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# Smart Garbage Van

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**Abstract:** Nowadays, waste management has become a major issue in many cities of India. We proposed an efficient vehicle tracking system which is designed and implemented for the purpose of waste management. This system makes use of a good and popular technology to track a garbage vehicle by combining smartphone application with an Arduino so that people will come to know the exact location of the Garbage Van. This will be easy and efficient technique as compared to other techniques. In this system, the van is tracked with the help of global positioning system (GPS). Arduino uses a microcontroller to control GPS and GSM module. The vehicle tracking system uses GPS module to give coordinates. GPS send coordinates to the Arduino so that GPS module is used to transmit an update location on the server. The smartphone application is also developed for continuously monitoring the vehicle position. In addition to this, the system will also send the SMS notification regarding the location of garbage van when it comes in particular area.

**Keywords:** Arduino, GPS Module, GSM Module

## I. INTRODUCTION.

Many times garbage dustbin is overflowed and many animals like dog or goat enter the mouth in a dustbin and they spill that dustbin. This creates a bad scene, then no one takes initiative to collect that spilled garbage. So, the solution to this problem is to implement GPS tracker system in the garbage can and see the location by using the application on a smartphone. Peoples who are busy in their schedule, they don't have time to watch that application always and track the location of garbage van on a smartphone. For that, the solution is when garbage van enters in a particular area which is near to home, the people will get a notification on a cell-phone through GSM. So people are aware that van is coming in their area without wasting their time.

An efficient vehicle tracking system is used to track the vehicle and it is used for many purposes. The development of satellite communication technology is easy to identify the vehicle locations. Vehicle tracking systems were first implemented for the shipping industry because people wanted to know where each vehicle was at any given time. It tracks the movement of any equipped vehicle from any location at any time. It is very popular technology, that combines mobile app with an Arduino. It is the easy and efficient process to track any vehicle and it is inexpensive also GPS and GSM technology are used for these tracking systems. If this technology is implemented in garbage van so it is helpful for all citizens. The device is situated inside a garbage van whose position is to be determined and tracked in real-time. An Arduino is used to control the GPS and GSM modules. GPS module is used to get coordinates in the real-time application mode. The GSM and GPRS module is used to transmit and update the garbage van location to a database. A mobile app is made for continuously monitoring the garbage van location that where is the van traveling, and by using Google map displays the location of garbage van on the mobile app. Thus, the citizen will be able to continuously observe that where the van is moving on a mobile app and determine the estimated distance and time for the vehicle to arrive at a given destination. In order to show the feasibility and effectiveness of the system.

## II. LITERATURE SURVEY

Sometimes theft is happening on parking and also at driving insecurity places. The safety of the vehicle is essential for the public. The GPS tracking system is to be implemented in the vehicle by using real-time GPS tracking system using Arduino[1]. When a user sends SMS on the number which is registered on the GPS-GSM attached to Arduino when a user receives the coordinates will be stored on SD card at the same time. This is used as an application for a vehicle.

A vehicle tracking system is implemented to track a vehicle from an instant at any time [2]. It is done with the help of smartphone application by continuously monitoring the vehicle location on Google map. Thus, users will be able to continuously monitor a vehicle position.

A smarter way of conventional waste management is implemented using sensors [3]. When the level of garbage in the dustbin rises above a given limit, then automatically SMS will be sent to an authorized number with the help of GSM and GPS module. The entire operation for this is controlled with the help of ATmega328 microcontroller.

The system including an ultrasonic sensor, GPS/GSM module, Arduino Uno is used [4].The ultrasonic sensor is used to detect the level of garbage van, that information is sent to Arduino Uno, with the help of GSM module it sends a notification to the municipal

corporation that level of dustbin is full. Then municipality workers go that place and collect it. Ultrasonic sensors are used to give identification to Arduino and GPS which searches where the dustbin is available, by giving the Latitudinal and Longitudinal detail to the controller[5]. With the help of GPS coordinates sent to the browser so that using GSM module SMS will be sent to the authorized person that dustbin is full, through this municipality aware about the garbage and collect it.

