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IOT Based Smart Movable Dustbin

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ABSTRACT

Solid waste management is a critical issue affecting all sectors of society and influencing the economy, public health, and environment. Environment sustainability and solid waste management are the prime most challenges for developing countries. Smart garbage monitoring requires smart city deployment models for various workplaces, Bus stands, Hospitals, and organizations. Unhygienic waste handling causes health hazards and urban environmental degradation. Through this paper, we propose a sophisticated way of garbage monitoring and management. We present a prototype model of IOT based smart dustbin, which can improve housekeeping tasks with reduced manual interference at various workplaces.

KEYWORDS- *IOT, Raspberry pi, IFTTT, Adafruitio*

INTRODUCTION

The detection, monitoring, and management of waste are among the primary problems of the present era. This system is automated and voice-controlled; we will use the Google voice assistance system for communication. This design smart movable dustbin will come to your place when you give the call to the bin. A bin is smart enough, which will tell the user about the bin's status, and the bin has smart indicators that will indicate status. We live in an age where tasks and systems are fusing with the power of IOT to have a more efficient system of working and to execute jobs quickly! The traditional way of manually monitoring the wastes in waste bins is a cumbersome process and utilizes more human effort, time, and cost, which can easily be avoided with our present technologies. Internet and its applications have become an integral part of today's human lifestyle. It has become an essential tool in every aspect. This systems architecture would be based on the context of operations and processes in real-time scenarios. Smart collection bin works similarly with sensors, namely weight sensor and ultrasonic sensor, that indicate its weight and different levels. The ultrasonic sensors will show us the various levels of garbage in the dustbins, and also the weight sensor gets activated to send its output ahead when its threshold The level is crossed. DTH sensor measures the temperature and humidity of the dustbin. GPS is used to track the location of the dustbin placed.

LITERATURE SURVEY

To dump garbage properly or to recycle them, first, the waste has to be categorized. It can be done in two ways. Categorizing waste in a center after collection in this method first the waste is collected and brought in to the center, then the waste is categorized manually as plastics, paper, glass, metal, etc. This method consumes a lot of labor; Manuscript received October 15, 2018; revised January 13, 2019. W. A. L. Gayanthika, S. D. H. S. Wikramarathne, and R. M. I. S. Ranasingha are with the Department of Computer Science and Technology, UvaWellassa University, Badulla, Sri Lanka (email: lakshani0915@gmail.com, harshisd@gmail.com,iranthiranasinghe@gmail.com).
G. K. C. D. Maduranga is with the Auxenta (Pvt) Ltd of Sri Lanka, Sri Lanka (email: cdm829@gmail.com). A. I. S. Silva is with the Department of Marketing of Asia Broadcasting Corporation Private Limited, Sri Lanka (email: irusha.sandeepa@gmail.com).

The smart dustbin is used to handle the waste dumped by the users. The user is given an RFID tag, and the given RFID tag identifies the user. Once the user taps the RFID tag in the RFID reader, the dustbin's lid is open by verifying the user ID through the database. Then the user can dump garbage into the dustbin. When the user dumps the garbage into the dustbin, the load-cell measure the weight of the waste dumped by the user and sends it to the database. If the dustbin is full, the ultrasonic sensor will detect it and send a text message to the collection center that the dustbin is full.

1. " Smart Dustbin for Waste Management" by W. A. L. Gayanthika, G. K. C. D. Maduranga, A. I. S. Silva, S. D. H. S. Wikramarathne, and R. M. I. S. Ranasinghe\

2. IoT-based Smart Garbage and Waste Monitoring System using MQTT Protocol byHarshithaN1, Nehashree K Ruthika1, RheaBenny1, Varsha S P1, Keerthi Kumar M2 2Assitant Professor, Department of TCE, GSSSIETW, Mysuru, and Karnataka, India.

METHODOLOGIES

A. Existing System

In the existing system, to monitor and check the dustbin status, they use Aurdino, GSM module, etc. It consists of the sensing units, Bluetooth, and GSM Module for Communication Purpose. Which increases the cost of the overall system also increases Power Consumption.

