BTEC

HND in Computing

Level 5

Computing Research Project

(Garbage Monitoring and Automatic Waste Collection System in Public Places)

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Executive Summary

As of now the population of Sri Lanka is 21,391,770 Garbage management is a big challenge in the Sri Lankan Public areas and there are several problems related to garbage management. There are not enough trash bins available to the public and most of the bins available fill up faster than ever. Many of these garbage bins overflow before collection. Garbage collection from these containers was delayed, as information on the fill level in the containers may not be available. The lack of information on empty containers allows the general public to dump trash on and near the street. The overflowing recycle bin becomes a messy street with an unpleasant smell. Sometimes biomedical or hazardous waste is also dumped in the trash on the street. This disastrous situation places great pressure on waste management.

In this situation, we want to implement solution for monitoring garbage bins in public places. We can provide simple solution using IOT (Internet of things) for this issue. Simply this system can be created so that any responsible person will automatically notify us when garbage is full. Also he can monitor using web portal garbage bins trash levels. Then the person concerned can request to dispose of the garbage. The feature is from this system if the trash is full the lid closes automatically. You can also select a garbage collection truck and send it notification for their truck driver.

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SECTION 1: STATEMENT OF PROJECT DETAILS

Project Title;

Garbage Monitoring and Automatic Waste Collection System in Public Places

Academic Question;

Unavailability of the proper waste management system

Aim;

The aim of this project is to design Garbage Monitoring System to ease the problems that peoples face while managing waste. In this system, we can monitor entire garbage bin using web portal.

Objective;

The objective of this project is to design and implement a cost effective, reliable & efficient Garbage Monitoring and Automatic Waste Collection System in Public Places. And Improvement of public hygiene conditions. In addition, to create a healthier environment for us.

Artefact (proposed) to be developed;

The first step is to monitor the accumulation of garbage in a container by using a web portal and to create a system that will automatically close the container once the trash has been collected. Further, the project will enable the person in charge of the area where the trash belongs to be automatically notified when the trash is filled. This web portal can also check all systems installed in the area.

The system works as follows: Uses HC-SR04 ultrasonic sensor to detect instantaneous depth or level of trash. This information is then received and processed by the microcontroller, which is mounted on the Raspberry Pi board. Next, based on the processed output, determine the instantaneous level of the recycle bin. Our developed system has four predefined threshold levels. The first level ranges from 0 to 25%, the second level up to 50%, the third level up to 75%, and the fourth level up to 90%. Trash bin depth.

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SECTION 2: PROJECT PROPOSAL

Introduction

This system does is always provide a realistic indication of the level of waste in the trash. You can use that data to optimize waste collection paths and ultimately reduce fuel consumption. Garbage collectors can schedule a daily / weekly selection schedule.

Initial Research into sources of information

We can see garbage bins are full and the dirt falling to the ground in many places in Sri Lanka. Because of this, we can see the potential for many other countries to manage this garbage.

Main inability of current recycle bin collection the system is as follows:

- There is no estimation to the amount of solid waste present inside the bin and the surrounding area due to the scattering of waste.
- .Lack of information about the collecting time and area
- No any idea about how much garbage is collected in the area per day?

It is at that points, started gathering requirements for Garbage Monitoring and Automatic Waste Collection System.

There are many systems to eliminate these problems Developed. Some of these are summarized below:

- Hong, I., Park, S., Lee, B., Lee, J., Jeong, D. and Park, implement Iot-Based Smart Garbage System For Efficient Food Waste Management in 2004. In the research they did how to reduce food waste to reduce, an iot-based smart waste system was proposed amount of food waste. Battery-based smartphones in this system garbage bins share information with each other wireless Networks, and adds a router and server and analysing information for service delivery and there are various IoT techniques for user convenience. This project is Solution for IoT-Based Smart Garbage System for Efficient Food Waste Management.

