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Smart Dustbin Management System Using Renesas

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Abstract: ***With the increase in population, the state of sanitation is declining. The abundance of garbage in public places creates a climate of impurity. It can cause several serious illnesses in the immediate vicinity. It also reduces the area rating. To avoid this and to improve sanitation, a 'smart waste management system' is proposed for this project. In the proposed system, the level of debris in dust bins is detected with the help of a Sensor, and transferred to a control room authorized by the GSM system. Microcontroller is used to communicate with the sensor system and the GSM / GPRS system. The Amazon application is built to monitor the information you want related to the waste of various selected sites. This will help to manage your waste collection more efficiently.***

Keywords: Smart Dustbin, Renesas, Force Sensor, IR Sensor, GSM, Android App.

I. INTRODUCTION

Due to rapid population growth, urbanization, developing countries due to this lack of public awareness about waste management. The most important priorities are to ensure clean and healthy land and to protect the urban environment. Over the past year, operating costs for solid waste management have steadily increased. The total budget for solid waste is 80-95% of the costs required for the collection and transportation of solid waste. In particular, in developing countries, not only waste monitoring but also management becomes a major problem with their urban development and economic development. Solid waste management authorities and authorities are trying to find an efficient and cost-effective solution. Key findings of the researcher include economic, technical and administrative issues that address the challenges of municipal waste management in developing countries.

In a public place, dust bins are overflowing and garbage dumped outside leading to pollution. This also increases the number of diseases as large numbers of insects and mosquitoes breed in it. So, our problem statement is to design a system based on the renesas micro controller and the sensors that make up the drum to deliver the data. Garbage is thrown inside the bin. Because of these sensors waste management is possible.

II. LITERATUER SURVEY

In paper [1], Research on smart cities has been done by many organizations and many applications have been launched. Typical examples include: smart parking that provides parking space at any time; intellectual agriculture to improve the productivity of agricultural industries depending on climate and environmental conditions; smart transport to find the best route considering current traffic conditions. All of these apps are a step towards achieving a perfect smart city.

In paper [2], The fourth industrial revolution has had a profound impact on modern manufacturing processes and services. Many of Industry 4.0 technologies, such as new diagnostic solutions or digital applications, can be used to improve the efficiency, availability, and flexibility of industrial processes.

In paper [3], The IoT waste monitoring system is designed to monitor the condition of the drums and sends a warning, if possible, in an effort to reduce air pollution and human energy and costs. This system uses the IR and Force sensor connected to the Renasas microcontroller and the GSM module to transmit data. Details will be displayed on the LCD. Jain et al designed and implemented a solid IoT-based waste monitoring and collection system. The objectives of the proposed system make waste management faster, smarter, less energy efficient, and save fuel. The computer hardware used in this system is the Renesas RL 78 microcontroller which is connected to all computer components and monitors the output of the sensor as input and processing and discharges the corresponding component, IR sensor to monitor the amount of waste, pressure sensor to weigh weight, Red full, green LED barrel blank, LCD display cabin status, GMS provides communication between microcontroller and android system that maintains drum status and update when needed, GMS provides drum location for Android app. When the user opens the application, GSM will send the status of the drums, according to this information the user can select the appropriate and empty trash can. After the process is complete, the status will be updated in the Android app.

In paper [4], Instead of focusing on waste collections, Ravale et al tried to prevent the dustbin from filling up using two IR sensors, when the drum is half full, the first sensor will send a warning and when the drum is full, the second sensor will send a final warning. The warning is sent by Renesas microcontroller to GSM and works on Android. Throughout the cycle, the state of the sensor in a simple database is reset to the empty state.

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III. PROBLEM STATEMENT

To implement a smart bin on a micro controller-based platform Renesas Microcontroller which is interfaced with GSM, IR and Force sensor which can give the status of the waste present in the dustbin to the android application.

IV. EXISTING SYSTEM

The current system ensures garbage collection as soon as the waste level reaches its maximum level. The system will provide accurate reports, and enhance the efficiency of the system. Monitoring real-time litter quality with the help of sensors and wireless communications will reduce the amount of travel required by a garbage truck and thus reduce the total cost associated with the garbage can. This system consists of a single ultrasonic sensor for collecting data at the waste level.

V. METHODOLOGY

A. Block Diagram

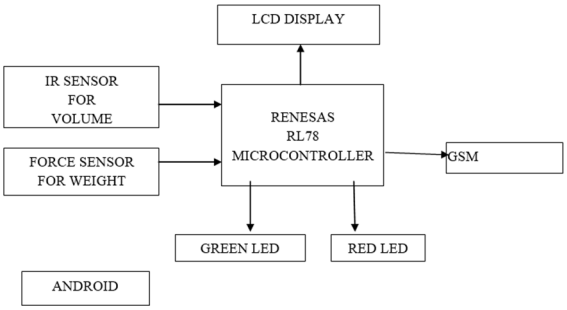


Fig.1 Block Diagram

Smart dustbin with Renesas micro controller, IR sensor, Force sensor, GSM will notify the status of the bin to the android application. Here GSM is the used to communicate between bin and the user. Force sensor is used to measure the weight of the waste present in the bin. IR Sensor is used to measure the volume of the waste present in bin. Renesas micro controller is used to control IR Sensor, Force sensor and GSM.

Here the user end will contain the android app which works on android compatible phone. The working is as follows, User inserts the trash into the bin, bin checks for threshold level, bin sends the status and coordinates the control on reaching certain level.