### III.SYSTEM OVERVIEW

The power supply is used to supply power to the whole system. The microcontroller controls all over the process. GPS module continuously receives the data from satellite and transmit to geographical coordinates with the help of a microcontroller. GSM modem is a specialized type of modem which accept the sim card and operate over a subscription to a mobile operator just like a mobile. GSM modem communicates over the mobile network. The GSM is used in internet mode and also when van enters a specific area then an SMS is sent to a specific mobile number of that area

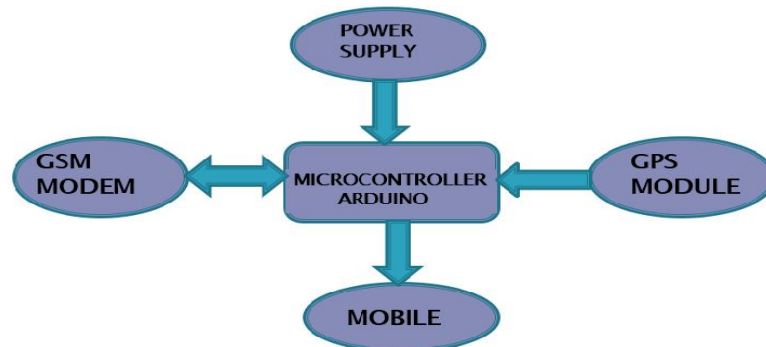


Fig. 1Block diagram of Smart Garbage Van

#### A. Arduino

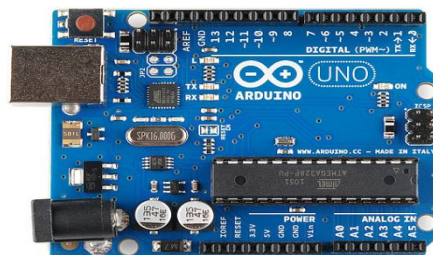


Fig. 2Arduino

Arduino is an open-source hardware kit with arduino IDE to control the operation of arduino it has 14 digital I/o pins with 6 PWM pins on it. It also has 6 analog pins and also has 16MHZ crystal oscillator. This 16MHZ crystal oscillator is used to provide a clock pulse to the arduino. It contains everything which is used to support the arduino connected with a USB cable to provide power supply to it and to get started.

#### B. GSM Module



Fig. 3 GSM Module

The main objectives of GSM module are to send a text message. GSM modem is used as a standard GSM mobile phone with the cable and software driver to drive the applications to connect by USB port to your computer. GSM modem is preferable to be used as a GSM mobile phone. It used in GPRS mode to send data to the server.

### C. GPS Module



Fig. 4 GPS Modem

The Global Positioning System (GPS) is used to give the coordinates (locations). The system was developed by the US government for military navigation but now it is used as a GPS device, mobile phone, etc. GPS is commonly used to provide location, speed, time, and so on, anywhere on Earth.

## IV. METHODOLOGY

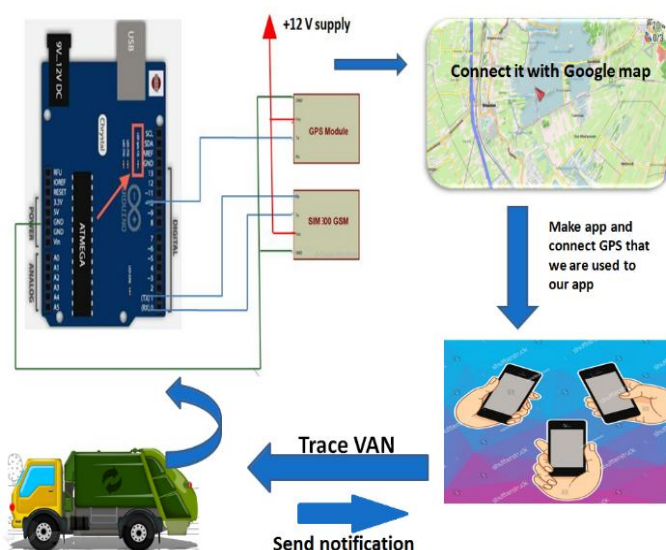


Fig. 5 Working of Garbage Van

The “Smart Garbage Van” used for tracking the location of garbage van. In this, we are interfacing GSM and GPS module with the Arduino. When GSM and Arduino are interfaced, GSM sends SMS including the location of the garbage can to a particular number. Then we interface GPS module with Arduino, which uses the mobile network of the sim card which is used in GSM and gives the coordinates. The coordinates include latitude and longitude. Using that co-ordinates we can see the location of garbage van on Google maps. We have also designed an android application to access the location of garbage van. In this app, we have to sign in and after creating the account on that app we can access the location of garbage van on also. There is an additive feature that we can get an SMS notification on our mobile that van is coming in our area. The SMS notification is sent manually from the driver of the van.

### V. RESULT

We can access the location of garbage van through our Android app and also on Google maps. Fig 6 shows overall system which has to be set up in garbage van.



