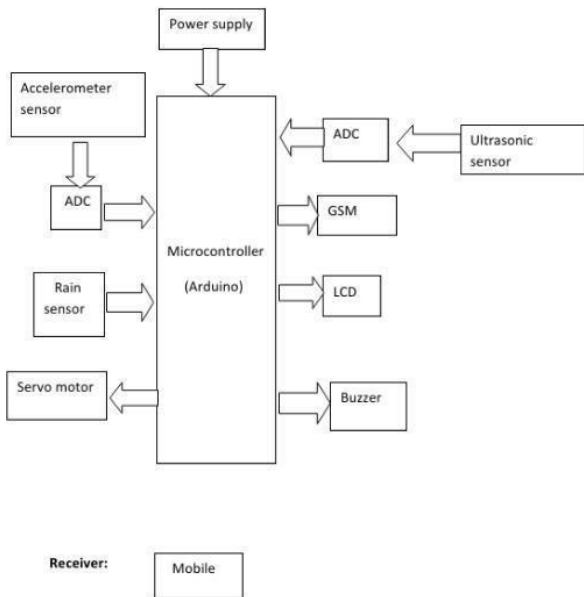


Fig.:2.1 Block diagram

This work can place a style for the good trash can, the explain the used hardware elements and the way it's connected together.

II.1. ULTRASONIC SENSOR



Fig.:2.1 Ultrasonic sensor

An Ultrasonic sensor is an electronic device that measures the distance of a target object by emitting **ultrasonic** sound waves and converts the reflected sound into an electrical signal.[4]

II.5. MEMS SENSOR

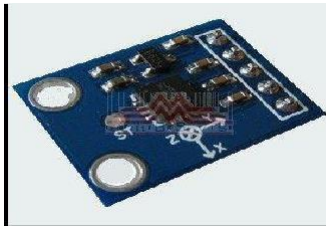


Fig.:2.5 MEMS Sensor

Whenever the tilt is applied to the MEMS sensor, then a balanced mass makes a difference within the electric potential. This can be measured like a change within capacitance. Then that signal can be changed to create a stable output signal in digital, 4-20mA or VDC.

II.6. ARDUINO UNO



Fig.:2.6 Arduino board

Arduino is an open source electronic prototyping platform enabling users to create interactive electronic objects.

III.IMPLEMENTATION

In every year 22 human diseases causing premature death due to improper waste management of garbage disposal. Many communication-based devices use the GSM module

The GSM network facilitates the interaction for a computer the communication interfaces are similar to RS-232, USB, and so on. It is necessary to have a SIM card in order to communicate with the network.

Ultrasonic sonic sensor is used to sense the certain given level of the waste for intimating purpose .It can also convert an electrical energy into acoustic waves and vice versa. The vibrating disk in a magnetic buzzer is attracted to the pole by the magnetic field. It helps to alert the people while it reaches a certain level. If suppose any accident is occurred (i.e.) any vehicle hits the dustbin it intimates by alarming using buzzer. Fall is detected by MEMS sensor, which is very useful in this project. When tilt is applied to the sensor, the suspended mass creates a difference in electric potential which is measured as a change in capacitance.

Servo motor is used here to close the bin lid while it rains or the angle of the bin position is changed. A servo motor is a closed loop serv3.6mechanism that uses position feedback to control its motion and final position. Liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device .It is used in our project to intimate that it reached a certain level.[7]

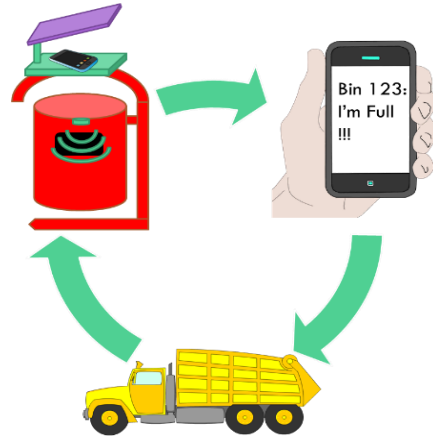


Fig.:3.1 process of the smart bin

IV.RESULTS AND DISCUSSION

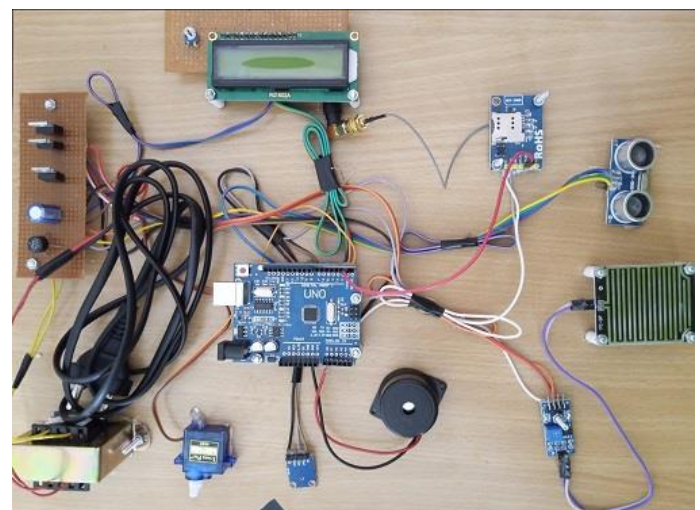


Fig.:4.1 Hardware implementation

The above mentioned Fig.:4.1 is the basic connection of a smart bin. It clearly explains about the working principle and how does it works.

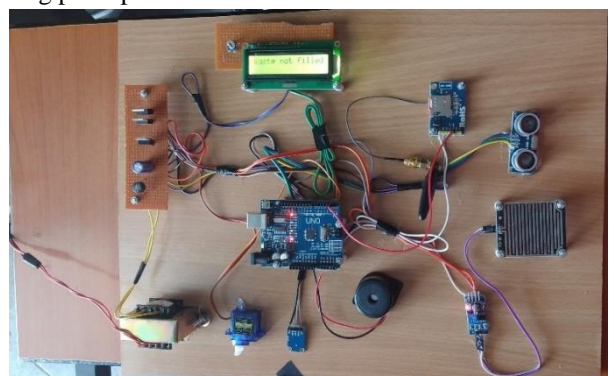


Fig.:4.2 output of the bin

The result of the output clearly displayed in the LCD and the buzzer alarms when it reaches its certain level. The lid of the bin automatically closes when it rains and position of the bin tilt.

V.CONCLUSION

A simple however helpful project referred to as sensible garbage can exploitation Arduino is intended and developed here. exploitation this project, the lid of the garbage can stays closed, in order that waste isn't exposed (to avoid flies and mosquitos) and once you wish dispose any waste, it will mechanically open the lid. The user web application a sensor composed hardware system developed in the GSM used project established in the basis of how technology can be used in the effective management of waste introducing a revolutionized approach to waste management. one of the utility of our system is that government can use the garbage generation statistics for policy and program design. If the system is implemented properly it will really make the cities cleaner and greener makes the smart city a reality.

VI.FUTURE SCOPE

The system's complexity introduces several dimensions to improving system functionality also, this project serves as a foundation for several changes and innovations in creating a highly efficient and effective waste management system to help address the nation's sanitation problems properly. It can be made more durable by making it smaller and cheaper. Wet and dry waste can be collected separately in two bins. Wet waste should be decompose and to be used to generate biogas and dry waste is recycled. Moreover, the system will store usage events, recorded by PIR sensor, and fullness events on a memory card, which is also used to play audio message using a speaker, when the bin is being used.

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