VI. RESULTS

In this project architecture, the system is mainly composed of microcontroller, IR sensor, Force sensor, GSM, LCD and Android app. The microcontroller located in the center of the block diagram forms the control unit of the entire project. The embedded internal microcontroller is a system that enables the microcontroller to perform an action according to the input provided by the sensor output. The level of pollution in the dust bins is determined with the help of an IR sensor. The weight of the waste in the bin is determined by the pressure sensor. Red and green LEDs are used to indicate the full and empty level of dustbin respectively. When the estimated number of sensors exceeds a certain limit, this information is sent to the GPS location where the dustbin is located in the Android app.

VII. CONCLUSION

In this project architecture, the system consists mainly of renesas microcontroller, IR sensor, Force sensor, GSM, LCD and Android app. The microcontroller located in the center of the block diagram forms the control unit of the entire project. The embedded internal microcontroller is a system that enables the microcontroller to perform an action according to the input provided by the sensor output. The level of contamination in dust bins is determined with the help of an IR sensor. The weight of the waste in the bin is determined by the pressure sensor. The red and green LEDs are used to indicate the full and empty level of the dustbin respectively. When the estimated number of sensors exceeds a certain limit, this information is displayed and notify through GSM where the dustbin is detected and SMS sent to Android devices via GSM.

In the future, this project can be included in the product level. To make this project friendly and user-friendly, we need to get it integrated and the Android App can be mapped to Google Maps to track location easily. Further, most of the units can be embedded with the controller on a single board with a change in technology.

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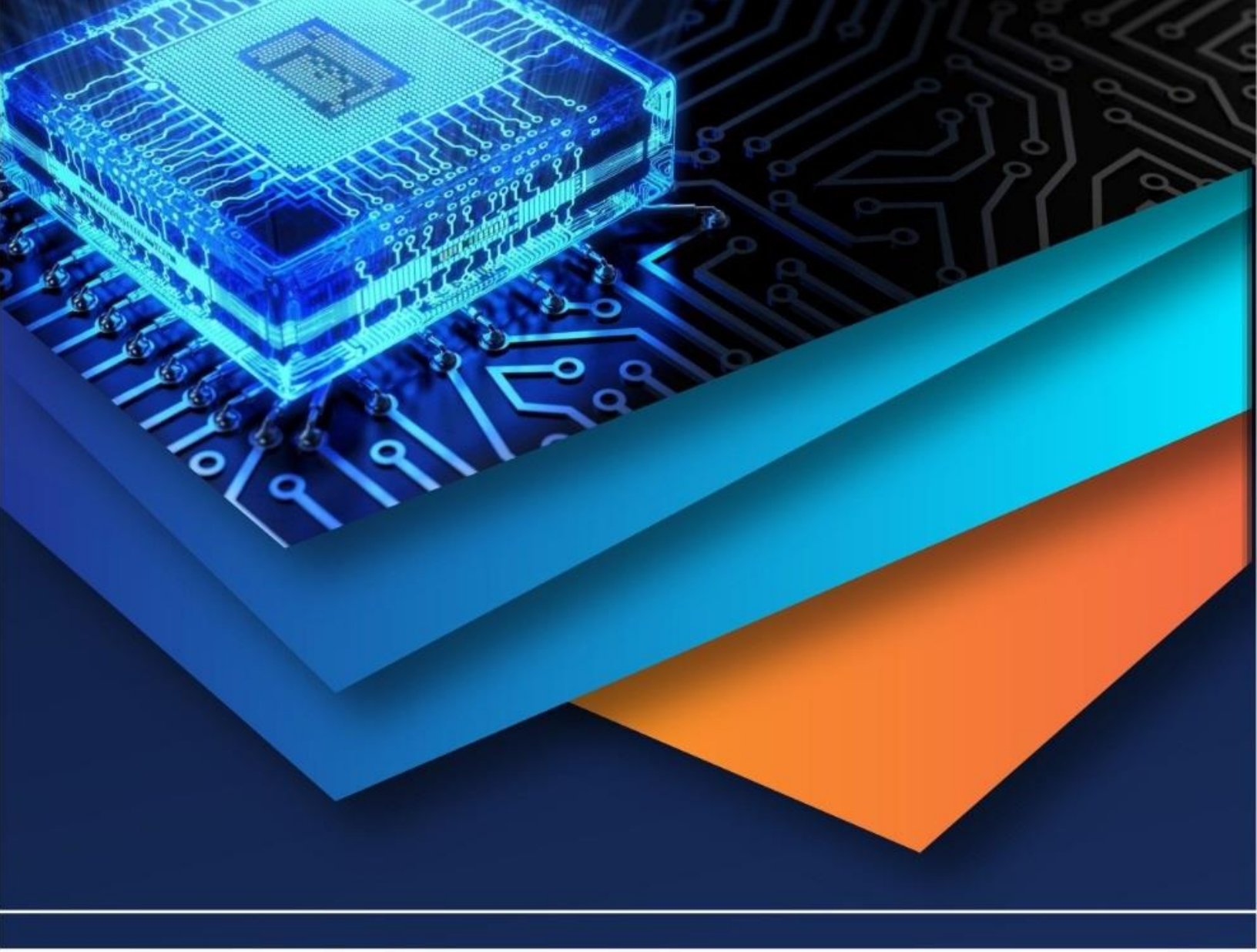
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