IOT BASED GARBAGE CLEARANCE ALERT SYSTEM WITH GPS LOCATION USING ARDUINO

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Abstract

As Population's are increased year by year that the way wastage also increased. Many of the cities maintain the overflow dustbins. Now most of diseases create from garbage's. Peoples are affected harmful diseases due to environment should be Maintain clean and hygienic. Reason for this status public Garbage Corporation did not get the proper information and time for clear the garbage. The Public Garbage Corporation needed this system because existing system gives proper information to corporation but not gives exact location so per Day Corporation maintain the less number of dustbins, not all filled dustbins. In this system via corporation get the proper information and location of dustbin when the dustbin full. So corporation will maintain the filled dustbin no need to maintain the unfilled dustbins. This system reduces the work and time and corporation will get more income because needed less number of workers for this system

Keywords: Solar Powered, IOT, Garbage Management, Solid waste management, Dust bin monitoring, RFID, Arduino

1. Introduction

IOT full form Internet of Things. It means internet connected physical devices exchange and collect the data using of this path [1]. IOT is used in most of technologies. We using IOT in this system get more effective advantages. Information will Got in without human help in anywhere and anytime. IOT separated into 3 categories. Data collector, communication, cloud platform. Data collector method used in embedded system [2]. Communication method used in network side. Cloud platform method used for store and process the data [3]. There are two types of Convergence in using cloud. Cloud based IOT that means IOT function in cloud. Another one is IOT centric cloud that means cloud function into the IOT [4]. AWS provides secure communication between IOT devices and cloud [5].

Garbage problem is large problem of most of the cities, Whole world have this problem [6]. An improper maintain of Garbage create the harmful disease. Garbage overflow is Main.

Overflow garbage create obnoxious gas and make hygienic environment [7]. Corporation do not get the information of dustbin's filled or not. This system overcomes the above problem. India generate 133-770 tons waste per day, 0.17 kg of waste is generate per person per day in small cities, large cities 0.62 kg. Optimal collection route save the truck fuel 7.5L per day. PMC generate 1300-1400 tons waste per day [8].

Nyayu Latifah Husni [9] described the idea about garbage management system. This system has two bins. One is g-box and another one is p-box. Users are put the garbage into the g-box and it send the notification to mp3 and p-box. Then mp3 played the message 'Thank you'. P-box gives the prize for user when the garbage correctly put into the g-box. Two boxes are connected through the Bluetooth.

G Sai Rohit [10] described the idea of "Smart Dual Dustbin Model for Waste Management in Smart Cities. In this system have 2 bins there are Bin A and Bin B. This method first using Bin A. If Bin A fully filled then using Bin B. When Bin A is fully filled then the controller send the alert the authority center with the help of GSM. Garbage level Monitored by Ultrasonic senor and obstacle detect by IR sensor.

The value of IoT applications for the industry is undeniable because of most of industry work based on IOT [11]. An IoT formal framework incorporates those involved Technologies, systems and devices [12]. Protect IoT data while at rest, when in traffic to ensure data integrity [13].

This system has the following activity. They check the level of Garbage. Find the location of dustbin. When the people come near the dustbin it will sense and automatically open. After user put the garbage in dustbin it's automatically close. If garbage is fully filled the alert message with location will send to the corporation with the help of device. If dustbins are fully filled door will not open. Then the corporation authorized person open the door use the certain way.

2. Proposed Methodology

The past system only sends the alert message when the garbage is filled with the help of GSM. Corporation did not find the exact location. So need more time to reach the place. But these systems have a GPS so easy to find the exact location. This System has following devices Arduino, Ultrasonic sensor, motor, GSM module, RFID reader, Solar panel. All the devices are connected to the arduino board. When the user come near to the dustbin PIR detect the motion and send the data to arduino. Then arduino send the comment to the motor. Motor will rotate door open automatically and door automatically closed. Ultrasonic sonar checks the level of garbage. If garbage is filled ultrasonic send the data to arduino. Arduino send the alert message

to Corporation with the help of GSM. This alert message also includes the Location of the bin. Arduino get the location of bin using GPS. Once the bins fully filled again door do not open.

