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Garbage Segregation and Monitoring system

Prof. Nitin Ahire[1], Ashwini .B. Kadam[2], Utkarsha .U. Khannukar[3]

[1]Professor, Dept. of Electronics and Telecommunication Engineering, Xavier Institute of Engineering, Maharashtra, India
[2,3]Final Year UG Student , Dept. of Electronics and Telecommunication Engineering, Xavier Institute of Engineering, Maharashtra , India

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Abstract : *This paper proposes an automatic waste segregate (AWS) which is a cheap, easy to use solution for a segregation system at households, so that the wastes can be sent directly for processing. Automatic waste segregate is designed to sort the waste into two main categories namely; dry, and wet thereby making the waste management more effective. Ultrasonic sensors are added for monitoring waste collection process. The sensors would be placed in all the garbage bins. When the garbage reaches the level of the sensor, then the indication will be given to a micro controller.*

Key Words: (Size 10 & Bold) Key word1, Key word2, Key word3, etc (Minimum 5 to 8 key words)…

1. INTRODUCTION:

This work is concerned with the issues of Municipal solid waste management in India with Emphasis on problems related to disposed by landfills. Open uncontrolled dumping is still the most common method of solid waste disposal in developing countries. Although the environmental consequences are often quite evident, the problem is seldom dealt with. Reasons for not dealing with the problem are low political priority, inadequate solutions for operating and managing a landfill/dump. Human activities create waste and this is the way this waste can handled, stored collected and disposed of. The benefit of doing this is that the occupational hazard for waste workers is reduced, also the separated waste could be directly sent to the recycling instead of sending it to the segregation plant then to the recycling plant. Which can pose risks to the environment and to public health. In urban areas, especially in the rapid urbanizing cities of the developing world, problems and issues of solid waste management (SWM) are of immediate importance.

2. LITERATURE SURVEY:

[1] "Design and development of smart waste subsystem" by "Ravena singh"

The author suggested that solid waste management is the pervasive problem now days. Solid waste can be categorized into two different types; biodegradable and nonbiodegradable waste.

[2]" Smart bin implementation for smart cities" (International Journal of Scientific & Engineering Research) by "Narayan sharma, Nirman singha." (April 2015)

The author describes that the application of smart bin in the managing of the waste collection system of an entire city.

[3] "Automatic waste segregation system" (National Conference on Communication and Image processing) by "Amruta chandramohanet" (April 2017)

It describes an India about an automatic waste segregating system which is chip and easy to used, solution for segregating the waste at household level.

[4] "Smart dustbin" (International Journal for Research in Applied Science & Engineering Technology) by "Twinkle singha, K Mukesh kumar" (April 2018)

It suggested that smart bin is built on microcontroller-based platform; waste management has been a crucial issue to be considering this paper is way to achieve good cost.

[5] "Microcontroller based automatic segregator" (International Journal of innovative Reasearch in Electronic and control engineering) by "M.K.Pushpa, Ayushi gupta". (May2015)

Author describes the idea about the waste segregate which segregates waste into 3 major categories, dry, wet and metal by using conveyor belt.

[6] "Garbage bin monitoring system for dry waste." (IRJET) by "Shabana sultana, Akshatha, Apeksha Kotian." (April 2017)

The framework guarantees the cleaning of dustbins soon when the refuse level achieves its greatest.

3. FOR HOUSEHOLD:

3.1 INTRODUCTION:

For household purpose, we are implementing one dustbin which is being used to segregate waste in dry and wet categories. We are using various types of sensors like IR sensor, ultrasonic sensor, and moisture sensor.

