

SENSOR BASED SMART WASTE SEGREGATION

AND MONITORING SYSTEM USING IoT

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ABSTRACT

Now-a-days technology is growing tremendously, but this boon has an increased production in various categories of waste. The present stage smart bins consists of waste management system for environmental defense only, but in this project we reckoning the process of waste segregation to reduce municipal worker's man power, predominance protection of diseases and also emission of hazardous gas. The segregation phenomena categories the waste as metal waste, dry waste, wet waste respectively. Proximity Inductive sensor is used for detection of metal waste. Humidity sensor is used for detection of wet waste. IR sensor is used for detection of dry waste and the presence of object (waste). Ultrasonic sensor is used to measure the level of waste in bins. Pollution sensor is used to measure the pollution level in the bins such as carbon dioxide, nitrous oxide and methane etc.,

Keywords: *sensor alert, smart dustbin, waste segregation.*

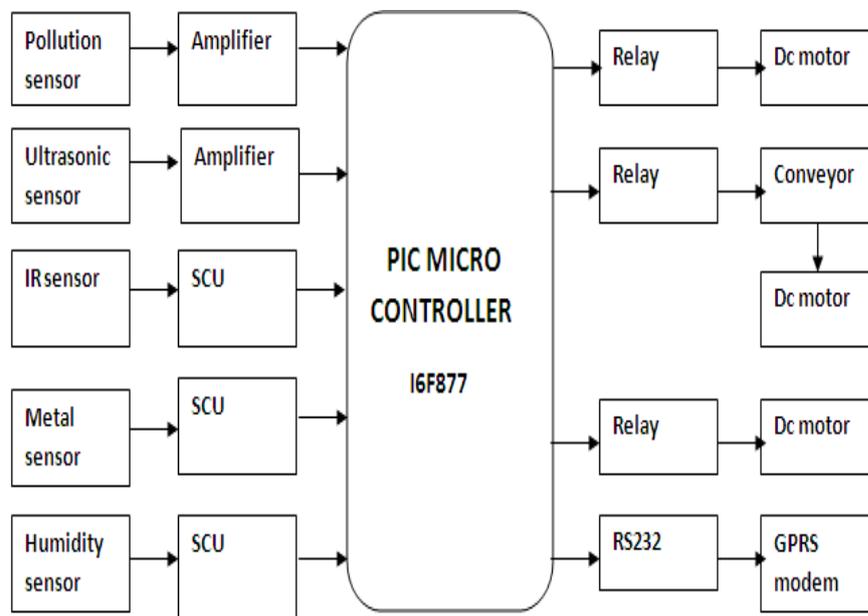
I. INTRODUCTION

India's garbage generation stands at 0.2 to 0.6 kilograms of garbage per head per day. Segregation at source is crucial for clean cities. India's per capita waste generation is so high, that it creates a crisis if the garbage collector doesn't visit a neighborhood for a couple of days. Improper waste disposal causes problems that cause degradation of the environment.

Waste has been piling up in many dumping grounds all over India. Most of this waste is in mixed form and hence cannot be disposed off effectively. The most commonly used waste handling techniques are burning of waste or using it as landfill. The waste is not subjected to recycling, composting, or any other form of environmental treatment. Hazardous toxic wastes lie side by side with the organic wastes in the landfill. It should be imperative on the part of municipalities to separate the biodegradable from non-biodegradable waste. Biodegradable wastes can then be subjected to composting. Wastes like plastic, metal, paper etc can also be subjected to recycling. In some ways, the waste can actually serve as a resource. By separating waste into different categories we can implement processes that will lead to effective resource utilization. This could be implemented at individual as well as society level. An Intelligent waste bin

Operate to ensure the efficient measurement of its status while consuming minimum energy. At present, major cities around the world require challenging solutions for waste management, as a result of growth in residential areas and the economy. Waste management is a costly urban service that consumes around 20% - 50% of municipality's annual budget in developing countries. Furthermore, 85% of solid waste management funds are spent on waste collection and transportation. It becomes an excessive wastage of resources when bins are collected that are filled up partially. In waste collection and carrying activities, the operational cost can be reduced by optimizing the quantity and deployment of collection bins and their collection rate. Estimating the status with waste level and weight of waste inside bins help to optimize collection routes and improve collection efficiency.

