IOT Based Smart Garbage Bin Alert System using HC-SR04 Ultrasonic Sensor

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Abstract-India faces major environmental challenges associated with waste generation and inadequate waste collection, transport, treatment and disposal. To make the cities greener, safer and more efficient , Internet of things(IOT) can play important role. We presents a waste collection management solution based on providing intelligence to wastebins, using IOT prototype with sensors. This design designates a technique in which the garbage level could be checked at regular intervals which would prevent the undesirable overflow of the bin. It also has facilitation so intimate the authority to clean up in case of any overflows. The filling level of the garbage in the dustbin and its original level height could be sensed monitored by the ultrasonic sensor. This project is very innovative system which will help to developing nation to the key of "Smart City".

Index Terms- Internet of Things, Ultrasonic Sensors, Arduino Microcontroller, Wi-Fi Module, Garbage Bins, Mapping.

I.   INTRODUCTION

The Internet of Things (IOT) is an environment in which objects, animals or people are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.

When it comes to the waste industry waste and recycling collectors are always looking at ways to minimize cost and increase productivity when possible. The IOT can change the way waste collectors carry on with their operations, know more information about their bins and bring change in the method of waste collection.

IOT based smart garbage bins alert system , in this project our main aim is to havea proper maintenance of waste management. We are used a ultrasonic sensor which passes sensing signals to the Arduino microcontroller. By the use of wi-fi module the sensing data will store in the database and also the notifications are transmitted to the administrator and garbage cleaner. We are also designed the user interface application in which the user may captured the image of the waste collection in any area. This image uploaded in the municipal website and searched by map system where it belongs to and clean it.

II.   OVERVIEW OF THE TITLE

In this project , we designed the real-time waste management system which is the biggest problem of our city or country. Where we used Internet Of Things (IOT) which used during the processing of cleaning the garbage bins by municipal corporation.
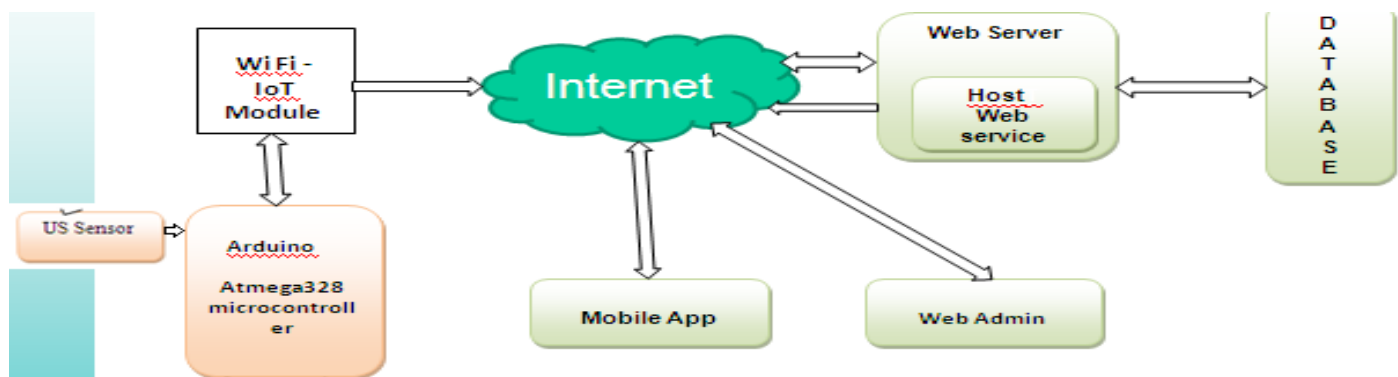

Fig. 1 System Flow Architecture

III.   LITERATURE SURVEY

IoT Based Smart Garbage and Waste Collection Bincreates unhygienic conditions for people as well as ugliness to that place leaving bad smell. To avoid all such situations we are going to implement a project called IoT Based Smart Garbage and Waste Collection bins.This project on the working of the Wi-Fi module; essential for its implementation. The main aim of this project is to reduce human resources and efforts along with the enhancement of a smart city vision. Byusing sensor and GSM for smart cities environment clean and ensures hygienic surrounding. Improper disposal and improper maintenance of the domestic waste creates issues in public health and environmental pollution. This model consists of an Arduino controller, a few garbage bins loaded with sensors and monitored continuously through a web. This system also has a scope for citizen participation, wherein any grievances from citizens related to waste management is heard. The proposed e-monitoring system is anembedded system that comprises of IOT technology interfaced with Arduino micro-controller and a web base which is completely computerized. By employing the proposed system, the municipal authority could monitor the waste collection status effectively.