Corporation receives the alert message then sends the worker to maintain the dustbin. The authorized persons use the authorized RFID in RFID reader for open the door. Bin door will open. System need energy is taken from solar panel. Without solar panel we need power supply.

3. System architecture

The proposed system give the information in real time when the dustbin filled send the alert message with location to Corporation. The System Architecture shown in Figure 1.
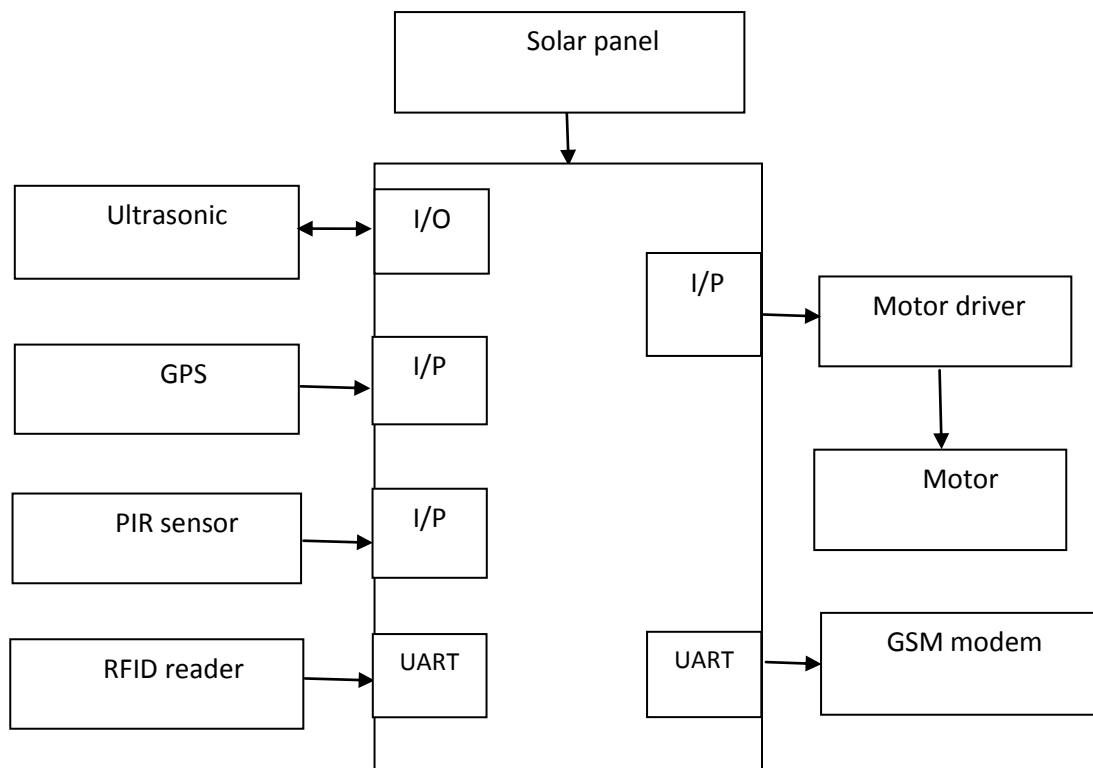
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Figure.1 Block diagram of garbage clearance alert system

As in Figure 1 all the devices are connected to and controlled by Arduino. Controller gives the instruction to each device. Each device does separate work. Ultrasonic sensor checks the level of garbage. PIR sensor detects the motion.GPS for find the location of dustbin and GSM modem for send the alert message to corporation.

