International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | Impact Factor: 7.194 |

|| Volume 8, Issue 4, April 2020 ||

A Survey on Automated Waste Collection and Sorting System

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ABSTRACT: The govt. of India has launched a smart city project and for these smart cities to be smarter it is necessary that the garbage collection system has to be smarter and in addition to that the people need easy accessibility to the garbage disposing points and garbage collection process has to be efficient in terms of time and fuel cost.The Smart city concept was recently introduced as a strategic means to encompass in a common framework and the growing importance of Information and Communication Technologies (ICT), social and environmental capital in growing cities competitiveness and sustainability. Smart cities includes smart care, smart energy, smart society, smart waste management, smart building, smart home, smart security etc. Now a day's waste management is important issue for the smart city. The implementation of proper waste management is easy by using IOT. Things that are connected to the internet and those devices controlled by the internet are called as Internet of Things. Internet of Things (IOT) is still a vague term that refers to the network of physical, identifiable objects connected via the internet, which cansense and communicate with other devices. In present there was a rapid growth in the population which leads to large quantity of waste disposal in the cities. The proper management of waste has significant impact on the quality of life of citizens. We can take advantage of our study to solve the problems of waste management in various cities. It is critical to efficiently manage the waste disposed in every location of a smart cities not onlyfocusingonthecollectionactivitiesbutalsoonitstransportandrecycling.

KEYWORDS: Internet enabled Smart Dustbin, Power Supply, Pipe, IR Sensor, Humidity Sensor, Utrasonic Sensor, Servo Motor, Arduino Uno, GSM, Keypad, LCD Display, Garbage Collection and Sorting ,Maximum working capacity

I. INTRODUCTION

Dustbins are small plastic containers that are used to store trash on temporary basis. Usually it is common practice to use separate bins collecting wet or dry recyclable or recyclable waste. To avoid this, we have this project as solution.The Smart city concept was recently introduced as a strategic means to encompass in a common framework and the growing importance of Information and Communication Technologies (ICT), social and environmental capital in growing cities competitiveness and sustainability.Smart cities includes smart care, smart energy, smart society, smart waste management, smart building, smart home, smart security etc.Now a day's waste management is important issue for the smart city. The implementation of proper waste management is easy by using IOT. Things that are connected to the internet and those devices controlled by the internet are called as Internet of Things.Internet of Things (IOT) is still a vague term that refers to the network of physical, identifiable objects connected via the internet, which can sense and communicate with other devices.In present there was a rapid growth in the population which leads to large quantity of waste disposal in the cities.The proper management of waste has significant impact on the quality of life of citizens.We can take advantage of our study to solve the problems of waste management in various cities.It is critical to efficiently manage the waste disposed in every location of a smart cities not only focusing on the collection activities but also on its transport and recycling.The overflow of dustbin will create an unpleasant environment and it affects many people by spreading of various diseases.

In this system the smart bin is connected with the internet to display the exact information about the dustbin level and to which area is belong. The dustbins are properly managed and information is seen regularly and the municipality officers makes immediate response by intimating to truck driver. The truck driver will go immediately and collect the waste form the dustbin. Multiple dustbins can be connected to this system.The dustbins are integrated with ultrasonic sensor, RF module. The ultrasonic sensor is used to detect the level of waste in the dustbin. After detecting the level of dustbin the information is send to the RF Transmitter and received by the RF Receiver at the central system and Internet connection is enabled through the connection of Wi-Fi module. The data is received and processed in the cloud. This report will give the efficient way to keep the environment clean and green.

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II. RELATED WORK

In this Project smart trash system consists of two trash bins, one for dry waste and another one for wet waste. Both dustbins are consists of ultrasonic sensors for dust level measurement. The ultrasonic sensors are placed near the top of the Smart Trash Bin which senses the waste status being collected by the Smart Trash Bin. Whenever the Smart Trash Bin is filled up to the specified level, the sensors get activated and it generates a signal. The level of garbage will be depicted in terms of distance between the sensor and garbage in dustbin.A GSM module is used to communicate with authorized person when the bin is about to fill. Communication is done via text massage that contain bin ID and location address. Thus person can collect waste from informed address. GSM module can also be used for two way communication. It is used as a complaint number for people. If cleaning of waste bin is not properly done then people can raise the complaint on this number to municipal office.SIM800C is a popular GSM GPRS modem. It supports General Packet Radio Service (GPRS) for connecting to the Internet. This module has built-in TCP/IP stack that can be accessed serially with AT commands. It is suitable for SMS, Voice as well as DATA transfer application in M2M interface.The client first connects to the server and sends some data to server and the server also responses with some data in order to acknowledge for receiving the data.We have written all the AT commands in the program which are required for sending the SMS.

