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Garbage Disposal Monitoring System

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Abstract - *The garbage bins which are kept in the cites are being filled or overflowed or some are being left uncollected. This is the major issue for the authorities to monitor. So, to avoid this issue we are making an efficient system which is used to monitor the level and location of the bin continuously and updating it to the authorities through the app. By using the app, it will be easily monitoring all the bins and collect it by and efficient way.*

Key Words: **Garbage Collecting, Monitoring, Tracking, Navigate, Disposal.**

1.INTRODUCTION

The issue of overflowing garbage in cities is a growing concern for municipal authorities worldwide. The rapid increase in urbanization has led to a corresponding increase in the amount of waste generated by city dwellers. As a result, managing the collection and disposal of this waste has become a major challenge for municipal authorities. This results in a large amount of waste that is difficult for municipal authorities to manage. The issue of overflowing garbage is not only unsightly and unpleasant, but it can also have serious health and environmental consequences. Garbage that is not properly collected and disposed of can lead to the spread of disease and pollution. By addressing the root causes of the problem and implementing effective waste management strategies, municipal authorities can help to ensure that cities are clean and healthy places to live for all residents.

2. EXISTING SYSTEM

The existing system for garbage monitoring utilizes an ultrasonic sensor in combination with a gas sensor to measure the fullness of garbage bins. The gas sensor is used to detect the presence of gasses that are released as the garbage decomposes, which provides additional information about the level of garbage in the bin. The system also includes a Global System for Mobile Communication (GSM) module, which is used to transmit the data collected by the sensors to a central server. One of the main drawbacks of the existing system is that it does not utilize a cloud-based database for storing and managing the data collected by the sensors. This means that the data collected by the sensors is stored locally on the GSM module, which can make it difficult to access and analyze the data in real-time. Additionally, the local storage of data can be vulnerable to loss or corruption, which can result in a loss of important information. Another limitation of the existing system is that it does not provide location data for the garbage bins. This can make it difficult for municipal authorities to track the location of garbage bins and plan their waste collection routes efficiently. Without accurate location data, the system may not be able to provide the most effective waste collection solutions, which can result in increased costs and inefficiencies. Overall, while the existing system utilizing an ultrasonic sensor, gas sensor, and GSM module is a step forward in garbage monitoring, it has limitations that can be addressed using cloud-based databases and GPS modules. Our proposed system aims to address these limitations and provide a more reliable and efficient solution for garbage monitoring and waste management.

3.PROPOSED SYSTEM

Our proposed garbage monitoring system utilizes advanced technology, such as ultrasonic sensors and GPS modules, to accurately measure the fullness of garbage bins and provide real-time location data. In addition to these sensors, the system also utilizes Firebase as a cloud-based database to store and manage the data collected by the sensors. This provides a reliable and secure method for storing large amounts of data, which can be easily accessed and analyzed by municipal authorities. Firebase is a cloud-based database platform that provides a wide range of services to support the development of mobile and web applications.

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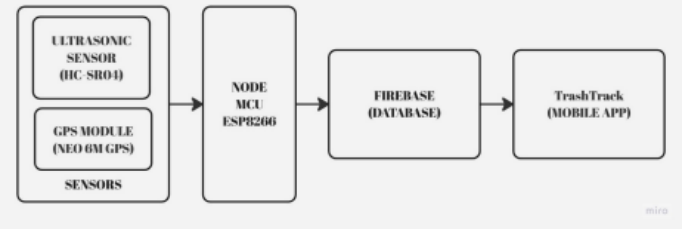

Fig -1: Block Diagram

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3. WORKING

3.1Circuit Diagram

The components of the bin are Node MCU, Neo 6M GPS and the Ultrasonic Sensor (HC-SR04). The schematic diagram of the bin is shown below.