Arduino Mega:

Arduino mega is the heart of the system. It controls all devices. Get the data's from devices and send to corporation using GSM Module. The operating voltage range 5V. It has

- 54 I/P & O/P pins
- 16 analog I/P
- 4 UART (hardware serial UART)
- 16 MHZ crystal oscillators
- 256kb flash memory, 8kb SRAM, 4kb EEPROM.

Ultrasonic sensor:

It used to find the distance of object. It emits the ultrasound waves continuously. The waves strike the object and return to the sensor in the form of echo. Object distance based on the time between emitting waves and received echo's.

$$Distance\ (L) = 1/2*T*C$$

Where, C - speed of ultrasonic wave;

T - Time

GPS:

Global Positioning System used to find the geographic location [14]. GPS receiver communicates to the GPS satellite placed around the earth and gets the geographic location of it [15].

PIR sensor:

Passive Infrared Sensor is used to find the human move in sensor range. When the user come near the dustbin it sense and sends the data to controller. It consumes Low Power, Inexpensive, and Light weight.

RFID Reader:

Radio Frequency Identification reader gets the information from RFID.

Solar Panel:

Combination of solar cells is called solar panel or solar plate. Solar cell generates 1 to 2 Watts of power. Solar cells are absorbed the sun light (input source) converted into electricity (output source) based on photoelectric effect. In this system we are using solar power so no need of external source.

Motor:

Motor converts the electric energy into mechanical energy. In this system motor rotate in two direction one forward another one is backward direction. If motor rotates forward bin door will open, rotates backward bin door will close. The motor will controlled by controller with the help of motor driver.

GSM Module:

The SIM900A is a dual-band GSM/GPRS solution. SIM900A delivers GSM/GPRS 900/1800MHz performance for SMS and Data in a small form factor with Low power consumptions. It controlled via AT commands.

4. Results and discussion:

Arduino have one hardware serial port. We need 3 serial ports. So RFID reader connected in Hardware serial port another two devices (GPS and GSM modem) connected in software serial port. All the data's like PIR sensor, Ultrasonic sensor and RFID reader data's are collected and check that data in controller. User reach near the Dustbin that time dustbin have a space for garbage. That the two conditions will true motor will rotate. A warning message will be sent to the company if there is no place for garbage in the dustbin. RFID reader read the data and sends to the controller. If the id is matched, motor will rotate. In case of dustbin have no space for garbage that time also motor rotate if ID will match. The proposed System worked flow shown in Figure 2.
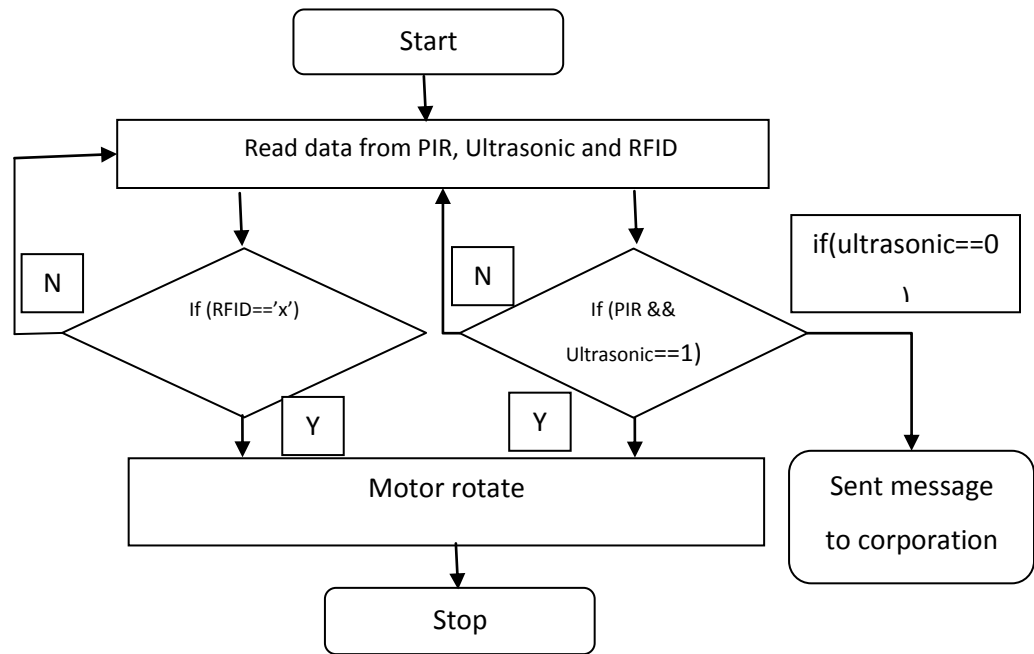
Flow of System:

