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A New Approach of Novel Analysis of IOT in Waste Management Scheme

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Abstract: *Waste management in India has recently become a topic of discussion that permeates most industrial cities and rural areas. The provision of bins by waste management agencies in terms of their perspectives is a solution to the problems of the current disposal system. Not enough. This paper presents a proposed method using multiple solutions to address the problem of runoff and inefficient collection schemes. The system provides a monitoring platform for waste management agencies to process alarm records by creating garbage collector/driver orders that can be accessed via a mobile application system. The proposed system includes intelligent A trash can is included. Once the workload is full, a work order is created that can be received by drivers and routing systems, and the status of bins distributed to specific regions is assessed over the driver's phone. The system implant works fine and can monitor the status of the waste container in real time, but the latency was sometimes high as it mainly uses the GSM module for GSM/GPRS connectivity..*

Keywords: Waste management.

I. INTRODUCTION

Waste management in India is a persistent issue that has received significant attention for decades. Despite the presence of trash cans in towns and villages, most of the time these bins fill up before the garbage collectors can dispose of them or reach the dust on site. there is a risk of is not full. This is a waste of money and resources. However, this problem can be mitigated by an automated system that regularly issues notifications to appropriate personnel assigned. This work provides several schemes for addressing existing inefficiencies. This includes smart bin deployment, a desktop management application powered by smart bins, an of the Government of India to solve the problem of waste management, but proposes a new smart cities. The remainder of this paper consists of an overview of the work involved and suggested ways to explicitly evolve the design and implementation of the various subcomponents. The next section presents test results of the constructed system, and the final section presents conclusions and recommendations for further related work. Related work Waste management issues continue to receive worldwide attention, and the work undertaken in this area varies.

II. HARDWARE AND SOFTWARE REQUIREMENTS

HARDWARE REQUIREMENT

There are different hardware requirements.

The Hardware requirement:

This section details the three main subcomponents in the hardware system: Microcontroller: Figure 3 shows the ATmega 328P, which was used in this work by considering key specifications that meet the requirement for the hardware system. ATmega 328P is a low power AVR 8-bit microcontroller which is based on advanced RISC architecture

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Fig 1 ATmega 328 P

Ultrasonic sensor:

Ultrasonic ranging module HC - SR04. This module can detect distance in the range of 2cm - 400cm. This module also includes ultrasonic transmitters, receiver, and control circuit GSM/GPRS.

Fig 2 Ultrasonic sensor

SIM800L Gsm/Gprs module:

It is a quad-band GSM/GPRS module, that works in the following frequencies: GSM850MHz, EGSM900MHz, DCS1800MHz and PCS1900MHz. It is a quad-band GSM/GPRS module, that works in the following frequencies: GSM850MHz, EGSM900MHz, DCS1800MHz and PCS1900MHz.

Fig 3 SIM800L Gsm/Gprs module

Functional Requirements:

The garbage collector should be able to access the system as a garbage collector, view the location of full bins on a map, and retrieve optimized bin collection routes.

Administrators should be able to. Access system as admin, add bin, add user, view bin dashboard, view all bins on map, get optimized route.Garbage can see the real-time level and location of garbage cans on Google Maps when the garbage collector is activated.

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The system verifies or authenticates registered users at login, retrieves and displays their current bin levels, sends her SMS notifications to the garbage collector on duty administrators to add users, geolocate their garbage collectors, and specify optimized routes for garbage collection.

SOFTWARE REQUIREMENT

There are several software requirements such as:

Adopted Software Development Model:

This work used an iterative and incremental development model. This was achieved by repeating cycles and developing the system in small chunks. Developing a system iteratively involves dividing the overall system into smaller pieces where functionality is defined, designed, developed, and tested.

Core system:

The application was developed using Angular Ionic Framework, Visual Studio Code, Microsoft SQL Server, and Thing Speak IoT platform. The Angular 7 Frontend Framework was used for the development of the web application which handles the monitoring of the bin and data processing of the bin status. Microsoft SQL Server was used for developing the database for the app. The Angular Ionic framework also provides a useful platform for the development and sustainability of applications that use complex algorithms to achieve user-friendly functionality.

- Angular JS: Angular is a platform that makes it easy to build applications with the web.
- Visual Studio Code: This is an Integrated Development Environment developed by Microsoft andfor Windows, Linux, and macOS. The source code is open source and released under the permission of the MIT License. The compiled binaries are freeware and free for private or commercial use.
- Microsoft SQL Server: This is a relational database management system developed by Microsoft that enables easy management of relational databases.

Google Maps:

This service helps to build customized and offers a seamless experience to users with static and dynamic maps, Street View imagery, and 360° views. By using the Google maps services, directions and route optimization API aided us to come up with the optimized real-time routing when multiple bins are full and need to be attended to. Functional Requirements: A garbage collector should be able to: access the system as a garbage collector, view the location of full bins on the map and get optimized routes for bin collection. Administrators should be able to: Access the system as administrator, add bins, add users, view bin dashboard, view all bins on map, get bin collection optimized root, garbage collection service provide. Location on Google Maps. The system verifies or authenticates registered users upon login, retrieves and displays their current bin levels, sends her SMS notifications to the garbage collector on duty when bins are full, and allows administrators to Allow to allow Add users, get garbage collector geolocation, and provide optimized garbage collection routes.