IV.   PROPOSED WORK

The main aim of our project is to maintain the waste pollution in the city or country. The idea of smart garbage bin alert system is comes from the mission of waste management i.e. "Smart City" and "Swachha Bharat Abhiyan". In this project the technology used is the Internet Of Things (IOT) which is now most popular all over the world via wi-fi module. By the used of IOT system the sensing signals are passing from ultrasonic sensor to the arduino microcontroller. Administrator of municipal corporation must passes the message to the garbage bin cleaner with their location in the city.

There is also designed the user module i.e. for the citizens of the city. This application is applicable to capture the image of waste pollution in any area of the city were uploaded in the municipal websites. Where the municipal corporation takes action on it for cleaning the waste pollution by finding the location of that image via map.
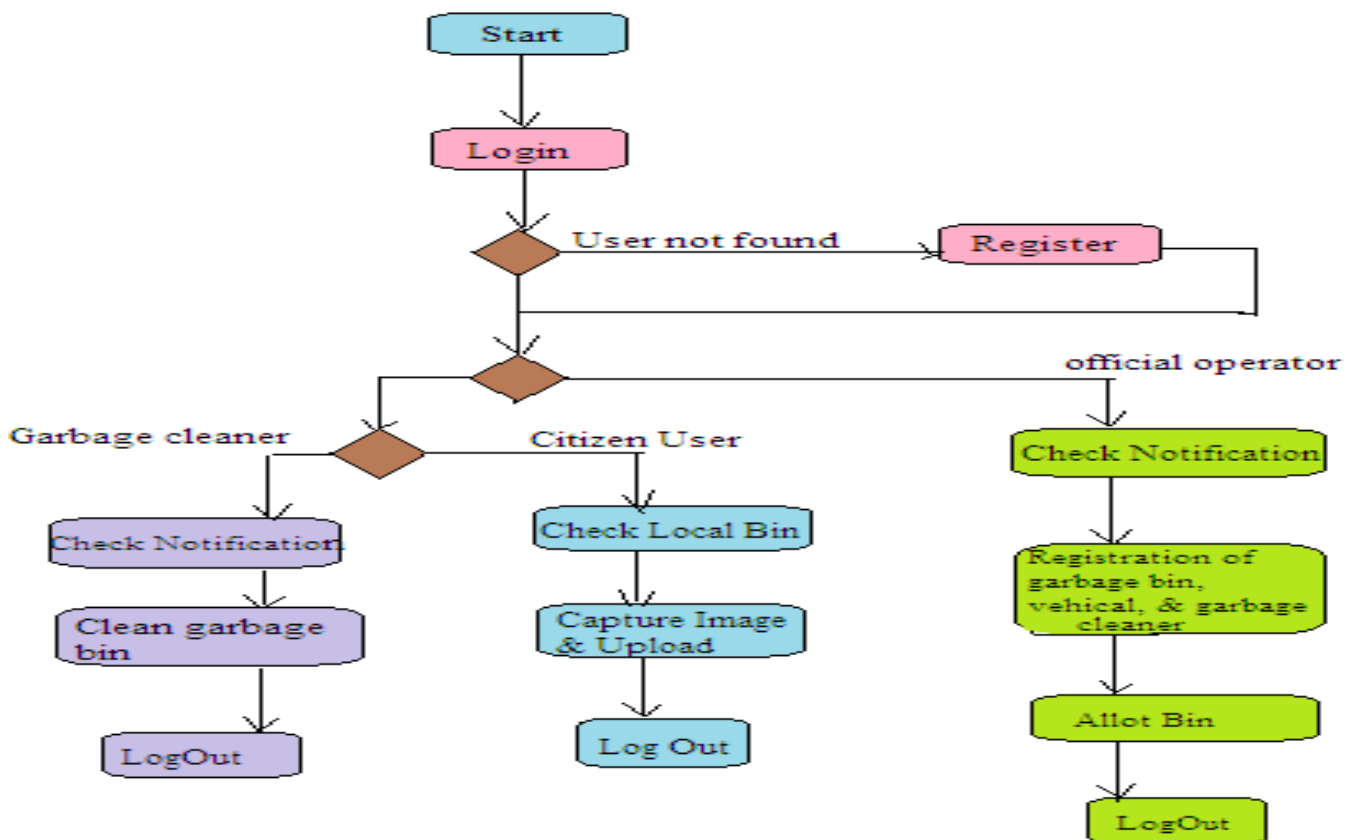

Fig. 2 Process of the System.

V. PROCESS

- The system includes three main users which are administrator/official operator , garbage bin cleaner and citizen .
- The official operator of this system have the rights i.e. to checking the garbage bin level, detail database about garbage bin cleaner and collection of vehicle.
- The users may interact with the system via website of the system.
- The garbage bin cleaner must have the right to know the status of garbage bin. And clean the garbage bin which located in the waste area of the city.
- Citizen must have right to complaint against waste area by capturing the image and upload image to the main system.
- This project may vary for every area of the city which used to manage the waste problem.

