iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 9 **Issue:** VII **Month of publication:** July 2021

DOI: https://doi.org/10.22214/ijraset.2021.36399

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue VII July 2021- Available at www.ijraset.com

Automatic Waste Collection & Segregation

Rehan Shaikh[1], M A Patil[2], Uttpalkant Rai[3], Nitesh Banawali[4], Venkatesh K.[5]
[1, 2, 3, 4, 5]*Dr. D.Y. Patil School of Engineering & Technology*

Abstract: ***Rapidly growing urbanization and increasing population in all over the world, causing dynamic increase in the amount of waste disposal. Dumping of waste has become a matter of concern all over the world because of the threat to the environment. There comes the pivotal role of the automatic waste segregation system which avoid this unfortunate situation and it also reduces the difficulty of recycling. Currently there is no such system for segregation of metal, dry, and wet waste. This work proposes a On spot automatic waste segregation system that gives the solution to this problem. The benefits of this work are, high potential for waste recovery and the occupational hazards of waste separating workers also reduces.***
Keywords: Automatic waste collection & segregation, Arduino UNO, Moisture sensor, Proxy sensor, Servo motor.

I. INTRODUCTION

The economic value of the waste generated is not realized unless it is recycled completely. When the waste is segregated into basic streams such as wet, dry and metallic, the waste has a higher potential of recovery, and consequently, recycled and reused. The wet waste fraction is often converted either into compost or methane gas or both. The metallic waste could be reused or recycled. Even though there are large scale industrial waste segregators present, it is always much better to segregate the waste at the source itself. The benefits of doing so are that a higher quality of the material is retained for recycling which means that more value could be recovered from the waste. The occupational hazard for waste workers is reduced. Also, the segregated waste could be directly sent to the recycling and processing plant instead of sending it to the segregation plant then to the recycling plant. The purpose of this project is the realization of a compact, low cost and user- friendly segregation system for urban households to streamline the waste management process.

One possible solution for this problem could be segregating the waste at the disposal level itself. We have thus come up with an Automatic waste segregator that categorizes the waste as wet, dry or metal. An 8051 microcontroller forms the heart of the system. Inductive proximity sensor is used to detect if the waste is a metal. Wet and dry waste can be distinguished based on their weight. A high speed blower system is used to blow dry waste off the belt while most of the wet waste remains. It then falls off as the belt rotates and is collected later. This cost effective system is particularly suitable for installation in apartments and colonies. It is now time to give back to Mother Nature. Therefore to set the ball rolling, we have proposed this project to give back to our nation, making our India a 'SwachhBharath'. Ready to convert trash to cash?

II. PROBLEM STATEMENT

Rapid increase in volume and types of solid and hazardous waste due to continuous economic growth, urbanization and industrialization, is becoming a burgeoning problem for national and local governments to ensure effective and sustainable management of waste. It is estimated that in 2006 the total amount of municipal solid waste generated globally reached 2.02 billion tones, representing a 7% annual increase since 2003 (Global Waste Management Market Report 2007). The segregation, handling, transport, and disposal of waste needs to be properly managed to minimize the risk to the health and safety of patients, the public, and the environment.

III. EXISTING SYSTEM

In existing system, there is sole risk to notice the various types of wastage. Then, we will divide the waste from the dustbins. Manual systems in which employees clear the dumpsters periodically.

A. No systematic approach towards clearing the dumpsters.
B. Unclear about the status of a particular location
C. Employees are unaware of the need for a particular location
D. Very less effective in cleaning city.

The outcome showed that the sensing system with the algorithm is efficient and intelligent and can be simply used to automate any solid waste bin management process.

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue VII July 2021- Available at www.ijraset.com

IV.PROPOSED SYSTEM

The whole system is controlled by an Arduino Uno board. All other parts like ultrasonic sensors, inductive proximity sensor, DC motors, blower and electromagnet are interfacedto the Arduino board.

A. Arduino UNO

The Arduino Uno is a microcontroller board is dependent on the ATmega328 (datasheet). The microcontroller in Arduino is Microchip ATmega328P and the Operating Voltage is 5 volts. The Input Voltage range from 7 to 20 Volts and the Digital I/O Pins are 14 of which 6 provide PWM output. The analog Input Pins are 6,and DC Current per I/O Pin is 20 mA. Direct Current for 3.3V Pin is 50 mA. .The main part is the flash Memory contains 32 KB of which 0.5 KB used by bootloader SRAM for this Arduino has 2 KB and EEPROM of 1 KB with a Clock Speed of 16 MHz .The Length of the Arduino is 68.6 mm With the Width of 53.4 mm having the weight of 25 g . It contains everything expected to assist the microcontroller; essentially associate it to a laptop with a USB link or power it with associate degree AC-to-DC instrumentality or battery to start. The Uno varies from each single going before board in that it doesn't utilize the FTDI USB-to-sequential driver chip. Rather, it includes the Atmega16U2 (Atmega8U2 up to make R2) modified as a USB-to-sequential device.