II.DESIGN IMPLIMENTATION:



This project designing for PIC microcontroller, LCD display, pollution sensor, ultrasonic sensor, IR sensor, proximity sensor, humidity sensor, relay ,dc motor, conveyor model. When waste is dumped ultrasonic sensor detects the entry of the waste. Thus, its sensing distance is max this point. The transmitter continuously transmits the signal to detect the presence of obstacle. When the waste is dumped into the bin the receiver receives the reflected signal from the waste and starts the entire process by the activation of microcontroller. Then pollution sensor used for dust bin small monitoring purpose.

The microcontroller in turn activates DC motor by executing program to rotate the motor in the forward direction. Two DC motors are used for the smooth rotation of the conveyor belt. Both DC motors rotates in forward direction allowing the waste to be detected by the sensors connected in series near the conveyor belt. Sensors are connected near conveyor belt to detect different types of waste. First sensor connected is the proximity sensor to detect metal waste and which is having highest priority among the two sensors connected.

This sensor gives accurate results even for smaller objects. Proximity sensor continuously emits electromagnetic waves and if any metallic object is passing over the belt within the range of proximity sensor, the metallic object gets energized and retransmits electromagnetic field of its own to the sensor. Microcontroller continuously checks the status of proximity sensor. If sensor is detecting metal then program is written to select that particular dustbin using DC motor. If the waste is not metallic then it passes through another sensor connected near belt itself called the IR sensor. Metal waste is connected in such a way, so that it makes a contact with every type of waste. If there is short in metal sensor then waste is of wet type. Microcontroller continuously checks the status of humidity sensor and if it is getting activated then bin for wet waste is selected using DC motor otherwise by default it is dry waste. Buzzer produces beep sound when any one of the wastes is sensed by any one of the sensors. Any way all sensor status in and dust bin level status send notification in GPRS modem in using IOT technology.

2.1 PROXIMITY SENSOR:



An **inductive proximity sensor** is a device that uses the principle of electromagnetic induction to detect or measure objects. An inductor develops a magnetic field when a current flows through it; alternatively, a current will flow through a circuit containing an inductor when the magnetic field through it changes. This effect can be used to detect metallic objects that interact with a magnetic field. Non-metallic substances such as liquids or some kinds of dirt do not interact with the magnetic field, so an inductive sensor can operate in wet or dirty conditions. An inductive proximity sensor is a non-contact electronic proximity sensor. It is used for positioning and detection of metal objects. The sensing range of an inductive switch is dependent on the type of metal being detected. Ferrous metals, such as iron and steel, allow for a longer sensing range, while nonferrous metals, such as aluminum and copper, may reduce the sensing range by up to 60 percent.

2.2 IR SENSOR:

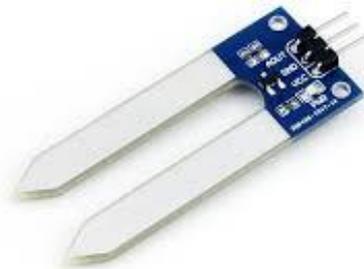


Infrared sensor (IR sensor) is an electronic device that measures infrared (IR) light radiating from objects in its field of view. Apparent motion is detected when an infrared source with one temperature, such as a human,

passes in front of an infrared source with another temperature, such as a wall. All objects emit as black body radiation. It is usually infrared radiation that is invisible to the human eye but can be detected by electronic devices designed for such a purpose.