- Priya B. K., T. Lavanya, V. Samyukta Reddy, Yarlagadda Pravallika peoples do the project name called "Bin That Think's". They have done this project too smart waste management system. In the research they did radio frequency identification (RFID) and weight sensor to use design a smart waste management system to reduce waste management costs and facilitate waste detection and automate the weighting process. This project is included in "The International Journal Of Science and Technoledge. Vol.3, pp 218-223, June 2015"

- Waikhom Reshmi, RamKumar Sundaram, M. Rajeev Kumar implement Sensor Unit for Waste Management. In the research they did, an electronic system design is proposed to provide a solution for an inappropriate waste treatment system. Biosensors and weight sensors are used in conjunction with height sensors to detect the extent of trash in the trash and the intensity of contamination caused by unwanted toxic gases from the trash. These sensors are then sent to the controller, which helps the GSM module send notifications about the status of the recycle bin to authorities. The main purpose of this paper is to provide a solution for the proper disposal of waste. An effective waste management system is achieved using the sensors in this paper. Sensor units are used for sensing, microcontrollers are used for control, GSM modules are used for communication, and solar energy is used for power required by the system. This Project is included in A Better Method for Frequent Data Updating System‖ International Conference on Science, Engineering and Management Research. 2014.

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Artefact (proposed)

The Paper IoT-based waste monitoring system is a very innovative system that helps clean cities. A web page makes it easy for administrators to know the bin storage capacity. An ultrasonic sensor is placed in the trash bin to detect the trash phase and balance the trash intensity with this system. The system sends data using a Raspberry Pi, LED Display and Motor. A 12V transformer powers the system. Users can use a web page to locate the waste. An image view of the trash bins is provided on the web page and highlights the accumulated trash in colour to indicate the trash collection phase. The buzzer will be activated if the added waste volume exceeds the limit. This method helps keep the city clean by providing a graphical image of the garbage through the IoT Web development platform and notifying about the garbage level. This system only can be identify the garbage bin trash levels and all garbage bins can view their trash levels using single portal. In addition, I use motor driver and servomotor for automatically close the garbage bin lid.

The system does not know what to put in the trash only can identify the trash level.
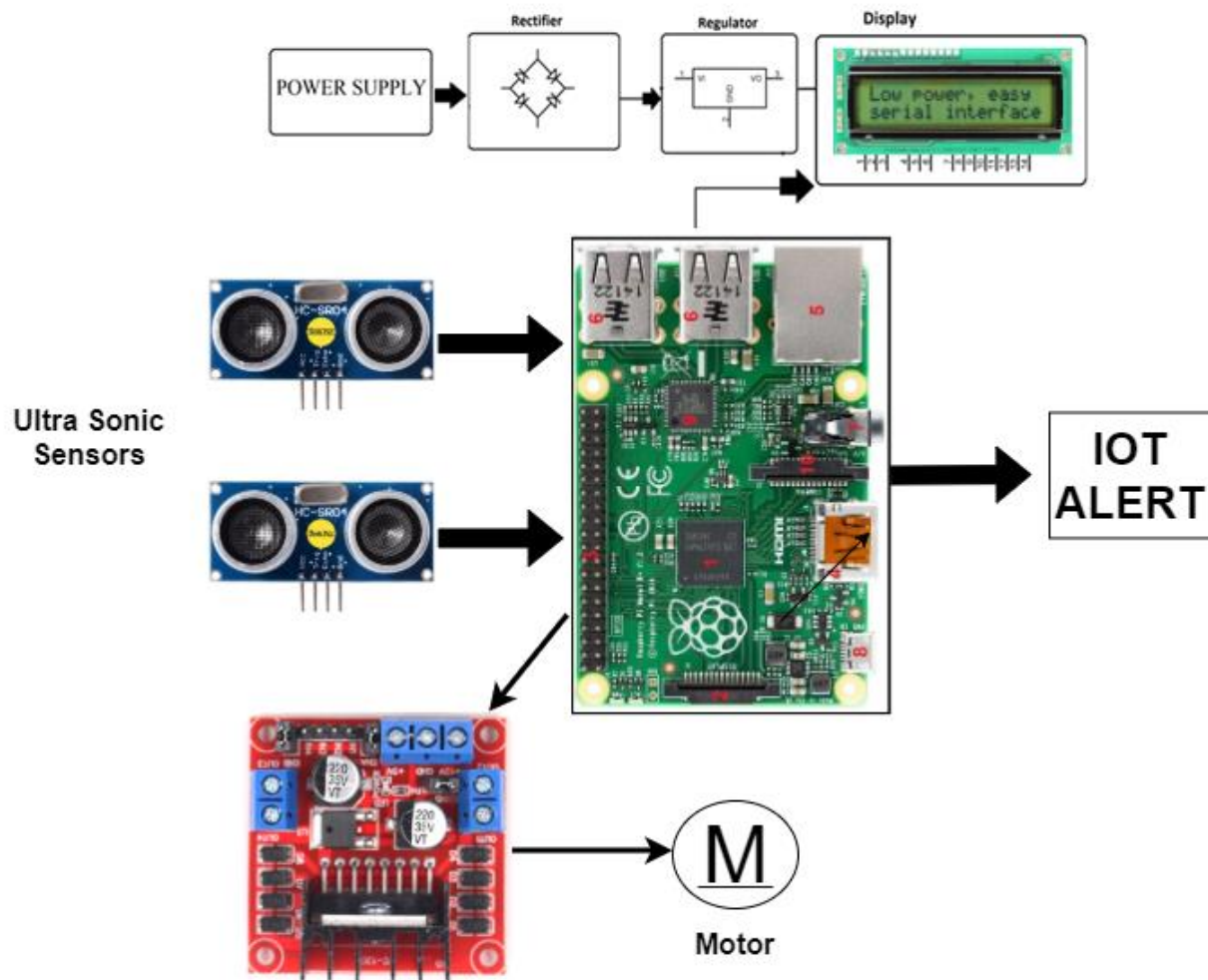