Non-Functional Requirement:

The application should be easy to use. The system should be designed for fast response time. The system needs to execute commands fast enough, including page load and refresh times.

You need to streamline your data and use your storage efficiently. The system should be portable. For easy downloads and fast app load times, the size of your application should not be too large. Systems and databases must recover quickly from failures without frequent failures.

III. METHODOLOGY:

System Architecture:

The system architecture consists of smart bins, cloud services, and a management system for desktop and mobile platforms. The Smart Bin: The top cover of the bin was fixed with a microcontroller-based circuit with an ultrasonic sensor to detect the level of garbage. A GSM module was also included in the hardware system for internet connectivity to the cloud-based database (Thing Speak) and SMS notification to the garbage collectors.

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Management System:

The management system has several modules that include a database on the waste bins with Realtime access to bin status, geolocation of bins, routing information and a work order form.

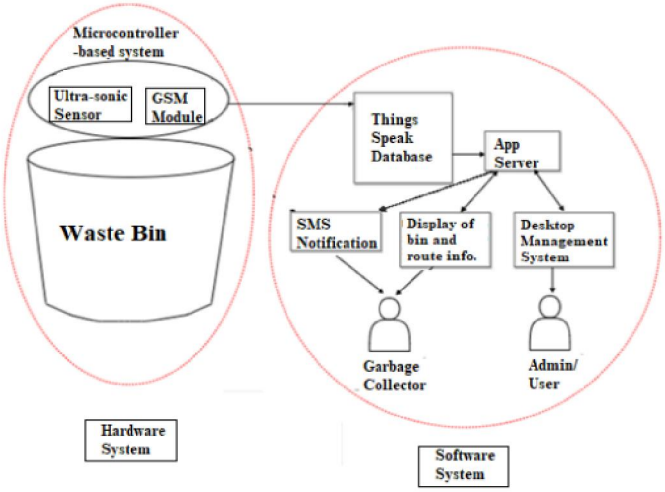

Fig 4. System Architecture

IV. BLOCK DIAGRAM

It begins with the detection of the garbage level in the smart bin and sends the bin status to the cloud system. The bin status is then sent to the application server. At this point the bin level is compared to the threshold value (viz. 70% of inner bin height). Below the threshold value, an updated bin level is tested until the threshold value is exceeded for further action. This action includes the creation of work order and sending SMS alert and routing information to the Garbage collector. Until the work order is executed, the admin would continue to monitor until a successful collection of garbage before clearing the work order.

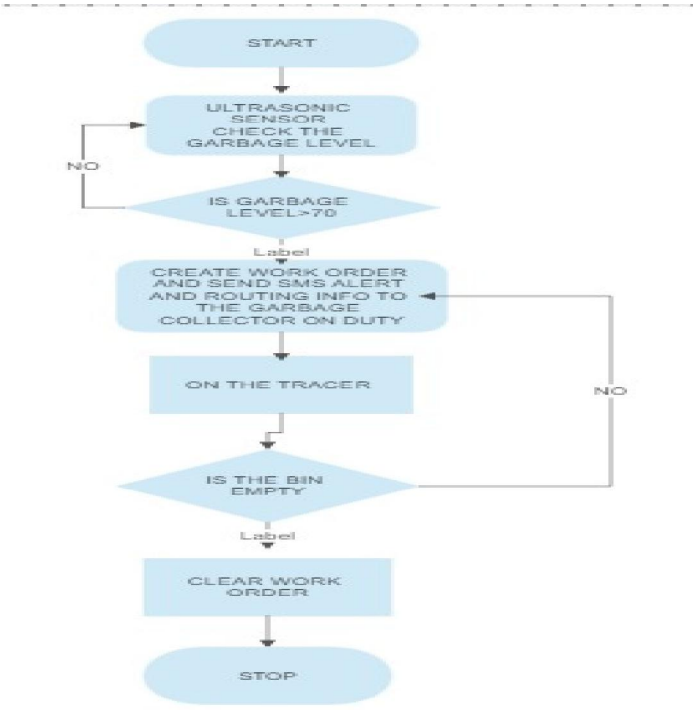

Fig 5. Block Diagram

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V. CONCLUSION

The constructed detection system and the results of simulation of the whole system. This section also provides a table listing tests performed on both existing and proposed systems.

Smart Waste Bin:

The final system implementation on the smart bin can be seen in figure 7a and 7b. The detection system is attached to the bin lid and an ultrasonic sensor is placed under the bin lid to detect the level of waste by line of sight.

Fig 6. Smart Waste Bin

Desktop Application System:

The system worked well and met all the pre-set requirements, especially when it came to responding to queries. The constructed tank and three additional mock tanks were deployed in selected areas of Accra, the capital of Ghana.