VI. COMPONENTS

A. HC-SR04 Ultrasonic Sensor:

The Ultrasonic Sensor HC-SR04 is one of the most commonly used distance measuring sensors and works extremely well with arduino. The time its take the sound wave to be sent, hit the object and return back to the sensor is measured.
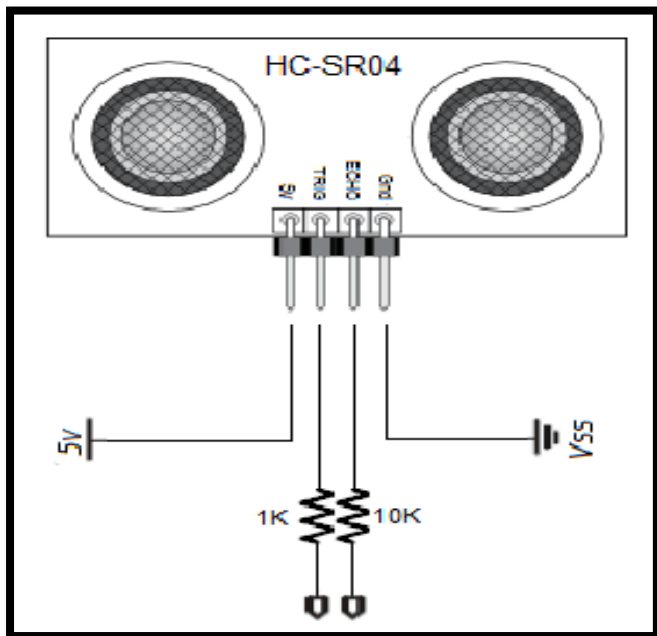

Fig. 3 Hc-Sr04

B. Arduino UNO ATmega328 Microcontroller

Arduino is an open source computer hardware and software company, project, and user community that designs and manufactures single board . The ultrasonic sensor module uses any two digital pins on the Arduino for Trig and Echo.
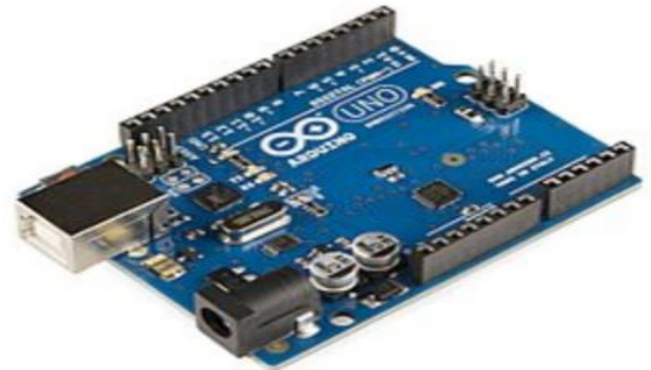

Fig. 4 Arduino UNO ATmega328

C. ESP8266 Wi-Fi Module

Wi-Fi is a technology for wireless local area networking with devices based on the IEEE 802.11 standard. Wi-Fi compatible devices can connect to the Internet via a WLAN and a Wireless access point. Wi-Fi module is used in this system for transferring the signals and show the level of garbage bins.
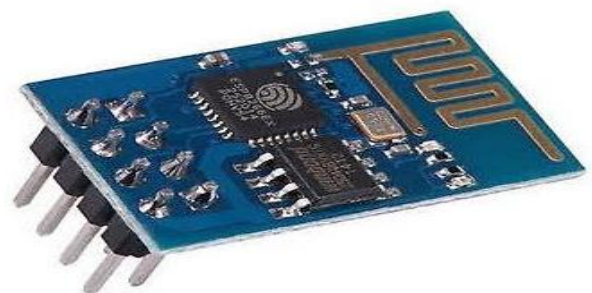

Fig. 5 ESP8266 Wi-Fi Module

D. Connecting Wire

For the connection of the Ultrasonic sensor to the Arduino microcontroller by using the jumper wire. A jump wire is an electrical wire or group of them in a cable with a connector or pin at each other.

Fig. 6 Connecting wire

E. Power Supply

A power supply is an electrical device that supplies electric power to an electrical load. The power supplies to the physical components of this Smart garbage bin system.

VII. CONCLUSION

The IOT Based Smart Garbage Alert System By Using HC-SR04 Ultrasonic Sensor implemented to solved the waste management problem of our city. In this project , the sensor sense the garbage bin level and signals are passes to the arduino microcontroller. The message passed to the administrator and garbage bin cleaner to clean the garbage bin located in the city. Implementation of this system the waste management problem would be solve to being our city Smart.

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