

AUTOMATED WASTE SEGREGATOR

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Abstract - The amount of waste has been increasing due to the increase in human population and urbanization. The proposed system segregates the waste into three categories namely **wet**, **dry** and **metallic** waste. Each of the wastes are detected by the respective sensors and gets segregated inside the bins which is assigned to them the amount of waste disposal is updated in the server regularly.

1. INTRODUCTION

In recent years, the waste disposal is becoming a huge cause. The most of common method of waste disposal is unplanned and it is dumped at the landfill sites which causes ill effects to all living beings. The waste is segregated into basic main streams such as metallic, dry and wet these waste has a large potential of being recycled and reused. The main purpose of this project is compact, low cost and user friendly waste segregation system for urban cities to streamline the waste management process. Using this system, the segregated waste can be directly sent to the recycling plant, instead of sending the waste to segregation plant and then to recycling plant.

2. LITERATURE SURVEY

Amrutha Chandramohan states there is no such system for segregation of wastes into categories such as dry, wet and metallic wastes at the household level. An Automated Waste Segregator (AWS) can be used at the household level so that the waste can be sent directly for processing.

The limitations of this system are it can segregate only one type of waste at a time with an assigned priority for metal, wet and dry waste.

J.S. Bajaj says many upgradations can be done to the existing project. Some of which are listed below: Advanced processing techniques can be incorporated once the waste has been segregated, methods for individual material feeding for local use so that the segregation can be performed continuously once the waste is dumped, image sensing can be used to segregate materials through Image processing technology.

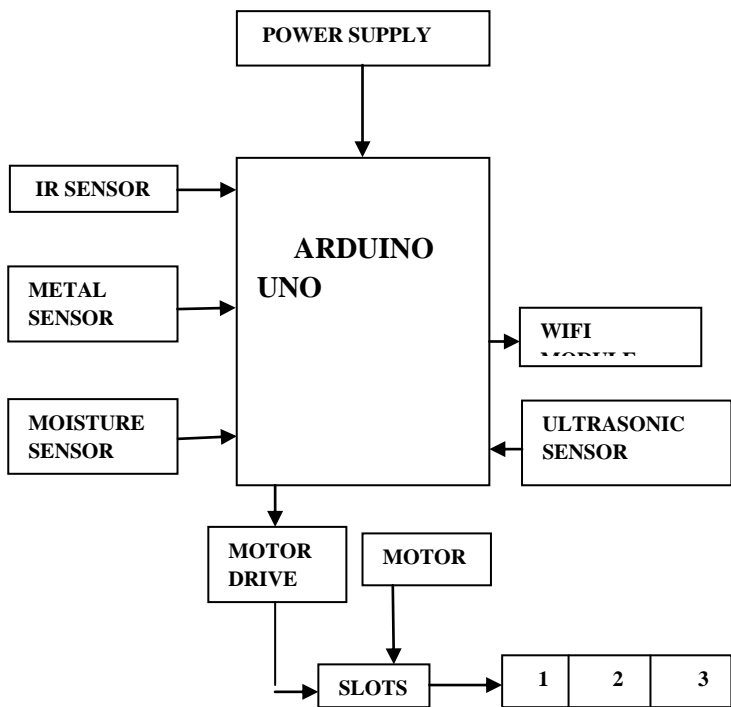
3. EXISTING SYSTEM

The garbage is collected from the streets, house and other establishments on circulation basis, which is not an effective management system. Cleaning of garbage bin is not done when it is needed. The existing system have no proper planning regarding the collection of garbage which makes the city or town unhygienic. Existing system don't regularly update the level of garbage bin to the authority. The traditional way of manually monitoring the garbage bins is complex. The labours who are cleaning the dustbins are also not taking any responsibility which makes the system worse in urgent cases. Proper monitoring of wastes is obligatory to run the city clean and green. The conservative and manual garbage monitoring and collection system is only available. The labours cannot always monitor the elevation and scent of the dustbin manually around all places of the city. No internet technology oriented system which is more systematic, cost-effective and energy-efficient exist.

4. PROPOSED SYSTEM

It is an IoT based Waste Segregation and monitoring system which is an innovative way to keep the cities clean and healthy. This is a model for Waste Segregation for Smart cities. The foremost goal of this project is to automatically segregate the wastes and to perceive the level of the dustbins which is delivered through wireless mesh network. With such information, litter bin providers and cleaning contractors are able to make better decision for the efficient disposal. IR sensor identifies the objects, moisture and metal sensors detects the wet and metal waste. Ultrasonic sensor observes the levels of bin. The Bin consists of three partitions inside, where each partition collects particular waste respectively.