3.2 BLOCK DIAGRAM:

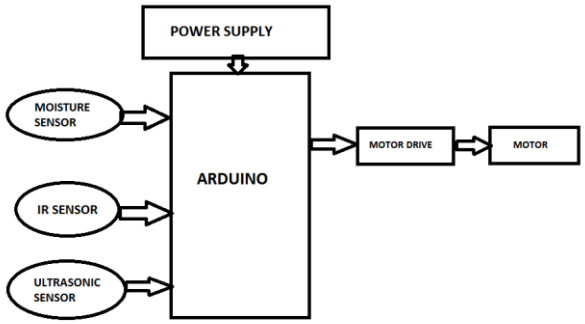


Fig 1- Block diagram for household

3.3 Working:

As shown in fig 1, we are designing power supply which will supply the power to Arduino nano and motor drivers. As they required different power. Here moisture sensor is used to sense the moisture present in the waste. IR sensor will detect object which is place over the plate of dustbin. And the ultrasonic sensor is used to detect the level. If the dustbin is full the buzzer will buzz for some time.

Motor drivers are used to drive the motor which will connected to the plate and after detecting the category of waste by these various sensors, it will flip to the defined side. Here motor is designed for 4 state as one for flip to clockwise and then return to original position and another two for anticlockwise and original position.

3.4 SENSORS:

3.4.1 MOISTURE SENSOR:

Fig 2- moisture sensor

3.4.1.2 WORKING:

Moisture sensors typically refer to sensors that estimate volumetric water content. Another class of sensors measure another property of moisture in object called water potential; these sensors are usually referred to as water potential sensors and include tensiometers and gypsum blocks.

The **Moisture Sensor** uses capacitance to measure dielectric permittivity of the surrounding medium. The **sensor** creates a voltage proportional to the dielectric permittivity, and therefore the water content of the object.

3.4.2 IR SENSOR:

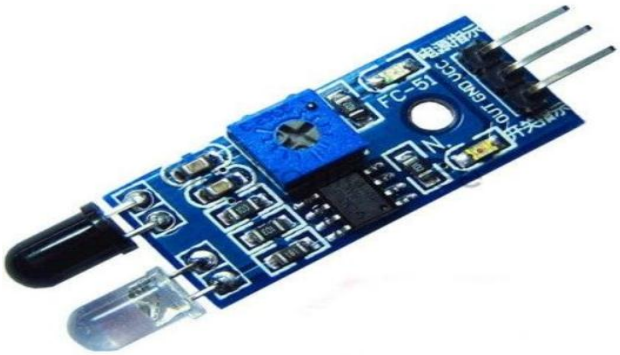


Fig 3- IR SENSOR

3.4.2.2 WORKING:

The principle of an IR sensor working as an Object Detection Sensor. An IR sensor consists of an IR LED and an IR Photodiode; together they are called as Photo – Coupler or Opto – Coupler.

When the IR transmitter emits radiation, it reaches the object and some of the radiation reflects back to the IR receiver. Based on the intensity of the reception by the IR receiver, the output of the sensor is defined.

3.4.3 ULTRASONIC SENSOR:

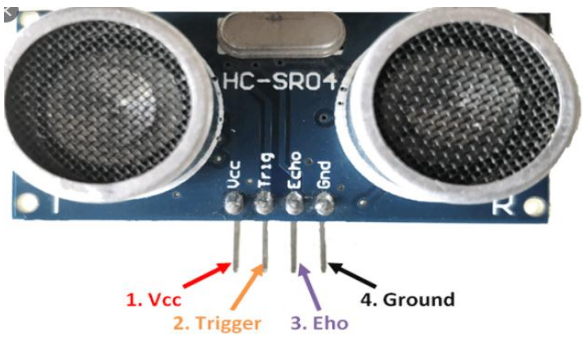


Fig 4- Ultrasonic sensor

3.4.3.2 WORKING:

As the name indicates, ultrasonic sensors measure distance by using ultrasonic waves. The sensor head emits an ultrasonic wave and receives the wave reflected back from the target. Ultrasonic sensor measures the distance to the target by measuring the time between the emission and reception.

An ultrasonic sensor uses a single ultrasonic element for both emission and reception. In a reflective model ultrasonic sensor, a single oscillator emits and receives ultrasonic waves alternately. This enables miniaturization of the sensor head.