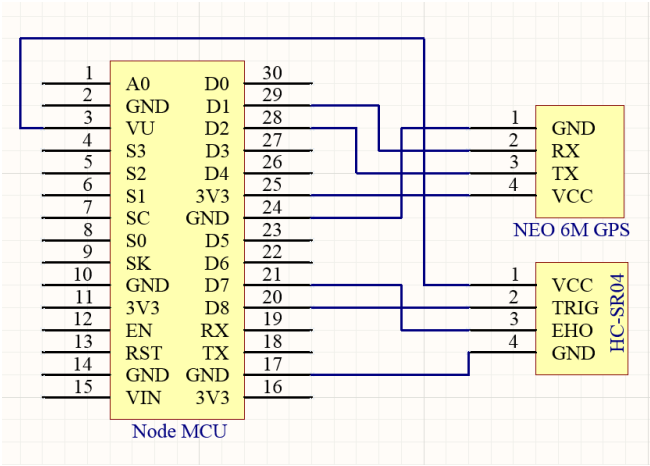

Fig -2: Circuit Diagram

The input power which was required by the Node MCU is provided by the battery with output of 5V. The GPS module requires 3.3V as the input voltage, the VCC pin of the GPS module is connected to the 3V3 pin and the data pins of the GPS, such as TX and the RX are connected to the digital pins of the Node MCU D2 and D1 respectively.

The operating voltage of the Ultrasonic Sensor is 5V. So, the Vcc of the Ultrasonic sensor is connected to the VU pin which provides the 5V from the USB power supply. The Trigger pin and Echo pin of the sensor are connected to the Digital pins of the MCU D8 and D7 respectively.

3.2Working

The ultrasonic sensor checks the level of the bin and send the data to the Firebase DB. The GPS module fetches the latitude and longitude and upload the data to the Firebase DB. The Firebase DB will store all the values which are been sent by the sensors. The app will display the level of the bins in the bin details screen. If the bin gets filled over 75% then the app will show the information message and the popup notification. While clicking the go to map we can able to see the location where the bin is placed. There will be a dropdown menu where we can be able to select the destination that we need to reach. The app will navigate the user from the user's current location to the selected destination in the dropdown menu. If we need to change the disposal center, we can enter the co-ordinates and click enter it will be updated in the app.

4.RESULTS

4.1 Model of the Bin

The model of the bins is created to demonstrate the working like the bins which are used in the metropolitan cities.

(a) **(b)**

Fig -3: (a) Top View and (b) Side View of Bins

The ultrasonic sensor is placed on the top of the Bin to identify the level of the bin is filled. The Node MCU and the GPS module are being mounted on the side of the bin.

4.2 Database

Fig -4: Stored data in DB

A separate database is created for each bin to store the data.The data from the bins are being uploaded to the respective database.

Fig -5: Updating the changes in DB

When the value of the bin is changed it will be uploaded to the respective database. The DB itself highlights when the data is changed.

4.3 Monitoring the level of the Bin

When the garbage is filled the bin will send the data from the controller to the cloud.

Fig -6: Bin level below 75%

When the "Get Details" button is pressed the app will display the amount of the garbage present in the bins is displayed in the app.

Fig -7: Bin level is higher in one of the bins

When anyone of the bin is filled more than 75% the app will show the notification on the screen to about that the "Bin 1 needs to be emptied".

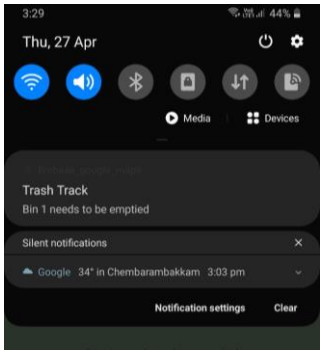

Fig -8: Notification denoting the Bin 1 to be emptied

The pop-up notification will be appeared regarding that the bin 1 needs to be emptied.

4.4 Changing the disposal center

When "Change the Disposal Center" is clicked the screen will change to which the latitude and the longitude are need to be updated.