Figure 1; Project Diagram

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Project Diagram

Figure 2; Project Diagram

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Plan/Schedule

No	Task	Duration	April week				May week				June week				July week				August week				September week			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1	Identify Exsisting Situation	1 weeks																								
	Information gathering exsisting situation		■																							
2	Analize and Design	2 weeks																								
	Prepair the system diagrm			■																						
	Documentation			■																						
3	Develop System and Network	10 weeks																								
	purchasing new devices and other equiments				■																					
	Hardware Configuration				■	■																				
	Servers installation and configuration						■	■	■																	
	Design Web Portal								■	■																
	Implement IOT Alert Gateway										■	■														
	Network Configuration												■													
4	Implementing and Testing	10 weeks																								
	Device Testing													■												
	Web Portal and Device Communication Testing															■									
	Making mistakes																■								
	Implementation Public Area																	■							
	getting feedback from peoples																		■						
	making changes accoding to feedback																			■	■				
5	finalized the project	3 week																								
	Documentaion																						■			
	finalized the project																								■	■

Figure 3; Plan & schedule

Due to COVID 19 situation, this timetable may change

REFERENCES

1. Hong, I., Park, S., Lee, B., Lee, J., Jeong, D. and Park, S., 2014. Iot-Based Smart Garbage System for Efficient Food Waste Management.

2. Priya B. K., T. Lavanya, V. Samyukta Reddy, Yarlagadda Pravallika, ― "Bin That Think's" The International Journal Of Science and Technoledge. Vol.3, pp 218-223, June 2015.

3. Waikhom Reshmi, RamKumar Sundaram, M. Rajeev Kumar, ―Sensor Unit for Waste Management: A Better Method for Frequent Data Updating System‖ International Conference on Science, Engineering and Management Research. 2014.

4. Rao, P., Kumar, S. and Prasad, C., 2017. Garbage Monitoring System using Arduino. International Journal of Trend in Scientific Research and Development, Volume-1(Issue-6), pp.808-811.

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SECTION 3: ADDITIONAL INFORMATION:

Resources:

Hardware Resources

- Raspberry Pi board
- Ultrasonic Sensors HC-SR04
- Regulator
- Rectifier
- LED Display
- Stepper motor
- Battery Pack
- GSM module (Additional)
- Motor Driver

Client

Public Place area

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