Fig. 6 Overall system

After implementing kit, longitude and latitude of current location of van which is shown in Fig. 7

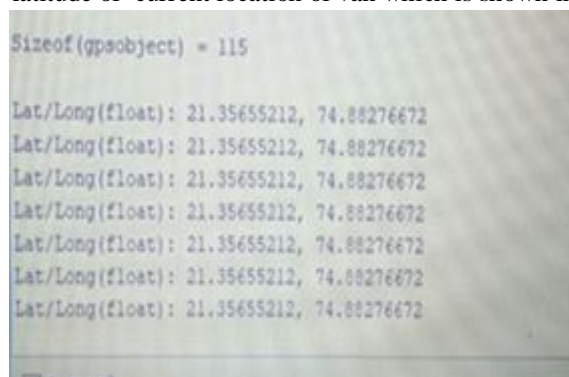


Fig .7 Geographical Co-ordinates

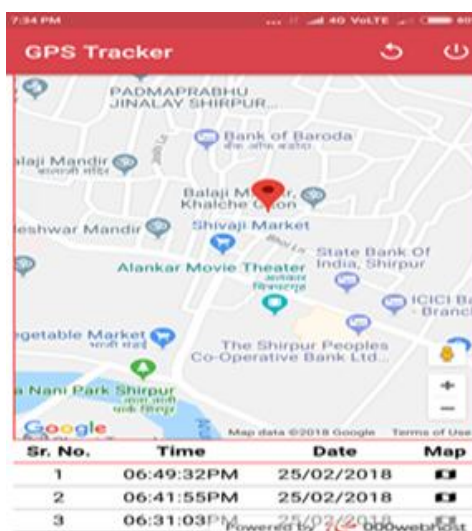
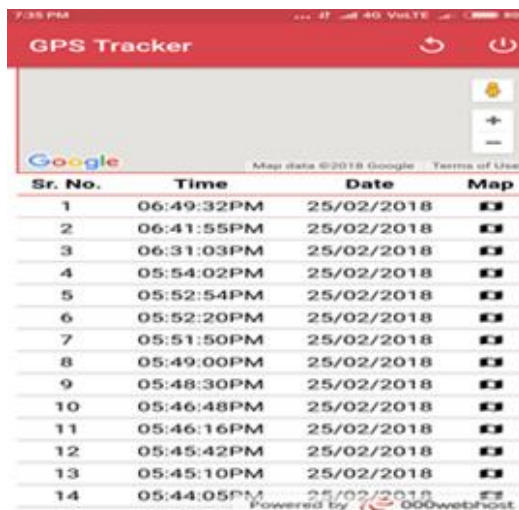


Fig. 8 Location of van on android app

Above image shows the location of garbage van with help of GPS tracker application. The application looks like in Fig. 8 and 9



Sr. No.	Time	Date	Map
1	06:49:32PM	25/02/2018	
2	06:41:55PM	25/02/2018	
3	06:31:03PM	25/02/2018	
4	05:54:02PM	25/02/2018	
5	05:52:54PM	25/02/2018	
6	05:52:20PM	25/02/2018	
7	05:51:50PM	25/02/2018	
8	05:49:00PM	25/02/2018	
9	05:48:30PM	25/02/2018	
10	05:46:48PM	25/02/2018	
11	05:46:16PM	25/02/2018	
12	05:45:42PM	25/02/2018	
13	05:45:10PM	25/02/2018	
14	05:44:05PM	25/02/2018	

Fig. 9 Information of co-ordinates

When the van is coming near our area we get an SMS notification on our mobile which showed in below image.

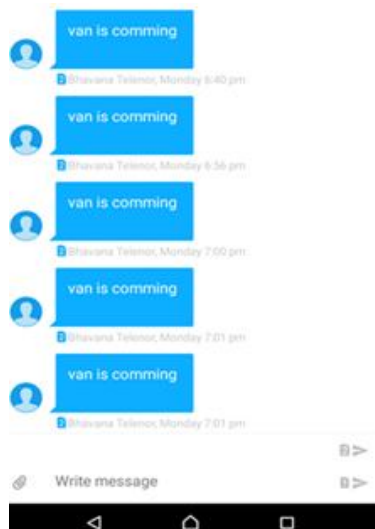


Fig. 10 SMS notification on mobile.

### VI. CONCLUSION

We can minimize the problem regarding timing of garbage van and we can also find the location of garbage van. Through the notification feature, we get aware that van is coming near our area.

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