3.5 ARDUINO NANO:

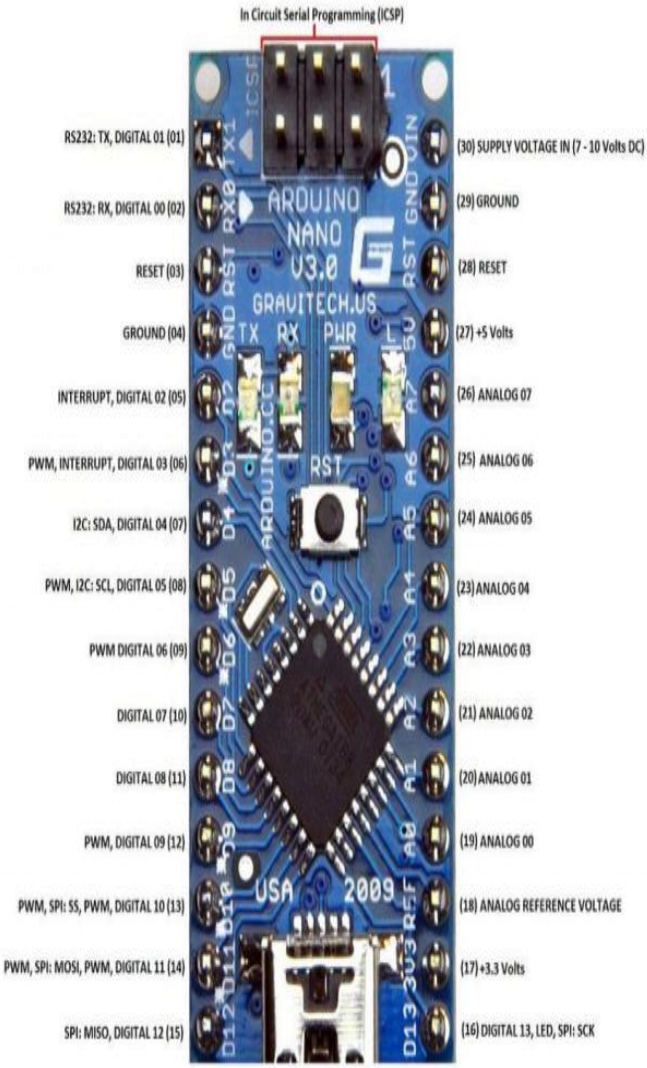


FIG 5- ARDUINO NANO

3.5.1 WORKING:

Arduino Nano is a microcontroller board designed by Arduino.cc. The microcontroller used in the Arduino Nano is Atmega328, the same one as used in Arduino UNO. It has a wide range of applications and is a major microcontroller board because of its small size and flexibility

Basic features of Arduino nano:

- It has 22 input/output pins in total.
- 14 of these pins are digital pins.
- Arduino Nano has 8 analogue pins.
- It has 6 PWM pins among the digital pins.
- It has a crystal oscillator of 16MHz.
- It's operating voltage varies from 5V to 12V.
- It also supports different ways of communication, which are:
    - Serial Protocol.
    - I2C Protocol.
    - SPI Protocol.
- It also has a mini USB Pin which is used to upload code.

4. FOR ROADWAYS:

4.1 INTRODUCTION:

For roadways purpose, we are implementing two dustbins which are being used to segregate waste by color coded bags. In this section, color sensor is the most important sensor is being. And same as for household ultrasonic sensor and motor drivers are being used.

4.2 BLOCK DIAGRAM:

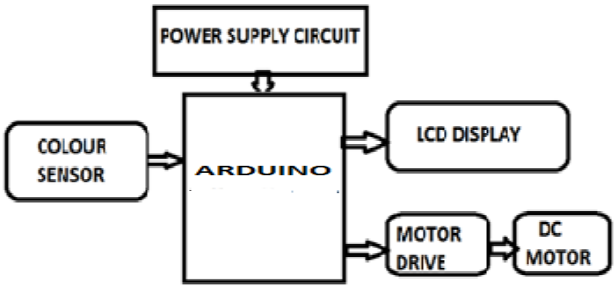


FIG 6- BLOCK DIAGRAM FOR ROADWAYS

4.3 WORKING:

In this section we are going to implement two dustbins for segregation with the help of color sensor.