Fig 1 - Arduino UNO

B. Moisture Sensor

Moisture sensors measure the volumetric water content in soil. Since the direct gravimetric measurement of free soil moisture requires removing, drying, and weighing of a sample, soil moisture sensors measure the volumetric water content indirectly by using some other property of the soil, such as electrical resistance, dielectric constant, or interaction with neutrons, as a proxy for the moisture content.

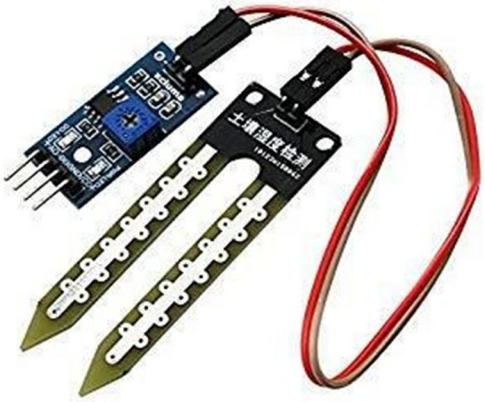


Fig 2 - Moisture Sensor

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue VII July 2021- Available at www.ijraset.com

C. Relay

DPDT stands for double pole double throw relay. Relay is an electromagnetic device used to separate two circuits electrically and connect them magnetically.

DPDT relay can be used to power wither one device/appliance or another. While SPDT relay can only switch the output circuit between on and off states; a DPDT relay can also be used to change the polarity at the terminals of a device connected at output.

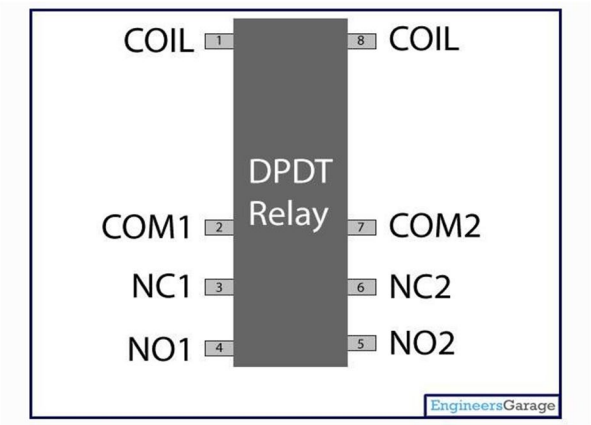


Fig 3 - Relay

D. Liquid Crystal Display

LCD can also used in a project to check the output of different modules interfaced with the microcontroller. Thus LCD plays a vital role in a project to see the output and to debug the system module wise in case of system failure in order to rectify the problem.

1) LCD has 2 Power Sources
2) 1. VCC and GND are at 1 and 2 NO. Pins of LCD. Used to drive the LCD 3mA current consumption.
3) 2. VCC and GND is at 15 and 16 NO. pins of LCD used to drive the backlight of LCD 100 mA current
4) Total current consumption = 3mA +100mA = 103 Ma

Pin No.	**Symbol**	**Function**
1	GND	GROUND
2	VCC	+ 5 V
3	CONTRAST	GND
4	E	ENABLE
5	RS	REGISTE R SELECT
6	R/W	READ WRITE
7	DB0	DATA LINE
8	DB1	DATA LINE
9	DB2	DATA LINE
10	DB3	DATA LINE
11	DB4	DATA LINE
12	DB5	DATA LINE
13	DB6	DATA LINE
14	DB7	DATA LINE
15	VCC	+ 5 V
16	GND	GND

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue VII July 2021- Available at www.ijraset.com

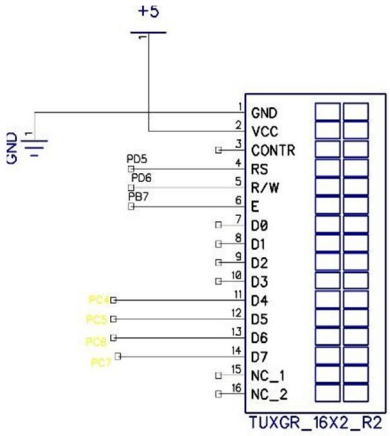


Fig 4 - LCD Pins

E. Power Supply

The basic step in the designing of any system is to design the power supply required for that system. The steps involved in the designing of the power supply are as follows,

1) Determine the total current that the system sinks from the supply.

