A Novel Approach on IOT based Smart Waste Management for Smart City using Arduino

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Abstract— The idea is simple and is driven by the fact that dustbins require very frequent cleaning, which is not always possible. This leads to unhealthy environment and spread of diseases. The aim is to accommodate more and get the dustbin cleaned timely using alert services. In many places, the Municipal garbage bins are overflowing and they are not cleaned at proper time. As a result of which the consequences are severe. It includes overflow of garbage which results in land pollution, spread of diseases, also it creates unhygienic conditions for people, and ugliness to that place. To remove the circumstances all such situations we are implementing a new technique called smart waste management using Arduino method is with the help of IoT concept. With the help of ultrasonic sensor to identify the dustbin whether full or not. GSM module which is used to send information to user. GPS which is used to identify the location.

Key words: IoT, Arduino, Smell Sensors, ultrasonic sensor, Relays

I. INTRODUCTION

These trends support the development of Smart City concepts, which are intended to improve living in urban areas by using innovative technologies. The "Internet of Things" provides new opportunities for making cities smarter. By introducing the Smart Waste Management System, we are taking key step towards becoming a Smart City. We have few garbage bins placed in cities which is overflowing and it checked by local authorities there are all types of garbage all disposed in bins and it all dumped together. So we designed the new concept of waste management disposal using automatic garbage level detecting from ultrasonic sensors and it will provide real time information about dustbins which is situated city. we classified waste in following categories: The garbage dustbins is filled these information can be send to the concerned authority person to clean the dustbin. For real time information we use GSM. GSM is now back bone of communication system which is low cost and high performance device and easy to implement. And another application are used in these system is GPS. GPS will show the location of the dustbin. The working of GSM module is give message signal when the dustbin is 90% filled. Their targeted wastes, Collection saves time, money, and fuel and also reduces exhaust Gas emissions and noise levels for local residents. Garbage truck tours can be reduced by 30 %.

II. EXISTING METHOD

In the existing system there is no indication whether the dustbin is over flown. It is more time consuming task and it is less effective. It leads to the wastage of time since the truck will go and clean whether the dustbin is full or empty.

This system need high cost. This system will create a unhygienic environment and make the city unclean. In this system the level of the dustbin will not be known and create the bad smell spreads and cause illness to human beings. It also make more traffic and noise.

III. PROPOSED METHOD

In present day the dustbin is over flown, the proposed system will help to avoid the overflow of dustbin. It will give the real time information about the level of the dustbin. It will send the message immediately when the dustbin is full. Deployment of dustbin based on actual needs. Cost of this system is minimum the resources are available easily. Improves environment quality by reducing the smell and make the cities clean. It has effective usage of dustbins. It will also reduce the wastage of time and energy for truck drivers. It will also indicate the availability of toxic substance in the bin .A smart dustbin will be fixed in underground, so easily can be reduce the traffics.
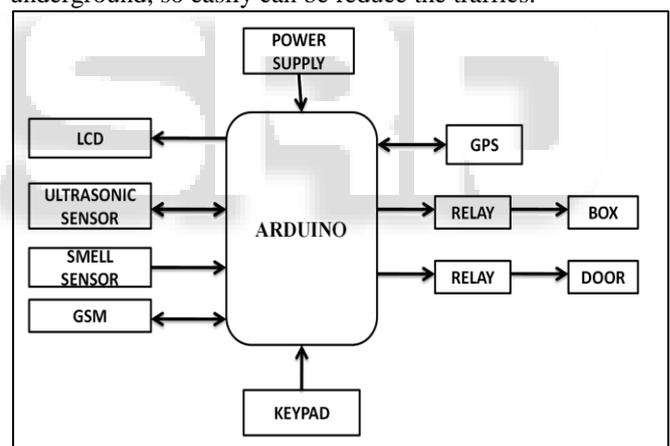

Fig. 1: Proposed Block Diagram

A. Block Description:

1) Arduino Mega

The Arduino Mega 2560 is a microcontroller board based on the ATmega2560 (datasheet). It has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, 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 Mega is compatible with most shields designed for the Arduino Duemilanove or Diecimila. The Mega2560 differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega8U2 programmed as a USB-to-serial converters.