We are programming this sensor as it will sense two color that is red and green. We are using LCD display at the output side which will display the color sense by the sensor. Also motor drivers are there only to open the flap of the dustbin. Here we are using motor for two states only one for open and closed as we are using dustbins separately.

4.4 SENSOR:

4.4.1 COLOR SENSOR:

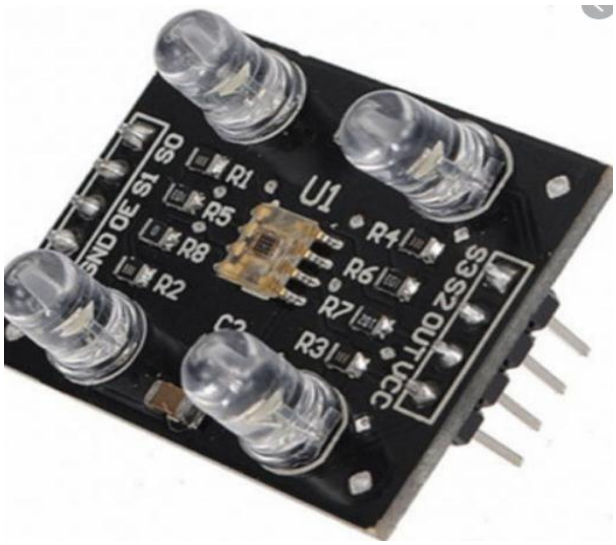


FIG 7- COLOR SENSOR (RGB)

4.4.1.2 WORKING:

TCS3200 Color Sensor is a complete color detector, including a TAOS TCS3200 RGB sensor chip and 4 white LEDs. The TCS3200 can detect and measure a nearly limitless range of visible colors. Applications include test strip reading, sorting by color, ambient light sensing and calibration and color matching, to name just a few.

The TCS3200 has an array of photodetectors, each with either a red, green, or blue filter, or no filter (clear). The filters of each color are distributed evenly throughout the array to eliminate location bias among the colors. Internal to the device is an oscillator which produces a square-wave output whose frequency is proportional to the intensity of the chosen color.

4.5 LCD DISPLAY:

FIG 8- LCD DISPLAY

4.5.2 FEATURES:

- Operating Voltage is 4.7v to 5.3v.
- Current consumption is 1mA without backlight.
- Alphanumeric LCD display module, meaning can display alphabets and numbers.
- Consists of two rows and each row can print 16 character.
- Each character is build by a 5x8 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.

4.6 MOTOR AND MOTOR DRIVERS:

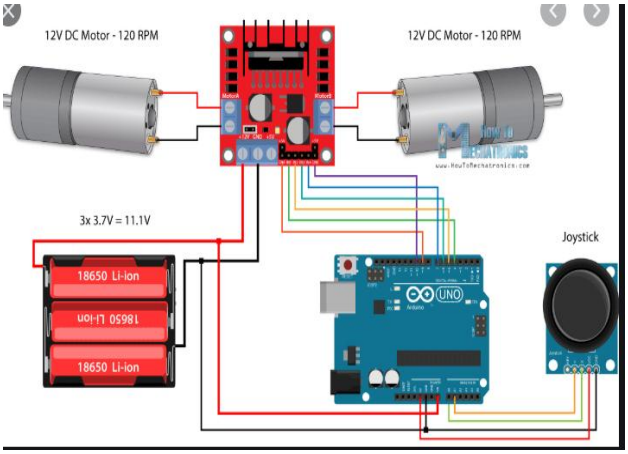


FIG 9- MOTOR AND DRIVERS

4.6.2 WORKING:

The DC motor drive is a type of amplifier or power modulator that integrate between the

controller and a DC motor. It takes the low current and then converts it into a high current which is appropriate for the motor. The DC motor drive also provides the high current torque, 400 % more than the rated continuous torque. The important applications of DC motor drives are rolling mills, paper mills, mine winders, hoists, machine tools, traction, printing presses, textile mills, excavators and crane.

5. POWER SUPPLY:

It has following parts:

1. TRANSFORMER:

It converts alternating current from one value to other vale of voltage with a limited loss of power. Step-up transformers have more winding towards the secondary section compared to primary section. This in turn increases the value of voltage. Step-down transformers have less winding towards the secondary section compared to that with the primary section. This in turn decreases the value of voltage. The step-down transformer is used commonly in power supplies to reduce the high risk associated with high voltage to considerably low voltage. The transformer has two coils namely primary coil and secondary coil. Between these two coils there is no electrical connection rather they are connected by the alternating magnetic field. This field is created by using soft-iron core of the transformer.

2. BRIDGE RECTIFIER:

An electric device which periodically reverses the direction that is from alternating current to direct current is rectifier. The output voltage from transformer is given as input to bridge rectifier. That converts alternating current into direct current which is pulsating.

3. FILTER:

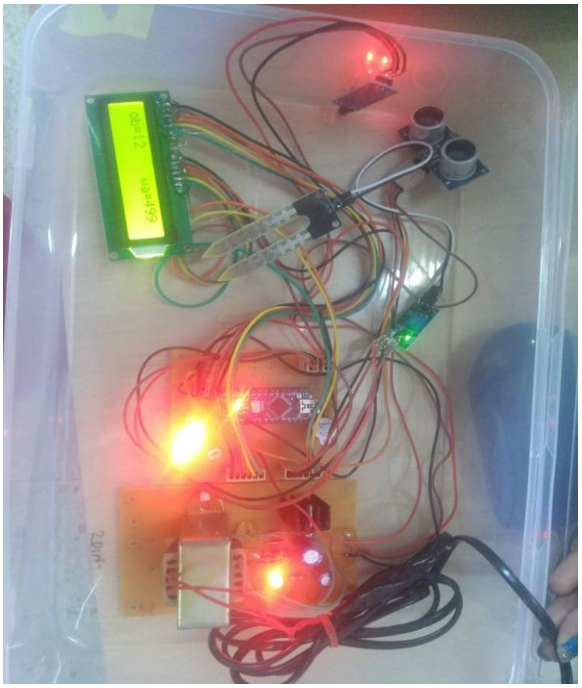
Capacitive filter is used in this project. It removes the ripples from the output of rectifier and smoothens the D.C. Output received from this filter is constant until the mains voltage and load is maintained constant. However, if either of the two is varied, D.C. voltage received at this point changes. Therefore, a regulator is applied at the output stage.

4. VOLTAGE REGULATOR:

7805 is a voltage regulator integrated circuit. Fixed output voltage is not obtaining due to fluctuation of the voltage source in the circuit. Constant value of output voltage maintains by voltage regulator IC. 7805 provides +5V regulated power.

6. RESULT:

6.1 FOR HOUSEHOLD:



6.2 FOR ROADWAYS:

7. CONCLUSION:

We as a group had begun working for more than a year ago and now, we come to the completion of our project. It has been a very fulfilling experience for all of us. We have got a thorough learning experience and we shall

cherish it for long. Despite being challenging and different from other assignments, it is a path where we have learn a lot about hardware, software, troubleshooting and other aspects of engineering. It was a chance given to us that we go deep into applying what we had learn in earlier years of our studies and we grabbed it with both hands.

For simplicity we divided the project work into smaller parts and alternately took leads in performing those parts following the principle of the best man for the job. Since we were new to this, at initial stages most of our decisions were not apt for the required situations. At such times our professors and other knowledgeable friends came to our help. From finding the project idea to publishing this report, learning has been a continuous process. There have been times where we have taken inappropriate decisions but have then learn how to overcome them and not to commit those errors in future tasks.

The project has helped us study the practical use of micro controller programming and its application. We have learned that what are the various stages one needs to follow when pursuing a project and how efforts as a team can be put towards finding solution to problems arising in the process. This opportunity given to us had proved very beneficial as it provided us with an avenue to furthermore dig into analog and digital electronics

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[3] “Automation of waste segregation system using PLC”, Rashmi M. Kittali and Ashok Sutagundar, 29/10/2016