According to Our survey, the existing system increases the work time. The structure of Aurdino is its disadvantage as well. During building a project, you have to make its size as small as possible, but with the big structures of Arduino, we have to stick with big-sized PCBs. The limitations of GSM are that multiple users share the same bandwidth. With enough users, the transmission can encounter interference.

B. Proposed Work

In Our Project, we are using Rechargeable Lead Acid Battery which is 12V, 1.3Ah. This voltage is given to the Raspberry pi3B Module through Rectifier and Regulator Circuit that Convert 12V to 5V. When 5V supply is given to the Module, then Raspberry pi Boots and program start running. When a user wants to put away some waste, he will command this robot using Google assistance “Hey, Bin, Come to place 1”. The robot works on command forwarded from the cloud to raspberry pi.

According to the user, the robot will decide the destination and drive to the location; then, it opens its lead using Servo Motor. After collecting the waste, the user will command to go back to the home position, and the robot will travel back to the home position. If the dustbin is full, then it will send a message that it is full and the user needs to wait. Whenever it receives the call from the particular user, it reaches that particular location, collects the waste, and returns to its original position. It also indicates the status of garbage level.

BLOCK DIAGRAM

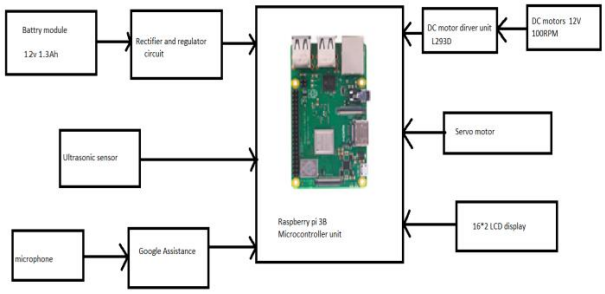
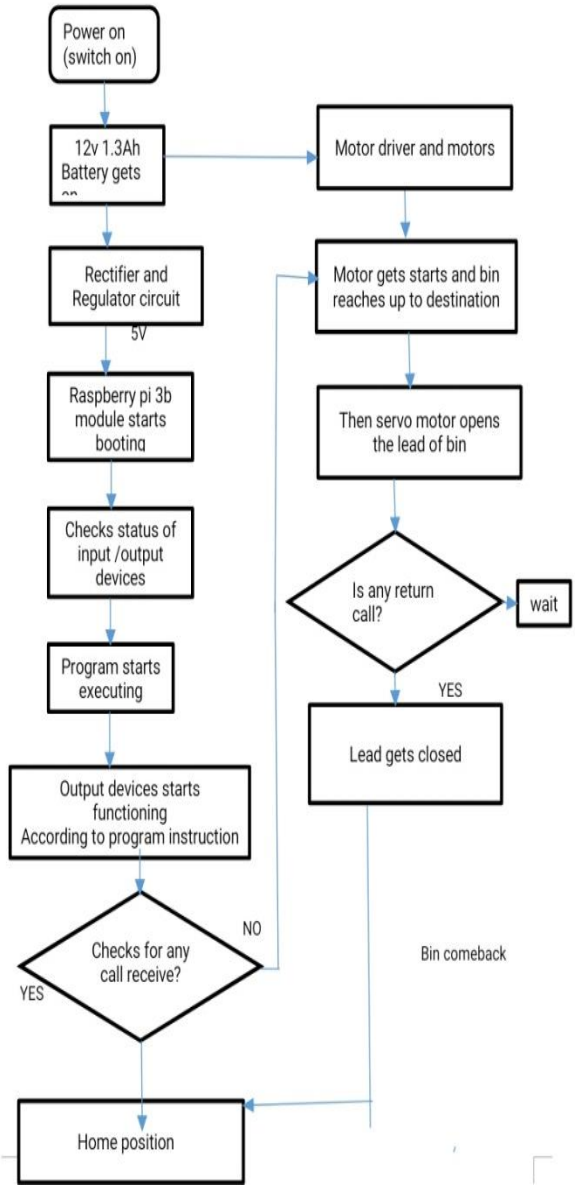