5. BLOCK DIAGRAM



6. METHODOLOGY

Step-1: When the waste enters the conveyer belt motor turns on and the conveyer belt starts moving.

Step-2: The microcontroller, all the motors, and sensors are turned on.

Step-3: The waste is sensed by the inductive proximity sensor to detect if it is a metal or no.

Step-4: If the waste is metal waste then the waste is pushed into the metal waste bin.

Step-5: If not a metallic waste then it comes in contact with the moisture sensor that decides whether the waste is a wet waste or dry waste by checking the moisture content of the waste.

Step-6: If the waste has some humidity it is detected as wet waste is pushed into the wet waste bin.

Step-7: If not a wet waste is kept on and then the waste is dropped into the dry waste bin placed at the end of the conveyer belt.

Step-8: Finally the wastes are dropped into the respective bins and the segregation process is completed.

7. HARDWARE COMPONENTS

- Arduino board
- Power supply
- IR sensor
- Inductive proximity sensor
- Soil moisture sensor
- 16X2 LCD Display
- I2C module
- Dc motor
- Ultrasonic sensor HC-SR04
- SG 90 servo motor
- 5V Single-Channel Relay Module

7.1 Arduino UNO:



It is a microcontroller board based on 8-bit ATmega328P microcontroller. Along with ATmega328P, it consists other components such as crystal oscillator, serial communication, voltage regulator, etc. to support the microcontroller. Arduino Uno has 14 digital input/output pins (out of which 6 can be used as PWM outputs), 6 analog input pins, a USB connection, A Power barrel jack, an ICSP header and a reset button.

7.2 IR Sensor:



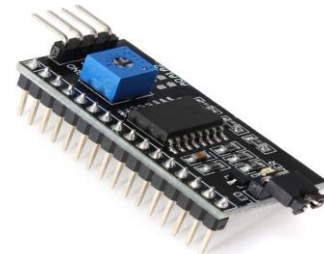
The IR sensor module consists mainly of the IR Transmitter and Receiver, Opamp, Variable Resistor (Trimmer pot), output LED in brief.

Applications

- Obstacle Detection
- Industrial safety devices
- Wheel encoder

these displays in our day to day life, either at PCO's or calculators. 16x2 LCD is named so because; it has 16 Columns and 2 Rows.

7.6 I2C MODULE FOR 16X2:



I2C Module has an inbuilt PCF8574 I2C chip that converts I2C serial data to parallel data for the LCD display.

7.7 Ultrasonic Sensor:



It is a 4 pin module, whose pin names are Vcc, Trigger, Echo and Ground respectively. This sensor is a very popular sensor used in many applications where measuring distance or sensing objects are required. The module has two eyes like projects in the front which forms the Ultrasonic transmitter and Receiver.

SOFTWARE COMPONENTS: The required software components are Arduino UNO Compiler, Thing speak, Putty, VNC Viewer.

RESULT:

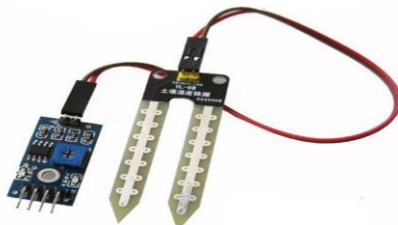
The system makes use of moisture sensor for the segregation of wet waste and dry waste by IR sensor and inductive proximity sensor for the detection of metallic waste like tin lid, aluminium pieces etc. An ultrasonic sensor is used for bin level detection which is displayed using a LCD Display. An IoT helped in monitoring the waste using Arduino UNO.

7.3 Inductive Proximity Sensor(Metal Sensor):



An Inductive Proximity Sensor is a non-contact electronic proximity sensor used for the detection of metals. Sensing range of this sensor completely depends upon the metal being detected. Their working principle is based on a coil and an oscillator that generates an electromagnetic field in the surrounding of the sensing range. Presence of any metallic substance in the sensing range causes dampening of oscillation amplitude.

7.4 Moisture Sensor:



This moisture sensor is used to detect the moisture of the soil. It measures the volumetric content of water inside the soil and gives us the moisture level as output. The module has both digital and analog outputs and a potentiometer to adjust the threshold level.

7.5 16X2 LCD MODULE



LCD modules are very commonly used in most embedded projects, the reason being its cheap price, availability and programmer friendly. Most of us would have come across

CONCLUSION:

With growing urbanization and increasing population, effective waste disposal is a major concern. Manual waste segregation is very expensive, time consuming and inefficient. This paper presents a smart and cost effective solution for waste segregation. The proposed Smart bin is an efficient waste segregation system that requires no human intervention to separate dry and wet waste and paves the path for timely collection and disposal. The proposed system can be deployed a domestic scale in households or on a large scale in public places.

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