2) Determine the voltage rating required for the different components.

a) The bridge rectifier and capacitor i/p filter produce an unregulated DC voltage which is applied at the I/P of 7805.

b) The minimum dropout voltage is 2v for IC 7805, the voltage applied at the input terminal should be at least 7 volts.

c) Assuming the drop out voltage to be 2 volts, the minimum DV voltage across the capacitor C1 should be equal to 7volts (at least).

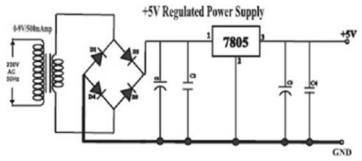


Fig 5 - Power Supply

F. Servo Motor

The servo motor is assembly of 4 things: A traditional DC motor, a gear reduction unit, a position-sensing devices and a bearing circuit. The DC motor is connected with a gear mechanism which provides feedback to a position sensor which is mostly a potentiometer. From the gear box, the output of the motor is delivered via servo spine to the servo arm.

Fig 6 - Servo Motor

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue VII July 2021- Available at www.ijraset.com

G. Software Arduino IDE 1.6.13

The Arduino integrated development environment (IDE) is a cross- stage application (for Windows, macOS, Linux) that is written in the programming language Java. It is utilized to compose and transfer programs to Arduino compatible boards, yet in addition, with the assistance of outsider centres, other seller advancement sheets.

The primary code, otherwise called a sketch, made on the IDE platform will eventually produce a Hex File which is then moved and transferred in the controller on the board.

The IDE condition for the most part contains two essential parts: Editor and Compiler where previous is utilized

For composing the required code and later is utilized for assembling and transferring the code into the given Arduino Module.

Fig 7 -Software 1.6.13

V. RESULT

The proposed system “automatic waste segregator and monitoring system” sorts wastes into three different categories, namely metal, plastic and the wet (organic) waste. Wet waste refers to organic waste such as vegetable peels, left-over food etc. Separating our waste is essential as the amount of waste being generated today causes immense problem. Here, we have tested the household wastes which are generated in every home today and we have come up with the following result.

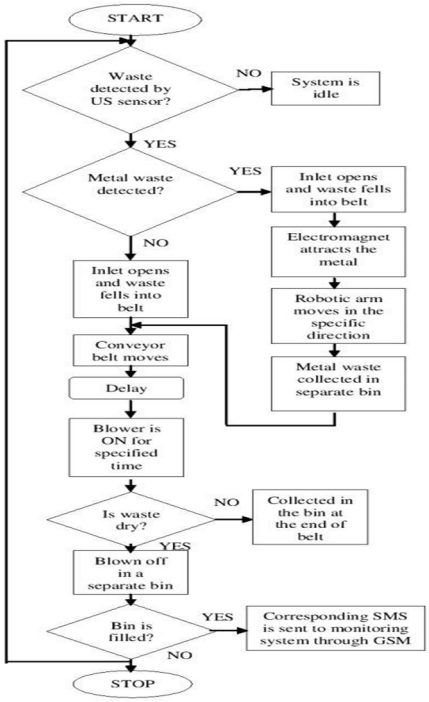


Fig 8 - Software Implementation

The advantages of automatic waste segregator and monitoring system arelisted below: Sorting of waste at the primary stage will make the waste management more effective and fruitful.

1) The dustbins are cleared as and when they are filled, thus giving way to a cleaner environment.
2) Eco friendly system.
3) Lower initial investment including lower cost of installation.

VI. CONCLUSION

In this paper we have described automatic waste collection & segregation we have shown the implementation and application of the above system. Using this system we can collect as well as segregate the garbage without human intervention. This system also helps service providers to automate customer invoices, enhance cost savings and improve security.

