

Smart Waste Management System

¹Pidishetty Vikramadithya, ²Prof. E.N.V. Purna Chanra Rao, ³Dr.Vandana Khare

¹P.G student, Dept. of ECE, CMRCET, Email: vikramadithya2012@gmail.com,

²Professor and the Head of the Dept. of ECE, CMRCET, Email: hodece@mrce.t.org,

³Professor, Dept. of ECE, CMRCET, Email: vandanakhare@mrce.t.org,

Hyderabad, Telangana, India.

1. ABSTRACT

The Internet of Things (IoT), true to form foundation for the imagined idea of Smart City, brings new conceivable outcomes for the city the board. IoT vision presents promising and practical answers for monstrous information assortment and its investigation which can be applied in numerous areas thus cause them to work all the more effectively. Typically there is one of the most testing issues - civil waste-assortment inside the Smart City. To advance the calculated technique of waste assortment. The displayed arrangement gives an estimation of increasingly proficient waste vehicle courses. As a yield, we give a lot of reenactments concentrated on the referenced territory. In the event that the dustbin it fills we get some caution through the Buzzer likewise send the SMS to an approved individual and if in a specific time if they don't react then we will cozy to the higher approved people/authority.

KEYWORDS: **THING** **SPEAK,**
ULTRASONIC **SENSOR,** **FILL**
NOTIFICATION

2. INTRODUCTION

The Smart City speaks to these days hotly debated issue as far as improving living conditions. Considering for the most part the circumstance in European Union, the EU national governments and furthermore privately owned businesses are contributing each year a lot of their financial limits to inquire about, development, and usage of the idea of Smart City. The Internet of Things (IoT) is at present considered as a fundamental correspondence foundation for brilliant urban communities, where machines convey consequently between one another. The greatest bit of leeway is the participation of a wide range of correspondence advances and gadgets inside one useful framework, where a major measure of data and information are shared and utilized in a safe and savvy way. A brilliant city is only a dream to coordinate a few data and correspondence innovation (ICT) alongside Internet-of-Things (IoT) in a route in order to deal with a city's benefits

. The city's benefits incorporate, among others, the nearby offices, data frameworks, libraries, schools, clinics, squander the board frameworks, transportation frameworks and so on. As of now, Indian urban areas oblige almost 31% of current populace and adds to 63% of GDP (Census 2014) . Urban zones are relied upon to house 40% of India's populace and contribute 75% of India's GDP by 2030. This requires complete advancement of foundations relating to social, prudent, physical, and institutional fields. All are significant in improving the personal satisfaction and pulling in individuals and speculation. Improvement of shrewd urban areas is a stage toward that path. In this paper, we talk about a brilliant system for improving the administration of squanders in urban areas. The proposed framework depends on the establishment of geographic data frameworks (GIS), and improvement calculations. It comprises of an IoT based model with sensors to quantify the waste volume in holders or wastebins, with office to transmit data over the Internet. The framework is recreated in for the city of Pune, utilizing Open Data. The reenactment covers a time of one month to display wastebin filling and waste assortment. The recreations are accomplished for playing out a proficiency examination of various ways

for assortment of squanders: Traditional technique and dynamic on-request arrangement, proposed work (wise) for a few cases. The impact of this work is a joined framework model for savvy squander assortment framework. The remainder of the paper is sorted out into the accompanying segments. Proposed work is shrouded in segment 2. Area 3 spreads reenactment and consequences of the proposed framework.

. 3. EXISTING SYSTEM

In the current framework, trash is gathered by the partnership by week after week once or by 2 days once. Despite the fact that the trash strikes and floods the trash container and spread over the streets and dirties nature which produces air contamination causes a few ailments.

4. PROPOSED SYSTEM

In this Proposed System comprises of a mechanical arrangement that isolates the waste and manages the loss in an alternate sort of box by utilizing automation. In this framework, we identify the dry and wet waste likewise and this sort of waste we separate via naturally. By having such a framework in various places everything is checked and constrained by brought together

hub utilizing IoT innovation and utilizing Thing speak cloud to store the information.

5. BLOCK DIAGRAM:

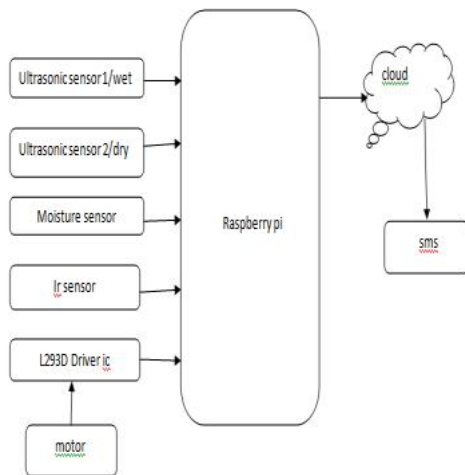


Fig 5.1 block diagram

6. HARDWARE TOOLS

- Raspberry Pi
- Ultrasonic sensor
- Moisture Sensor
- Ir sensor
- L293D DRIVER IC
- MOTOR

7. SOFTWARE TOOLS

- Raspbian Jessie OS
- Language: Python
- Thingspeak cloud

8. HARDWARE COMPONENTS

8.1 RASPBERRY PI

The Raspberry Pi establishment is chipping away at one more model of the famous Raspberry Pi sheets, as the Raspberry Pi 3 model B board. The new board looks fundamentally the same as Raspberry Pi 2 model B, however includes board Wi-Fi 802.11 b/g/n (2.4GHz just) and Bluetooth 4.0. How about we play "recognize the distinction" with Raspberry Pi 2 at the top and Raspberry Pi 3 under. We'll discover the Wi-Fi/BT chip reception apparatus on the upper left corner, and two through gaps on the privilege of the 40-stick connectors, likely the RUN header for reset that can be found on the RPi2 where the chip receiving wire is currently set on RPi 3. So the through gaps are not new, they've quite recently moved it. All connectors have precisely the same position between the two renditions. How about we look at the opposite side of the board.

8.2 IR SENSOR



Fig8.2.1 ir sensor

IR LED at 900nm-GaAlAs Infrared Light we chose to utilize flickering as we needed the gadget to be utilitarian for non-vocal or ventilated clients (blowing or sucking was another alternative). Our first idea and the one we executed, was to utilize a driven/photodiode pair to reflect light off the eye. We found that Optek Inc. makes a round recipient, comprising of a LED and a photo transistor mounted on a similar unit. This recognized a solid increment in signal after flickering. We were stressed over recognizing the distinction among typical and purposeful flickers, yet we found that for most clients the deliberate squints delivered an a lot more grounded sign, and they were in every case any longer the ~300ms ordinary flicker length

8.4 DC MOTOR



Fig 8.4.1 dc motor

DC motors are configured in many types and sizes, including brush less, servo, and gear motor types. A motor consists of a rotor and a permanent magnetic field stator. The magnetic field is maintained using either permanent magnets or electromagnetic windings. DC motors are most commonly used in variable speed and torque.

Motion and controls cover a wide range of components that in some way are used to generate and/or control motion. Areas within this category include bearings and bushings, clutches and brakes, controls and drives, drive components, encoders and resolves, Integrated motion control, limit switches, linear actuators, linear and rotary motion components, linear position sensing, motors (both AC and DC motors), orientation position sensing, pneumatics and pneumatic components, positioning stages, slides and guides, power transmission (mechanical), seals, slip rings, solenoids, springs.

Motors are the devices that provide the actual speed and torque in a drive system. This family includes AC motor types (single and multiphase motors, universal, servo motors, induction, synchronous, and gear motor) and DC

motors (brush less, servo motor, and gear motor) as well as linear, stepper and air motors, and motor contactors and starters.

8.5 L293D MOTOR DRIVER

L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors.

L293D contains two inbuilt H-bridge driver circuits. In its common mode of operation, two DC motors can be driven simultaneously, both in forward and reverse direction. The motor operations of two motors can be controlled by input logic at pins 2 & 7 and 10 & 15. Input logic 00 or 11 will stop the corresponding motor. Logic 01 and 10 will rotate it in clockwise and anticlockwise directions, respectively.

Enable pins 1 and 9 (corresponding to the two motors) must be high for motors to start operating. When an enable input is high, the associated driver gets enabled. As a result, the outputs become active and work in phase with their inputs. Similarly, when the enable input is low, that driver is disabled, and their outputs are off and in the high-impedance state.

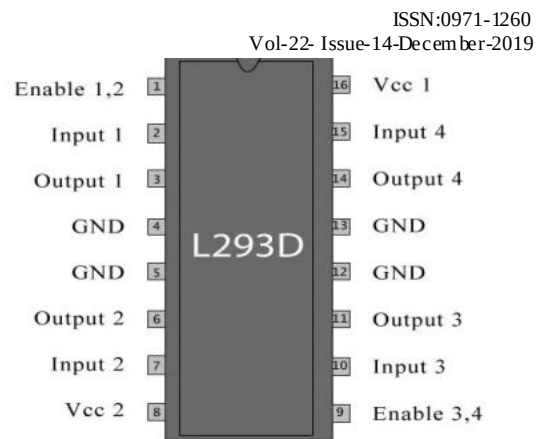


Fig 8.5.1: Pin Diagram:

8.4 ULTRASONIC SENSOR

Ultrasonic sensors are administrating the market by furnishing a financially savvy detecting technique with extraordinary properties not controlled by other detecting advances. By utilizing a wide assortment of ultrasonic transducers and a few distinctive recurrence goes, an ultrasonic sensor can be intended to take care of numerous application issues that are cost restrictive or just can't be tackled by different sensors.

Long range recognition: In mechanical detecting, an ever increasing number of uses require discovery over separation. Ultrasonic sensors recognize over long ranges up to forty feet, while limit switches and inductive sensors don't.

Expansive zone identification: While some photograph electric sensors can identify over

long separations they do not have the capacity to recognize over a wide region without utilizing countless sensors. The benefit of Migatron's ultrasonic sensors is that both wide and limited zones can be secured. Everything necessary is the best possible ultrasonic transducer choice. Amplest scope of target materials: Only ultrasonic sensors are impenetrable to target material piece. The objective material can be clear, strong, fluid, permeable, delicate, wood and any shading since all can be identified.

Non contact separation estimating Because sound can be planned from when it leaves the transducer to when it returns, separation estimating is simple and exact to .05% of range which likens to +or-.002 of an inch a ways off of 4 inches.

It is Migatron's proceeding with objective to give ultrasonic sensors in mechanically solidified bundles that are electrically and electronically perfect with standard controls utilized in the present modern commercial center

8.6 SOFTWARE TOOLS

This chapter introduces the devices and software which are used in this bachelor's thesis. The chapter also contains short

introduction to the Linux operating system which is used in this thesis.

Linux

Linux is a free open source operating system and it belongs to the Unix operating systems. Actually Linux means the kernel itself which is the heart of the operating system and handles the communication between the user and hardware. Normally Linux is used to refer to the whole Linux distribution. (Upton, E. & Halfacree, G. 2012, 28.)

Linux distribution is a collection of software based on the Linux Kernel. It consists of the GNU-project's components and applications. Because Linux is an open source project, anyone can modify and distribute it. That is the reason why there are many variations of Linux distributions. Most popular distributions are Ubuntu, Red Hat Linux, Debian GNU/Linux and SuSe Linux. (Kuutti, W. & Rantala, A. 2007, 2.)

Linux compared to Windows

When comparing Linux and Windows as operating systems, one of the major differences are that Linux is an open-source project and Windows is a closed-source project. In the closed-source project the users sees only the finished product but do not know how it has been done. In open-

source projects everything is made fully visible to the public. (Upton, E. & Halfacree, G. 2012, 13-14.)

In practice this can be seen in Linux's easy customization for different platforms. This process is called porting. There are several distributions ported to the Rasp-berry Pi's BCM2835 chip. One of the distributions is called Raspbian Wheezy. (Up-ton, E. & Halfacree, G. 2012, 14.)

Raspbian Wheezy

Raspbian Wheezy is a free operating system based on Debian distribution. It is created by a small team of developers who are fans of Raspberry Pi. Raspbian is optimized for the Raspberry Pi's hardware and it comes with over 35 000 packages and pre-compiled software. Raspbian is still under active development and it aims to improve the stability and performance of the Debian packages. (Raspbian [Ref. 15.2.2015])

Raspbian is officially recommended for beginners and it includes the graphical desktop environment called LXDE. Raspbian Wheezy is one of the fastest ways to setup and get the RasPi running. (McManus, S. & Cook, M. 2013, 20.)

Programming languages

There are considerable numbers of programming languages which have been adapted for Raspberry Pi. Python

programming language is recommended by The Raspberry Pi foundation especially for the beginners. Basically any programming language which can be compiled for ARMv6 can run on the Raspberry Pi. Therefore the users are not restricted to use only the Python. On the Raspberry Pi there are

8.7 RESULTS:



Fig :8.7.1 bin one status



Fig: 8.7.1 bin two status

8.8CONCLUSION

The article introduced the upcoming IoT infrastructure for smart cities and put it in the context of municipal waste management. Given overview showed that it is not yet enough discussed the possibility of using genetic algorithms as an optimization method for waste collection. This system result is based on the idea of IoT infrastructure, which should provide enough information to handle this Smart City issue more efficiently.

FUTURE SCOPE

The authors are continuously working to upgrade the Smart dustbin so as to address a wide number of current shortcomings. The problems of foul odour and manual controlled mobility calls for the future scope which includes the odour control mechanism to get rid of foul smell of organic garbage. Also, realising the requirement of an autonomous dustbin, GPS module can be implemented for path planning combined with ultrasonic sensor for obstacle avoidance.

REFERENCES

[1] J. Sreenivasan, M. Govindan, M. Chinnasami, and I. Kadiresu, "Solid Waste Management in Malaysia – A Move Towards Sustainability," *Waste Manag. An Integr. Visions*, vol. 2005, no. April 2005, pp. 55–70, 2012.

[2] M. Adam, M. E. Okasha, O. M. Tawfeeq, M. A. Margan and B. Nasreldeen, "Waste Management System Using IoT," 2018 International Conference on Computer, Control, Electrical, and Electronics Engineering (ICCCEEE), Khartoum, 2018, pp. 1-4

[3] S. Aleyadeh and A. M. Taha, "An IoT-Based Architecture for Waste Management," 2018 IEEE International Conference on Communications Workshops (ICC Workshops), Kansas City, MO, 2018, pp. 1-4.

[4] G. K. Shyam, S. S. Manvi and P. Bharti, "Smart waste management using Internet-of-Things (IoT)," 2017 2nd International Conference on Computing and Communications Technologies (ICCT), Chennai, India, 2017, pp. 199-203.

[5] W. Chen, Y. Wang, P. Huang, Y. Huang and M. Tsai, "A Smart IoT System for Waste Management," 2018 1st International Cognitive Cities Conference (IC3), Okinawa, 2018, pp. 202-203.

[6] S. S. Chaudhari and V. Y. Bhole, "Solid Waste Collection as a Service using IoT-Solution for Smart Cities," 2018 International Conference on Smart City and Emerging Technology (ICSCET), Mumbai, 2018, pp. 1-5.

[7] E. Al-Masri, I. Diabate, R. Jain, M. H. Lam and S. Reddy Nathala, "Recycle.io: An IoT-Enabled Framework for Urban Waste Management," 2018 IEEE International Conference on BigData (Big Data), Seattle, WA, USA, 2018, pp. 5285-5287

[8] S. Paul, S. Banerjee and S. Biswas, "Smart Garbage Monitoring

Using IoT," 2018 IEEE 9th Annual Information Technology, Electronics and Mobile Communication Conference (IEMCON), Vancouver, BC, 2018, pp. 1181-1185.

[9] H. N. Saha, S. Gon, A. Nayak, S. kundu and S. Moitra, "IoT Based Garbage Monitoring and Clearance Alert System," 2018 IEEE 9th Annual Information Technology, Electronics and Mobile Communication Conference (IEMCON), Vancouver, BC, 2018, pp. 204-208.

[10] S. K. Memon, F. Karim Shaikh, N. A. Mahoto and A. Aziz Memon, "IoT based smart garbage monitoring & collection system using WeMos & Ultrasonic sensors," 2019 2nd International Conference on Computing, Mathematics and Engineering Technologies (iCoMET), Sukkur, Pakistan, 2019, pp. 1-6.

[11] R. N. Subrahmanian, S. K. S, T. Suvidharbabu, and B. Manikandan, "Smart Bin using IoT with Fog Computing," International Journal of Emerging Technology in Computer Science & Electronics vol. 24, no. 6, pp. 13–16, 2017.

[12] S. Murugaanandam, V. Ganapathy and R. Balaji, "Efficient IOT Based Smart Bin for Clean Environment," 2018 International Conference on Communication and Signal Processing (ICCS), Chennai, 2018, pp. 0715-0720.

[13] N. Alsou, M. A. Samad, M. Alhashem and A. S. A. Abuabed, "Developing a Self-Powered Enlarging Smart Waste Bin," 2018 14th International Wireless Communications & Mobile Computing Conference (IWCMC), Limassol, 2018, pp. 683-689.

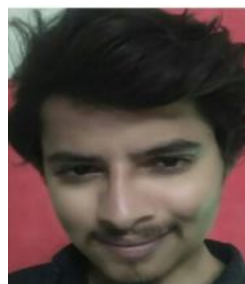
[14] S. Mdukaza, B. Isong, N. Dladlu and A. M. Abu-Mahfouz, "Analysis of IoT-Enabled Solutions in Smart Waste Management," IECON 2018 - 44th Annual Conference of the IEEE Industrial Electronics Society, Washington, DC, 2018, pp. 4639-4644.

[15] D. Evans, "The Internet of Things How the Next Evolution of the Internet" Cisco Internet Business Solutions Group (IBSG) no. April, 2011.

http://www.cisco.com/web/about/ac79/docs/innov/IoT_IBSG_0411

FINAL.pdf
54

Author Profile:



Mr. PIDISHETTY VKRAMADITHYA received his B.Tech degree in 2014 from Vishwa Bharathi Institute of Technology and Sciences, Telangana, India. He is currently working toward Post Graduation degree in the Department of Electronics and Communication Engineering in CMR College Of Engineering & Technology, TS, India. His research interest is in Embedded Systems.

Author Profile:



PROF. E.N.V. PURNA CHANDRA RAO

is currently working as the Professor and the Head of the Department of ECE at CMR College of Engineering and Technology and has completed AMIE with Electronics and Communication Engineering from The Institution of Engineers (India), Calcutta, M.Tech with Digital Systems and Computer Electronics from College of Engineering, Jawaharlal Nehru Technical University, Anantapur, Andhra Pradesh, Pursuing his PhD from JNTUH, Hyderabad. He has a vast experience in teaching and technical research of 20 years.

Author Profile:



Dr. VANDANA KHARE is presently working as a Professor at CMRCET, Hyderabad. She has received PhD (Wireless Communication) from JNTU Hyderabad. She has more than 21 years of experience in the field of teaching. Her contributions include around 45 research papers in journals & Conferences of national/international repute. Her areas of interest include Multimedia systems, Communications & Biomedical signal

processing. She is a senior member of ISTE, IETE & IEEE technical societies