III. SYSTEM ARCHITECTURE

Arduino Mega 2560 :

Fig 1 ATMega 2560

The Arduino Mega is a microcontroller board based on the ATmega2560. It has 54 digital I/O pins (of which 14 can be used as PWM outputs), 16 analog inputs,4 UARTs,a 16MHz crystal oscillator,a USB connection,a power jack,an ICSP header and a reset button.

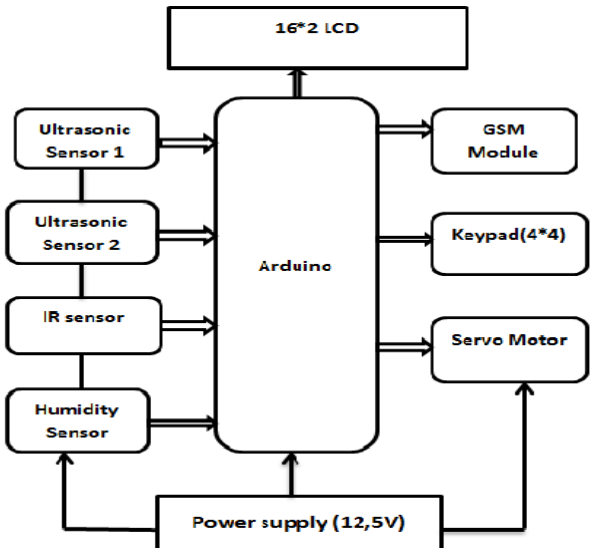

Fig2 Block Diagram of System

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IR Sensor :

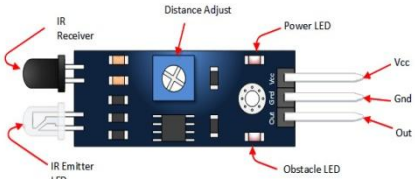

Fig 3 IR Sensor

An IR Sensor is an electronic instrument that is used to sense certain characteristics of its surrounding.It does this by either emitting or detecting infrared radiation. The IR sensor is a light-sensitive optoelectronic component with a spectral sensitivity in infrared wavelength range 850nm to 50um.

Ultrasonic Sensor :

Fig 4 Ultrasonic Sensor

This sensor is a high performance ultrasonic range finder. It is compact and measures an amazingly wide range from 2cm to 4m. This ranger is a perfect for any robotic application, or any other projects requiring accurate ranging information.

Humidity Sensor :

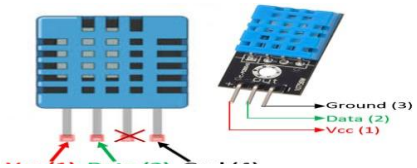

Fig 5 DHT11 Sensor

The DHT11 is a basic ultra low cost digital temperature and humidity sensor.It uses a capacitive humidity sensor and a thermistor to measure the surrounding air and spits out a digital signal on the data pin.The DHT11 calculates relative humidity by measuring the electrical resistance between two electrodes.The humidity sensing component of DHT11 is a moisture holding substrate with the electrodes applied to the surface.

Servo Motor :

Fig 6 Servo Motor

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Wire Number	Wire Colour	Description
1	Brown	Ground wire connected to the ground of system
2	Red	Powers the motor typically +5V is used
3	Orange	PWM signal is given in through this wire to drive the motor

GSM Module :

Fig 7 GSM Module

SIM800C is a complete Quad band GSM/GPRS solution in SMT type, which can be embedded in the customer application.SIM800C supports Quad band 850/900/1800/1900MHz, it can transmit Voice, SMS and data information with low power consumption.

Keypad :

Fig 8 Keypad

This 4X4 matrix keypad has 16 built in push button contacts connected to row and column lines. A microcontroller can scan these lines for a button pressed state. In the keypad library, the Propeller sets all the column lines to input and all the row lines to input.

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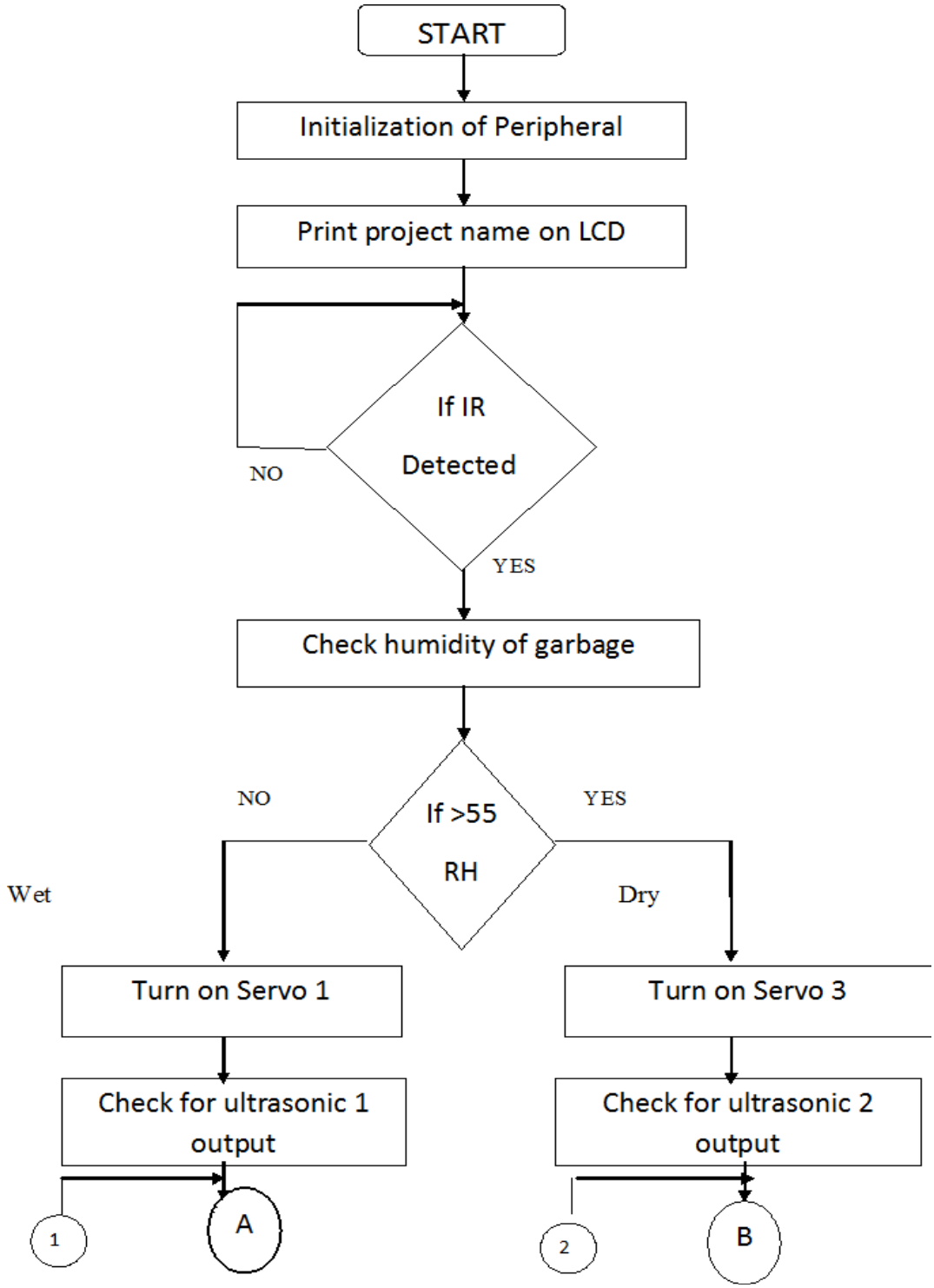
IV. PROPOSED ALGORITHM AND FLOWCHART

Flowchart:



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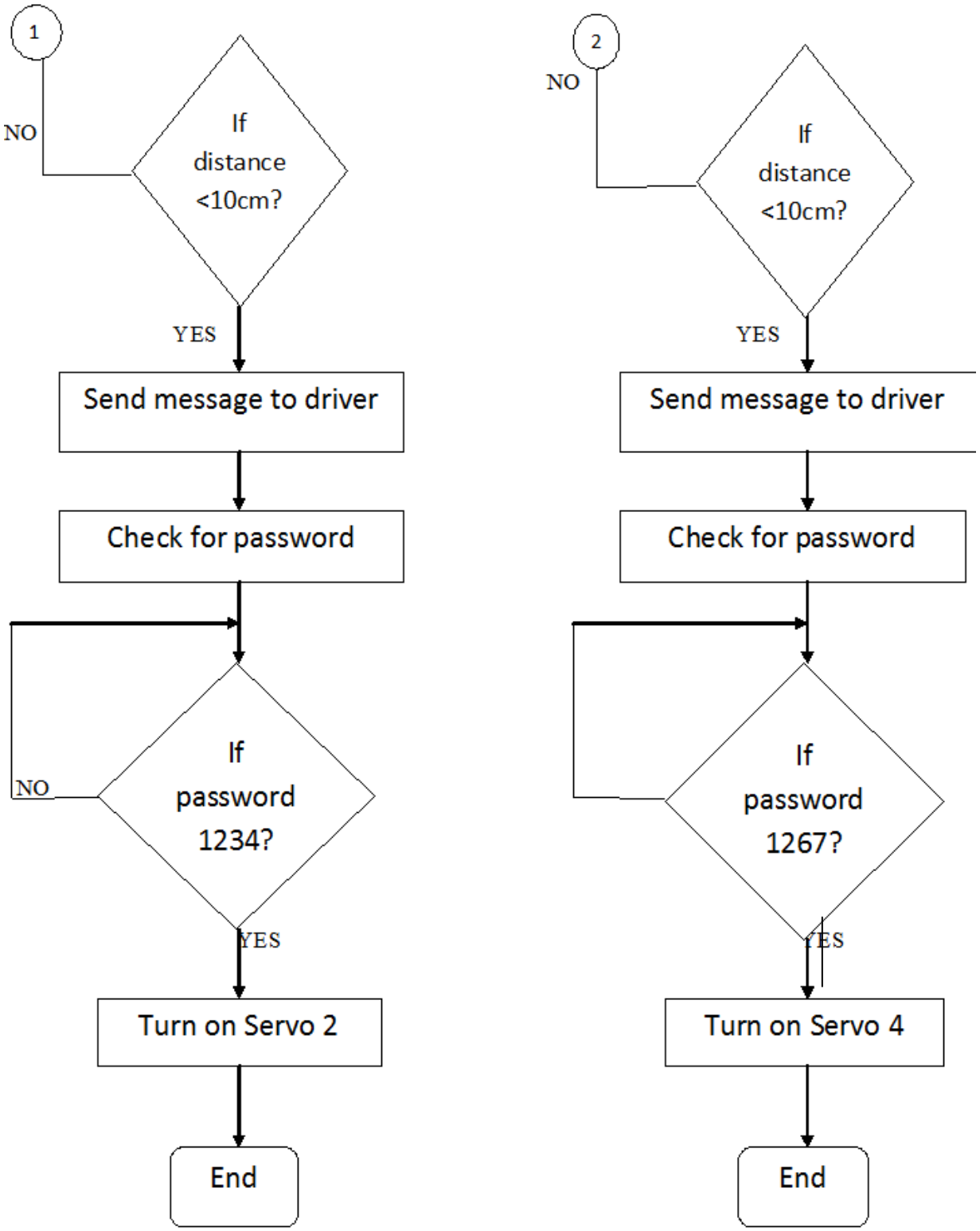

Algorithm :

1. Start
2. Initialize all the peripherals.
3. Print project name “Smart Waste Management” on LCD.
4. Check the status of IR sensor.
5. If IR sensor is detected then check the humidity of garbage which is dropped in inlet.

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6. If IR sensor is not detected then go to step 4
7. If humidity is greater than 55 RH, then it is dry garbage
8. Turn on servo motor 3
9. Check the status of ultrasonic sensor 2
10. If distance is less than 10 cm, send SMS to driver
11. Then if entered password is equal to "1267", then turn on servo motor 4.
12. If distance is not less than 10 cm, then go to step 9.
13. If humidity is less than 55 RH, then it is wet garbage
14. Turn on servo motor 1.
15. Check the status of ultrasonic sensor 1
16. If distance is less than 10 cm, send SMS to driver
17. Check for password.
18. If entered password is equal to "1234", then turn on servo motor 2

V. CONCLUSION

In this project, an integrated system of Ultrasonic Sensor, GSM Module is introduced for efficient and economic garbage collection. The developed system provides improved database for garbage collection time and waste amount at each location. By implementing this project we will avoid over flowing of garbage from the container in residential area which is previously either loaded manually or with the help of loaders in traditional trucks. It can automatically monitor the garbage level & send the information to collection truck. The technologies which are used in the proposed system are good enough to ensure the practical and perfect for solid garbage collection process monitoring and management for green environment.

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