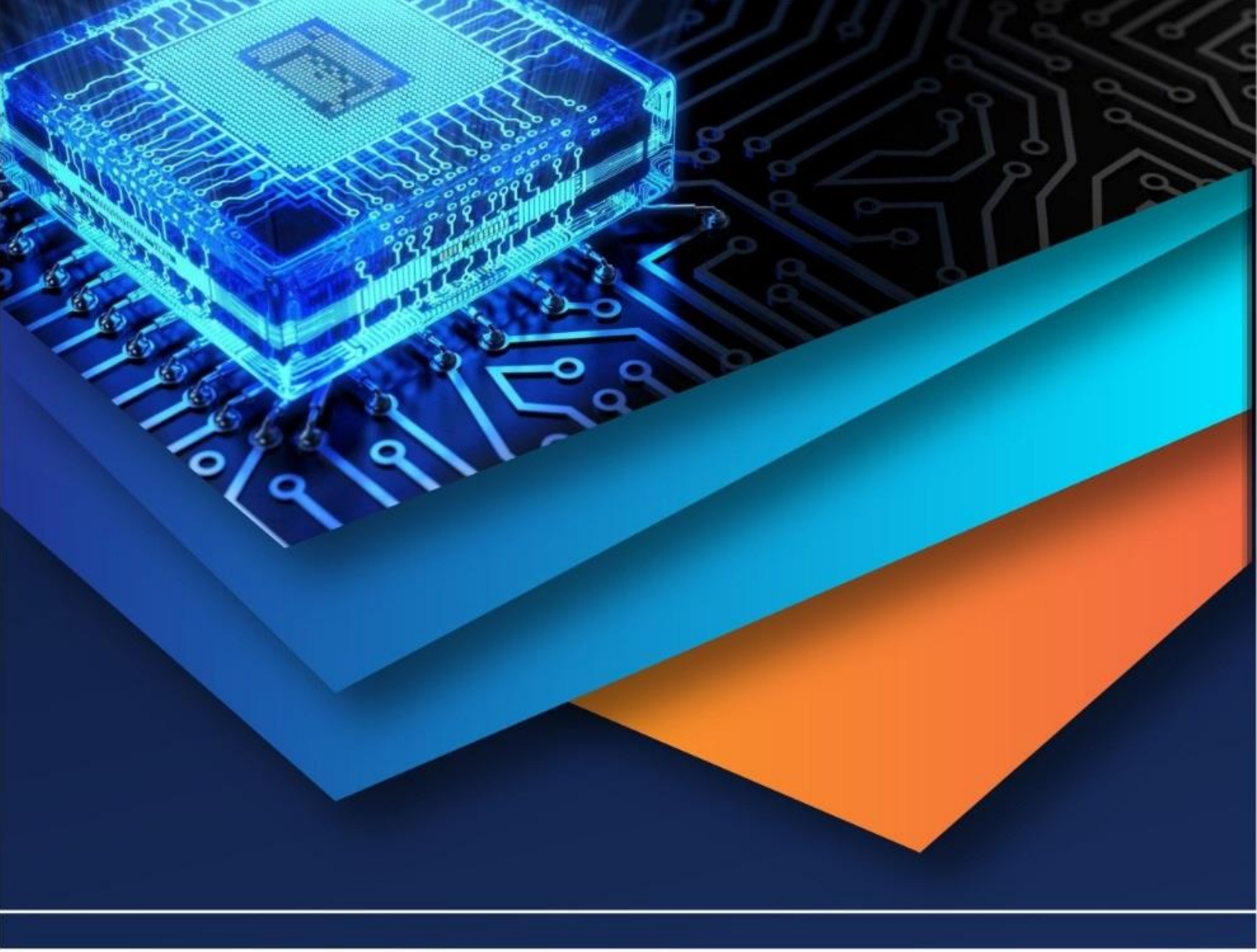
VII.FUTURE SCOPE

Inlet section can be incorporated with a crusher mechanism to reduce the size of the incoming waste.

A. Inlet section can also be integrated with a blower mechanism to dehumidify the waste input in the system.
B. Provisions can be made for on spot decomposition of wet waste.
C. GSM contraption to intimate to the nearest industry to use the metals collected.

REFERENCES

[1] Bajaj JS. Urban Solid Waste Management in India. New Delhi: Planning Commission Government of India; 1995.
[2] Daniel Hoornweg, et al. What a Waste: A Global Review of Solid Waste Management. Washington, DC: Urban Development & Local Government Unit World Bank, No.15; Mar 2012.
[3] Shuchi Gupta, Krishna Mohan, Raj Kumar Prasad, et al. Solid Waste Management In India: Options and Opportunities. In Resource, Conservation and Opportunities. Nov 1996; 24(2): 137p.
[4] Pushpa MK, et al. Microcontroller Based Automatic Waste Segregator. International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering (IJIREEICE). May 2015;3(5).
[5] Nishigandha Kothari. Waste to Wealth. New Delhi: NSWAI; Jul 2013.
[6] Sakai S, Sawell SE, Chandler AJ. World Trends in Municipal Solid Waste Management. Environmental Preservation Centre, Kyoto University, Japan. 1996; 16: 341p.
[7] Claudine Capel. Innovations in Waste. Waste Management World. Mar 2010; 11(2). 8. Claudine Capel. Waste Sorting: A Look at the Separation and Sorting Techniques in Today's European Market. Waste Management-World. Jul 2008; 9(4).



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY