SMART GARBAGE MANAGEMENT SYSTEM USING INTERNET OF THINGS [IOT]

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Abstract

Many times, in our city we see that the garbage bins or dustbins placed at public places are overloaded. It creates uncomfortable for the people as well as ugly to that place, with the bad smell. To avoid all such kind of situations, we are going to implement a project called IOT based 'Smart Bins'.

These Bins are work with an Automation controller system with Arduino / NodeMcu. And the data will pass by ESP8266 wi-fi module. The Aim of my project is to reduce the manpower, Time, cost and Easy monitoring the Dustbins.

Introduction

The dustbin is a common and basic need everywhere. A Simple thing is "If the population going to increase, then the pollution become a Global concern" Just go through all around our University and count, how many Dustbins are not maintain properly..! Likewise all the dustbins aren't maintain in a proper way. So According to our University, Waste Management System needs to be improved by Smart way for handle it simple. Because our Rubbish bins are continuously full of garbage (because of the student population) and its take a long time to collect by the workers manually.

My point of view is:

> Smart Bins need to clean by time to time – "But it's not happening on time……!"

So that's why I'd mention here, Smart garbage management system for monitoring. The sensors will update time to time readings to maintain the real-time system. **And here I'm willing to calculate Distance measurement (Height of Dustbin=h).**

Bad waste management can easily result in air pollution and soil contamination. It also causes human disease in a short period by breathing that air. Implementation of this smart dustbin can prevent lump of garbage to store a long period of time.

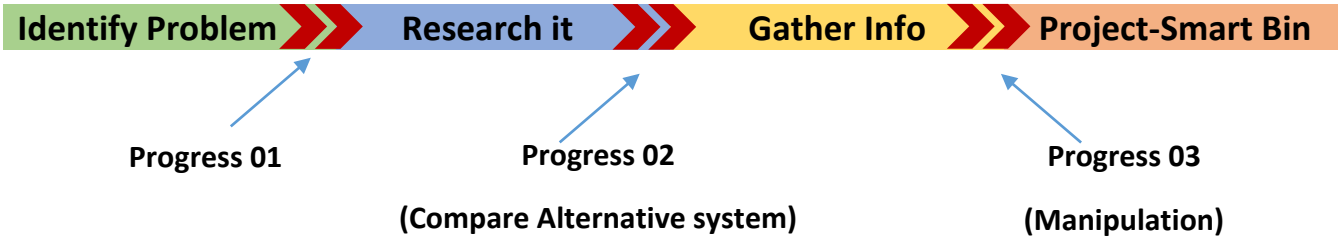
Literature Survey

Lack of information about the collecting time and area, a Proper system to maintain the garbage well, These things are willing to mention for, these type of Smart Garbage bins.

And the reason for this kind of topic is, Always I observe garbage are not clean properly in our Country. Also, there is an incident **'Rubbish mount' collapse happen on 15th April of 2017 @ Meethotamulla, Colombo.** Proper Garbage management system is not maintain in that area. According to this incident above factor also one of reason to happen.

Smart Garbage Management system will run as Standalone. This Desktop Application will help to manage with the system interface. The Admin can able to search for dustbins. And the result will depend on every bin performance. The bins are located with the help of maps. According to BIN_ID, admin/user can view full detail about the particular dustbin. And also picker able to reset the bin location for their wish.

According to my system, I was observing through the everyday scenario in our University. And also it will help to be clean our environment. Data transmission is done by ESP8266 module (according to that range - it was limited area data transmission)