Figure.2: Worked Flow of IOT based garbage clearance alert system

PIR sensor, Ultrasonic sensor, Motor and RFID reader are connected as the respective pins in arduino and tested. The person came near to the PIR sensor (means dustbin) and also space available in dustbin, so motor rotated. And then dustbin filled time, person came near to the bin but motor not rotate at the time alert message also got. Finally this proposed System tested and result also got. The test picture captured shown in Figure 3.
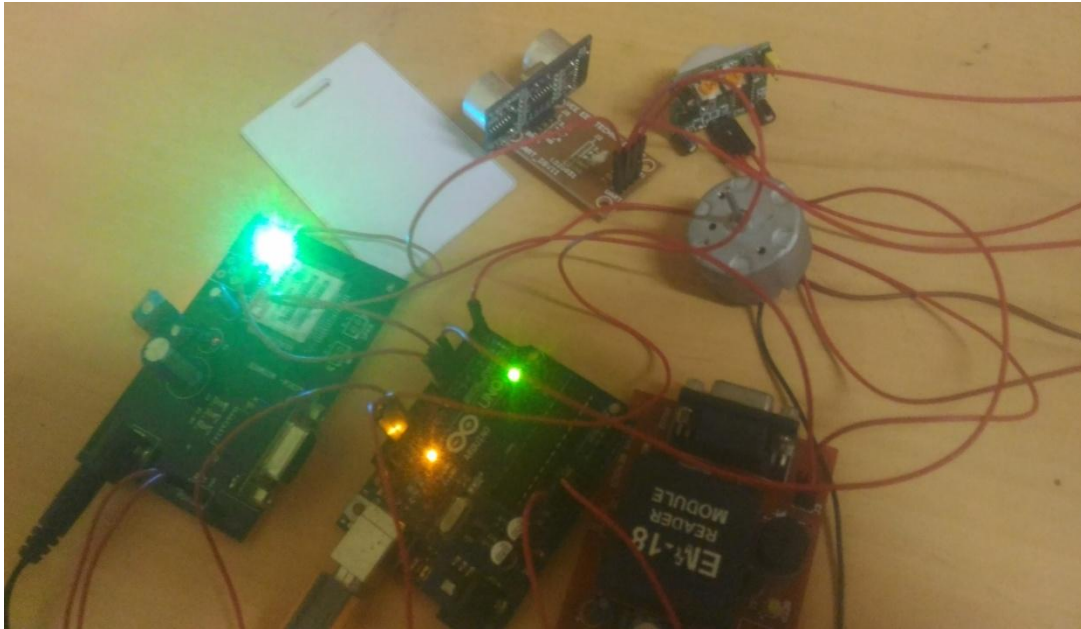
Figure.3: Picture of Garbage clearance alert system

5. Conclusion

Garbage clearing is the biggest problem of all over world. India has an improper garbage maintenance corporation. Most of the cities have an overflow garbage reason improper maintenance. So peoples are affected harmful diseases. According to the survey for this situation corporation did not get the proper information and place. So we are implementing the IoT based garbage clearing system. In this system via corporation get the proper information and location. So avoid the time waste and reduce the fuel usage of corporation vehicle. In future this system will be include the technology of segregation of garbage in biological and non biological automatically that is very useful for our world.

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