B. Ultrasonic Sensor

The sensor is used to detect the level of the dust in the dustbin .It uses a sound transmitter and receiver .An ultrasonic sensor create a ultrasonic pulse .called ping and listen for the reflection of pulse. The sound pulse is created electronically using a sonar projector consisting of signal generator ,power amplifier, and electro-acoustic transducer array .A beam former is usually employed to concentrate the acoustic power into the beam.

C. LCD Display

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.

D. GSM Module

GSM (Global System for Mobile Communications), is a standard developed by the European Telecommunications Standards Institute. to describe the protocols for second-generation digital cellular networks used by mobile phones, GSM networks operate in a number of different carrier frequency ranges with most 2G GSM networks operating in the 900 MHz or 1800 MHz bands. Where these bands were already allocated, the 850 MHz and 1900 MHz bands were used instead . In rare cases the 400 and 450 MHz frequency bands are assigned in some countries because they were previously used for first generation systems. This GSM Modem can work with any GSM network operator SIM card just like a mobile phone with its own unique phone number.

E. Relay

A relay is usually an electromechanical device that is actuated by an electrical current. The current flowing in one circuit causes the opening or closing of another circuit. Relays are like remote control switches and are used in many applications because of their relative simplicity, long life, and proven high reliability. Although relays are generally associated with electrical circuitry, there are many other types, such as pneumatic and hydraulic. Input may be electrical and output directly mechanical, or vice versa. Relays are mainly made for two basic operations. One is low voltage application and the other is high voltage. For low voltage applications, more preference will be given to reduce the noise of the whole circuit. For high voltage applications, they are mainly designed to reduce a phenomenon called arcing.

F. GPS

The Global Positioning System (GPS) is a satellite-based navigation system made up of at least 24 satellites. GPS works in any weather conditions, anywhere in the world, 24 hours a day, with no subscription fees or setup charges. GPS satellites circle the Earth twice a day in a precise orbit. Each satellite transmits a unique signal and orbital parameters that allow GPS devices to decode and compute the precise location of the satellite. GPS receivers use this information to calculate a user's exact location. the GPS receiver measures the distance to each satellite by the amount of time it takes to receive a transmitted signal. With distance measurements from a few more satellites, the receiver can determine a user's position and display it electronically to measure your running route, map a golf course find a way home.

IV. ALGORITHM

1) Start.
2) Initialize setup.
3) Receive available data, send it to computer.
4) Sort data coming from different bins.
5) Display level corresponding to each bin on graphic user interface.
6) Check bin status.
7) If bin is full and send details of respective bin via SMS .
8) The same process to be repeated.
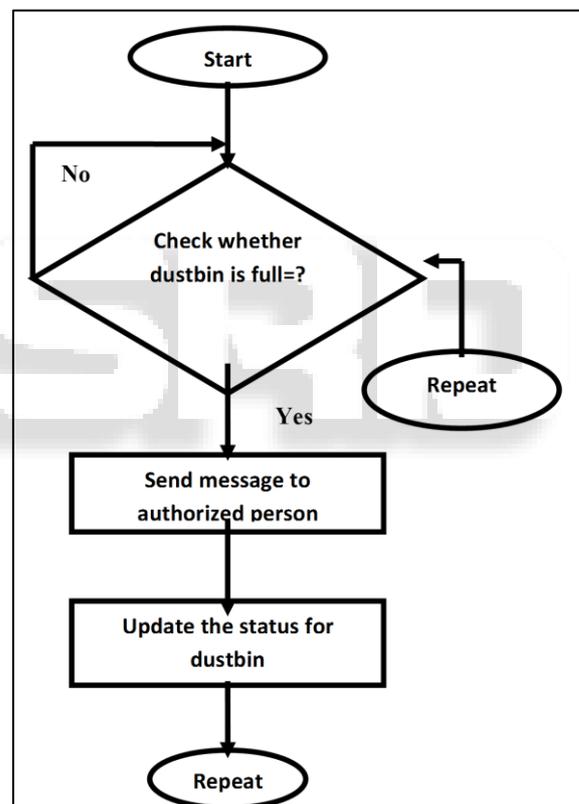9) Stop.