Fig. Block Diagram of IOT Based Smart Movable Dustbin

When a user wants to put away some waste, the user will command this robot using Google assistance. The robot works on command forwarded from the cloud to raspberry pi. According to the user, the robot will decide the destination and drive to the location. After collecting the waste, the user will command to go back to the home position, and the robot will travel back to the home position. If the dustbin is full, then it will send a message that it is full and the user needs to wait. Whenever it receives the call from the particular user, it reaches that particular location collects the waste, and returns to its original position. It also indicates the status of garbage level.

HARDWARE



Raspberry Pi 3B

- CPU: Quad-core 64-bit ARM Cortex A53 clocked at 1.2 GHz
- GPU: 400MHz Video Core IV multimedia
- Memory: 1GB LPDDR2-900 SDRAM (i.e. 900MHz)
- USB ports: 4
- Video outputs: HDMI, composite video (PAL and NTSC) via 3.5 mm jack
- Network: 10/100Mbps Ethernet and 802.11n Wireless LAN
- Peripherals: 17 GPIO plus specific functions, and HAT ID bus
- Bluetooth: 4.1
- Power source: 5 V via Micro USB or GPIO header
- Size: 85.60mm × 56.5mm
- Weight: 45g (1.6 oz)

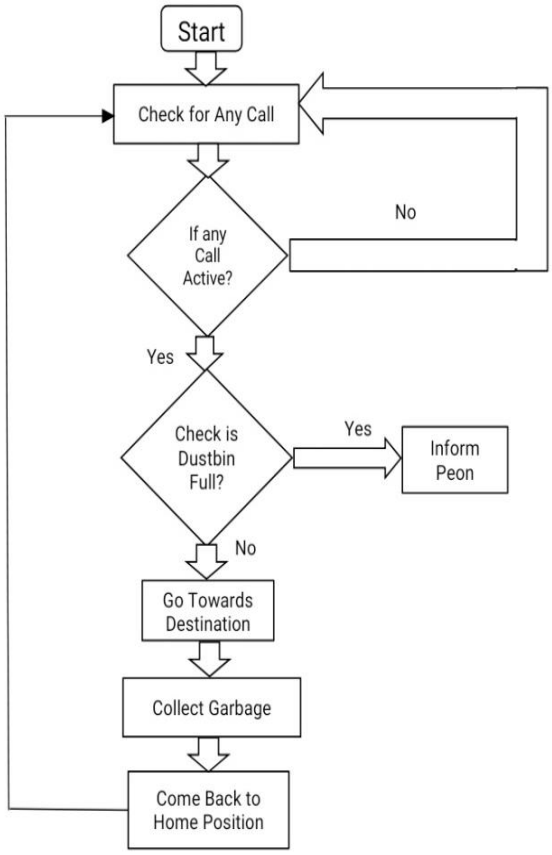
Ultrasonic Sensor

- Operating voltage: +5V
- Theoretical Measuring Distance: 2cm to 450cm
- Practical Measuring Distance: 2cm to 80cm
- Accuracy: 3mm
- Measuring angle covered: <15°
- Operating Current: <15mA
- Operating Frequency: 40Hz

16X2 LCD Modules

- Operating Voltage is 4.7V to 5.3V
- Current consumption is 1mA without backlight
- Alphanumeric LCD module, meaning can display alphabets and numbers
- Consists of two rows, and each row can print 16 characters.
- Each character is built by a 5×8 pixel box
- Can work on both 8-bit and 4-bit mode
- It can also display any custom generated characters
- Available in Green and Blue Backlight

SOFTWARE



Adafruitio

Adafruit.io is a cloud service - we connect to it over the internet. It's meant primarily for storing and then retrieving data.Adafruit.io can handle and visualize multiple feeds of data. Want to display data from a temperature-humidity sensor alongside data from an air quality sensor and add a button to turn on the air-conditioner in your room?