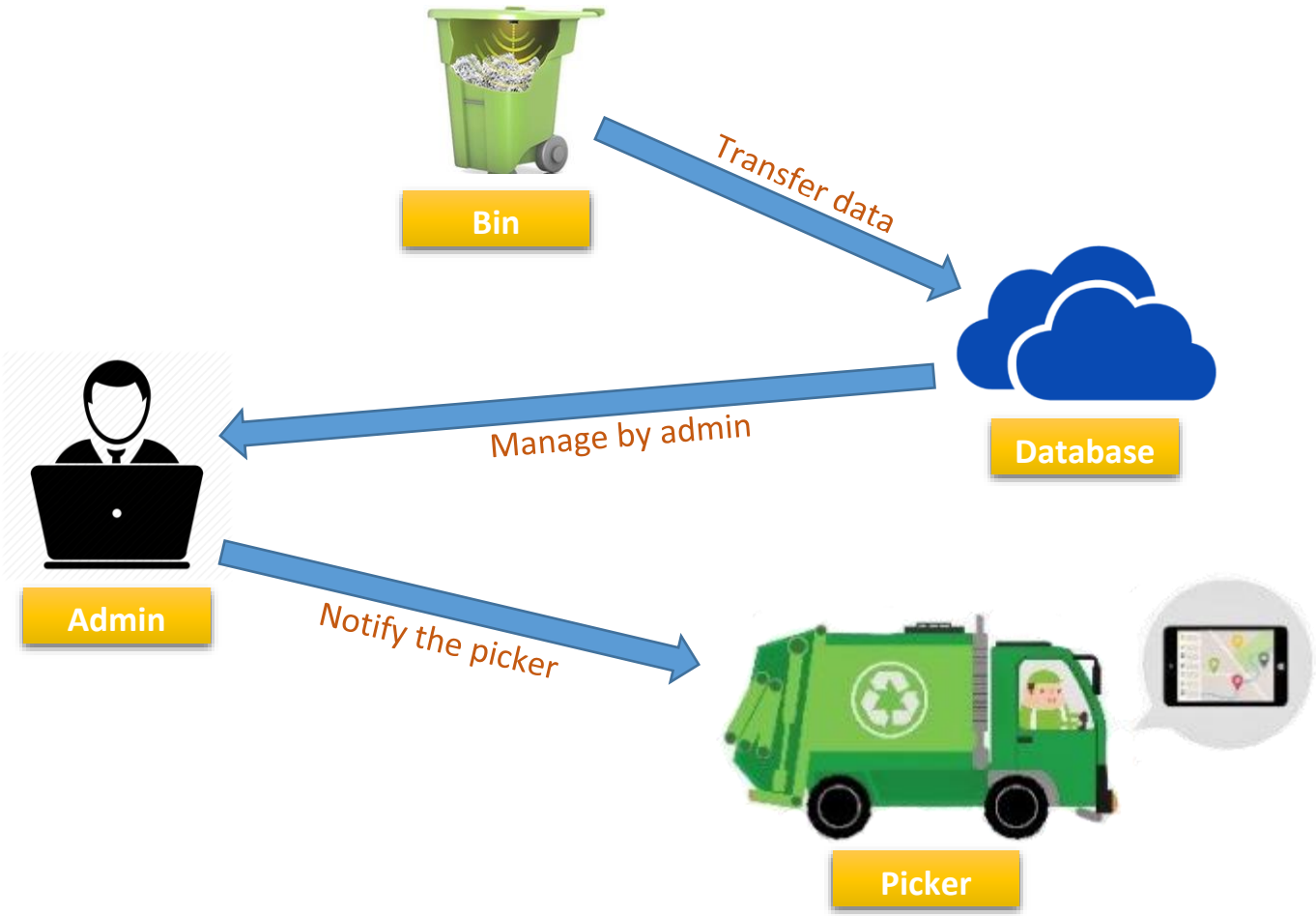


Methodology

The desktop application is referred to log in the user to monitor the system. The Ultrasonic sensor was placed at the top of the bin. A threshold level was set as **15cm (*from the top*),** So the garbage reaches the level of threshold ⇒ The sensor triggers the ESP module which alerts the maintainer. (It notified the system, till the garbage emptied)

On here, **I'm not using the 'Weight sensor'** inside the Bin. Because **Sponge/Soft material can fill up the Bin.** That's why I'm using the Ultrasonic sensor to measure the height.

Proposed System



Functionality

- The Arduino system has to Attached with the Bins.

  The automation system is needs to be attached the Bin – else, the system will not be notified. So these type of hardware part wants to attach.

- Need to be power supply the Arduino board.

  Arduino board has to power supply 24 hours. Because

- Admin had to monitor the system well.

  System Maintenance is confirmed, if it's admin or not. [security purpose]

- Every Bin need to pin the location when we set to process.

  Location is important to notice here. Because when we consider it as a large system, there are thousand of Bins are need to be connected to our system.

- Sensor Readings are pass to the database by time to time.
- Picker is notifying, when the Bin fill to 90%

  Garbage picker is navigated by the admin with the help of location.

This Standalone system will help us to identify the exact Bin, which is needed to be clean immediately. And also I'm willing to add GSM module also (If wifi connection not available to BIN, System will work by- send an SMS to the Picker)

According to our University, All the Bins are connected to the **particular Faculty wifi**.

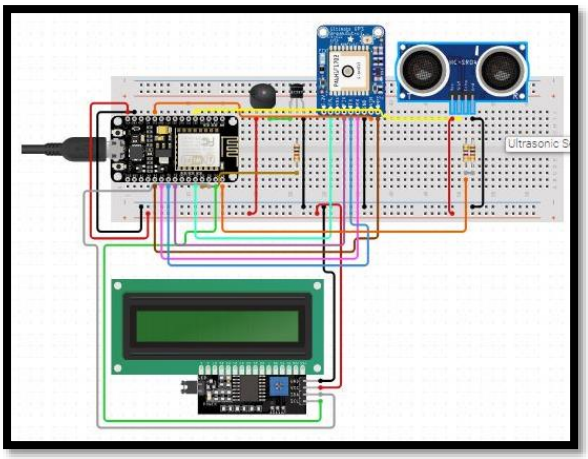


Figure1: Detail connection about Automation system

Hardware used:

- Arduino Uno / NodeMcu

  IS a microcontroller board, Which has 14 digital out pins. For controlling Smart Bin, this board will help to automate. (NodeMcu have own wifi shield with it)

- Ultrasonic Sensor

  In here Ultrasonic Sensor is used to measure the distance with height accuracy of Bin. It will measure the distance from 2cm – 400cm criteria. And also a wave of the frequency is 40KHz. [Distance = Time * sound speed/2]

- ESP8266 WIFI module / GPS / GSM

  Wi-Fi module which will pass the data to a particular IP address for transfer the data. It can communicate with any microcontroller and make the project wireless. And the GPS module helps to locate the place. GSM helps to send a message to the picker.

- Bins

  The dustbins, which is used to put the garbage.

- Battery (to Power up the Board)

Software Used:

- C# Application

  Desktop Application for Manage the data as well.

- Firebase, MySql

  Databases for using to store the data.

- Blynk is an Android App which is used to pass the data.

Gantt Chart

Month / Week / ACTION	1st Month		2nd Month				3rd Month			
	1	2	3	4	5	6	7	8	9	10
Make proposal & Gathering Information										
Literature Review & Gather Hardware parts										
Design user interface										
Programming steps [coding]										
Testing & Modification										
Project Submission / Implementation										

Reference

- IoT Based Smart Garbage and Waste Collection Bin (International Journal of Advance Research in Electronics and Communication Engineering)
- Smart waste collection system based on Location System.