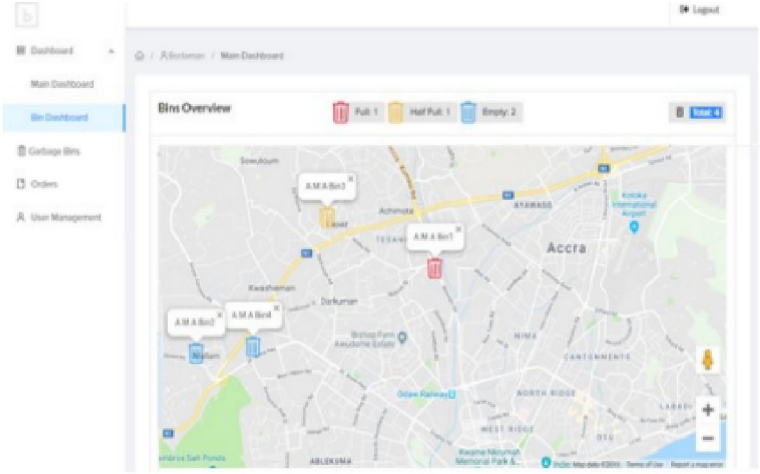

Fig 7. Route Information for Bins on Desktop Application

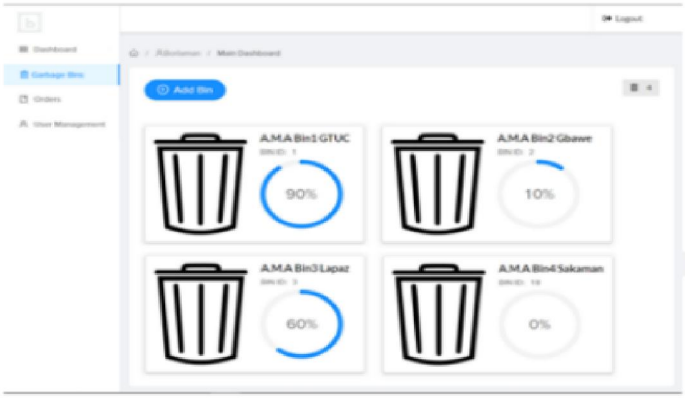

Fig 8. Display of Bin Status on Desktop Application

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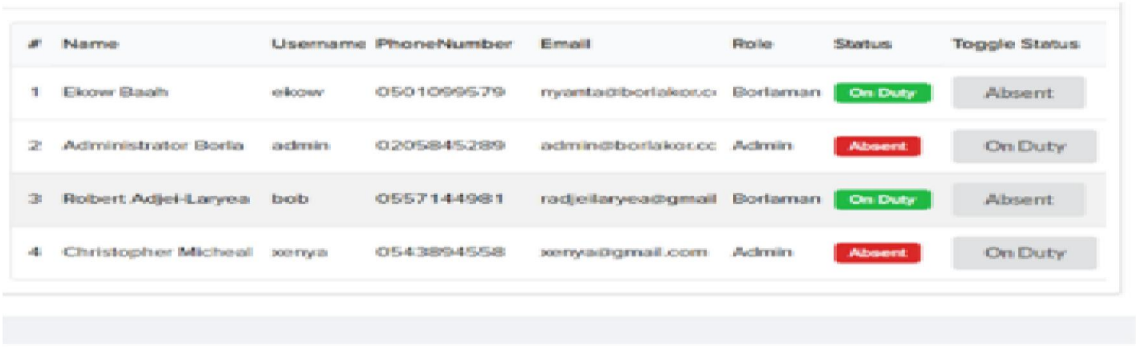

Figure 10. Work Order on Desktop Application

Fig 9. Work Order on Desktop Application

SMS Notification:

By way of providing an alternative monitoring mechanism for the smart bins, SMS of all full bins are sent to the garbage collector in order to keep attending to them whenever routing system fails on the mobile app.

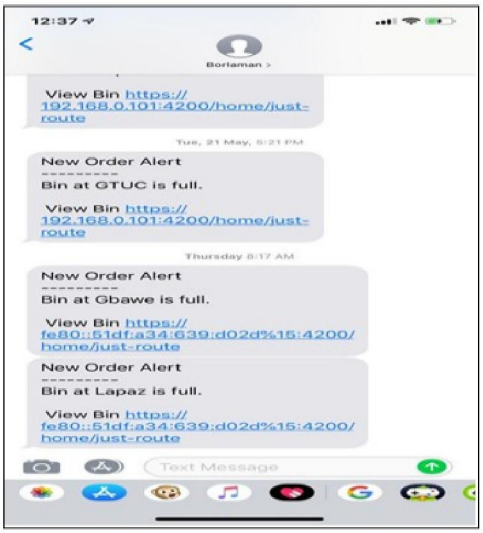

Fig 10. SMS Notifications Indicating Various Bin Location

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