- No problem! Dashboards are a feature integrated into Adafruit IO, allowing you to chart, graph, gauge, log, and display your data. You can view your dashboards from anywhere in the world.
- Integration with IFTTT
- Adafruit IO is a system that makes data useful. Our focus is on ease of use and allowing simple data connections with little programming required.

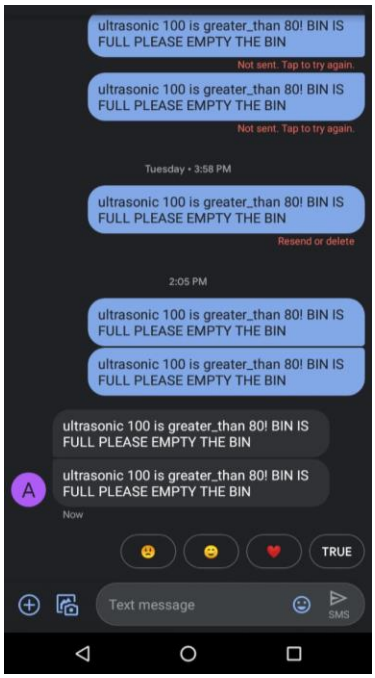
IFTTT

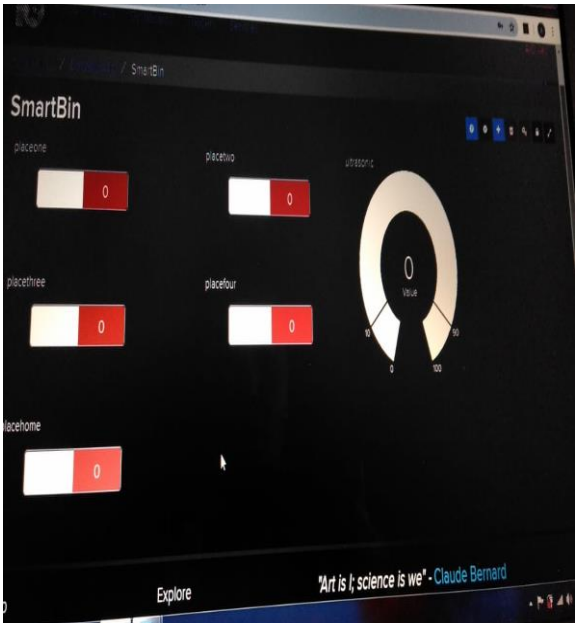
IFTTT derives its name from the programming conditional statement "if this, then that." The company provides a software platform that connects apps, devices, and services from different developers to trigger one or more automation involving those apps, devices, and services. IFTTT is the freeway to get all

your apps and devices talking to each other. Not everything on the internet plays nice, so we're on a mission to build a more connected world.

IFTTT is the freeway to do more with hundreds of the apps and devices you love, including Twitter, Dropbox, Ever note, Nest, Fit bit, Amazon Alexa, and Google Assistant.

On IFTTT, we call those services.





CONCLUSION

The real-time waste monitoring system is a challenging task. Our proposed system is implemented using raspberry pi 3B, ultrasonic sensor, servo motor. This project can be realized at small places like parks, universities, hospitals, and domestic applications. This paper will help the physically challenged person, aged people, and help us maintain the clean home surroundings. This model will be made user-friendly and cost-effective, which will help keep daily surroundings neat, clean and reduce health issues of the human being to fulfill the mission of Swatch Bharat Abhiyan.

FUTURE WORK

Future work for the proposed system is that in the proposed model, we connected a single dustbin to collect garbage we will connect the entire dustbin. Data of dustbin can be checked in cloud database; further, we will design a web portal to connect the entire dustbin. Notification of dustbin is done by email further it. An automated system can be developed which can segregate them and put them in respective bins.

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