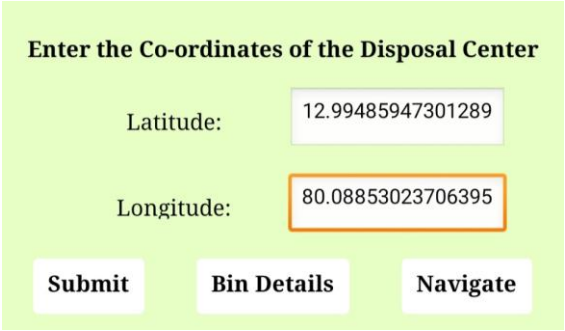

Fig -9: Entering the co-ordinates to change the center

When the Latitude and the Longitude are been entered and the "Submit" button is clicked. This will update the marker which is in the map denoting the disposal centre.

4.5 Navigating the user:

The app will navigate the user to the destination. The app will navigate the user from the current location of the user to the selected destination by drawing the route. When the dropdown is clicked it will show the list of destinations such as Bin 1, Bin 2 and Disposal center. While choosing the destination it will show the route from the user to the selected destination point.

When the "Recenter" button is clicked the app will update the current location of the user.

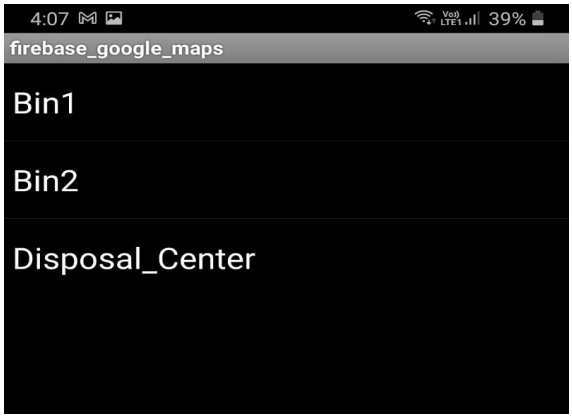

Fig -10: Dropdown to select the destination

When the user needs to select the while clicking the button the drop-down menu will be appeared denoting the Bin 1, Bin 2 and the Disposal Center.

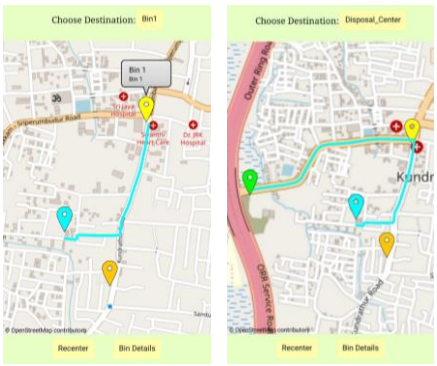

Fig -11: Navigating routes by the app

By selecting the destination in the app, it will navigate the user to the respective location by routing the laying the route from the user to the selected destination.

5. CONCLUSION

The Garbage Disposal Monitoring System is an innovative solution to address waste management challenges in rural areas. By leveraging technology, this system uses an ultrasonic sensor to measure the level of garbage in bins and a GPS module to locate them in real-time. These data are transmitted to the cloud via a Node MCU, allowing for remote access and monitoring. This system has numerous benefits, including accurate measurement of the level of garbage in bins, making it easier to plan for waste collection and disposal. By preventing overflowing bins, the system can reduce health and environmental hazards. Additionally, the use of GPS helps to identify areas where garbage is disposed of illegally or inappropriately. Storing data in the cloud makes it easy to access and analyze, which can be used to improve waste management practices. The Garbage Disposal Monitoring System can be applied in various scenarios, such as in the tourism industry to monitor waste generated by tourists, keeping the destinations clean and attractive. Additionally, in disaster management, the system can be used to monitor waste disposal in a safe and environmentally responsible manner. In conclusion, this system has the potential to greatly improve waste management practices in rural areas, with further development and refinement. The integration of technology to accurately measure and locate garbage bins, and the use of cloud-based storage for data analysis and remote access, makes it a promising solution. Its implementation can have a significant impact on waste management practices across the country.

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