V. FLOW CHART

Fig. 2: Flow Chart

A. Flow Chart Explanation

The garbage containers transmit signals to indicate that they are over 80% or 90% full and signal to the GSM system and GSM module send the message to the authorized person and he collect the garbage from located bins. So it reduces transportation cost and less time consuming system. A set of sensors is installed in the garbage bin to detect level of a bin. As soon as the garbage bin is 90% full it will send a notification to the authorized person and also to the garbage collecting vehicle. By using GSM technology it will assign a unique ID to every Bin and it will send its location through GSM only to the vehicle. As soon as the vehicle is notified about the condition of the garbage bin it will collect the

garbage. After the collection it will send message about the empty bin.
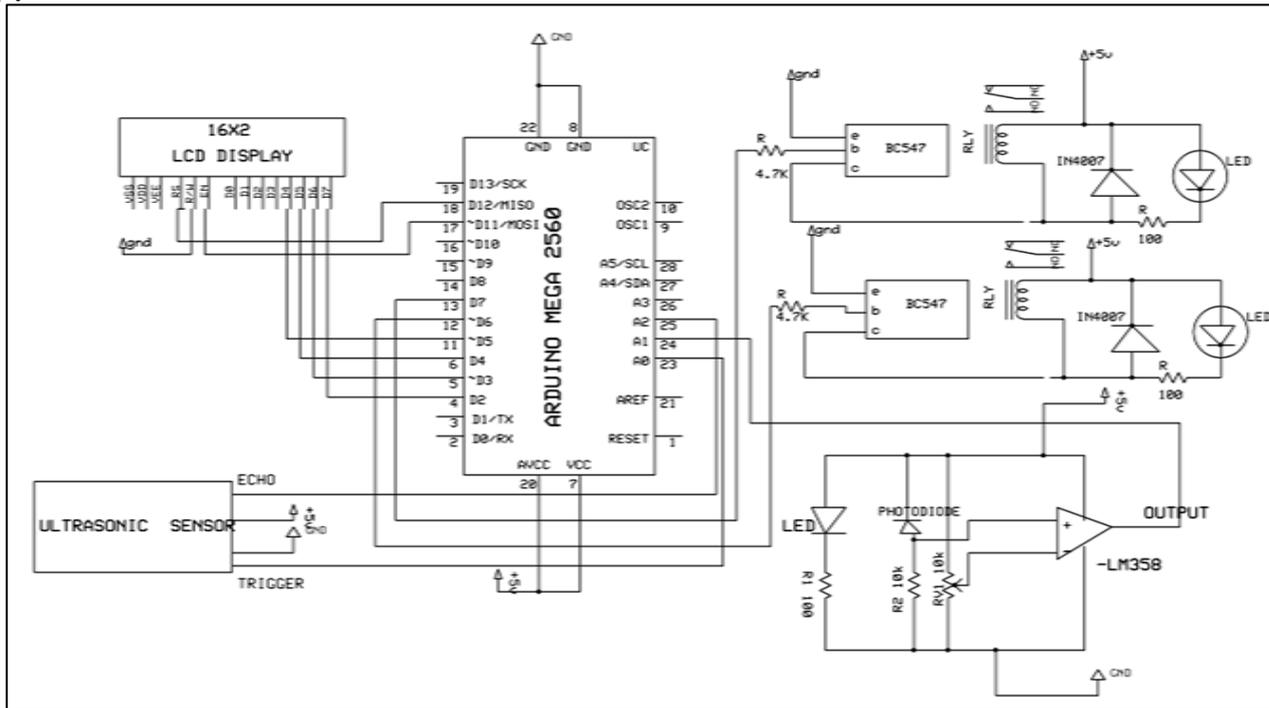
VI. HARDWARE CIRCUIT:

Fig. 3: Hardware Circuit of the proposed model

VII. CONCLUSION

The main objective of the project is for the real time access of information about the dustbin. This waste Management System using IOT has implemented the management of waste in real time using smart dustbin to check the fill level of dustbin to check if it is full or not with the help of ultrasonic sensor. By using GSM module information is send and action is taken immediately based on the aspect It is able to be understand easily by all kind of people. It does not have any complicated work. This Iot based management of waste is very useful for smart cities in many aspects .This system will prevent the overflow of dustbin and make the environment neat and clean .It will reduce the wastage of time, cost and energy of the human .It will also prevent the occurrence of any disease .The truck drivers easily get the information about the clearing process and do their work immediately.

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