“Infra” meaning below our ability to detect it visually, and “Red” because this color represents the lowest energy level that our eyes can sense before it becomes invisible. Thus, infrared means below the energy level of the color red, and applies to many sources of invisible energy. Infrared transmitter is one type of LED which emits infrared rays generally called as IR Transmitter. Similarly IR Receiver is used to receive the IR rays transmitted by the IR transmitter. One important point is both IR transmitter and receiver should be placed straight line to each other. The transmitted signal is given to IR transmitter whenever the signal is high, the IR transmitter LED is conducting it passes the IR rays to the receiver. When receiver receives the signal from the transmitter its resistance value is low. When the resistance value becomes high the signal is cut. By this sensor sense the value.

2.3 HUMIDITY SENSOR:



A humidity sensor also called a hygrometer, measures and regularly reports the relative humidity in the air. They may be used in homes for people with illnesses affected by humidity; as part of home heating, ventilating, and air conditioning (HVAC) systems; and in humidors or wine cellars. Humidity sensor can also be used in cars, office and industrial HVAC systems, and in meteorology stations to report and predict weather.

A Humidity sensor senses relative humidity. This means that it measures both air temperature and moisture. Relative humidity, expressed as a percent, is the ratio of actual moisture in the air to the highest amount of moisture air at that temperature can hold. The most common type of humidity sensor uses what is called “capacitive measurement.” This system relies on warmer the air is, the more moisture it can hold, so relative humidity changes with fluctuations electrical capacitance, or the ability of two nearby electrical conductors to create an electrical field between them. The sensor itself is composed of two metal plates with a non-conductive polymer film between them. The film collects moisture from the air, and the moisture causes minute changes in the voltage between the two plates. The changes in voltage are converted into digital readings showing the amount of moisture in the air.

2.4 ULTRASONIC SENSOR:

Ultrasonic refers to any study or application of sound waves that are higher frequency than the human audible range. Music and common sounds that we consider pleasant are typically 12 kHz or less, while some humans

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can hear frequencies up to 20 kHz. Ultrasonic waves consist of frequencies greater than 20 kHz and exist in excess of 25 MHz's Ultrasonic waves are used in many applications including plastic welding, medicine, jewelry cleaning, and nondestructive test. Within nondestructive test, ultrasonic waves give us the ability to "see through" solid/opaque material and detect surface or internal flaws without affecting the material in an adverse manner.



Ultrasonic waves are transmitted by high frequency particle vibrations, and can be transmitted through air, water, and solids such as steel. These waves are transmitted in homogenous solid objects much like pointing a flashlight around a room with various objects that reflect light. The directed energy in an ultrasonic wave is reflected by boundaries between materials regardless of whether the material is gas, liquid, or solid. Ultrasonic waves are also reflected by any cracks or voids in solid materials. These reflected waves, which are caused by internal defects, can be compared to the reflected waves from the external surfaces, enabling the size and severity of intern defects to be identified.

2.5 GPRS:



The GPRS core network is the central part of the general packet radio service (GPRS) which allows 2G, 3G and WCDMA mobile networks to transmit IP packets to external networks such as the Internet. The GPRS system is an integrated part of the GSM network switching subsystem. GPRS stands for 'General Packet Radio Service' and was the first popular data standard for mobile phones. GPRS was used for WAP and MMS messages and offered modest connection speeds, typically 30-40 Kbit/s, although the theoretical maximum is 115 Kbit/s. GPRS is known as a '2.5G' technology. Tap "Wireless & Networks," then tap "Mobile Networks." 3. Tap "Network Mode." If you want your Android to use only the GPRS network, tap "GSM only"; if you want to access CDMA networks as well, tap "GSM/WCDMA auto." GPRS (General Packet Radio Service) is a service within the GSM network, just like the two most popular services SMS and voice connections. GPRS is used for transmitting data in the GSM network in from of packets. The effort for the error correction will be reduced with this and longer data blocks are transmitted.

III. ADVANTAGES

- Low power consumption
- Our system mainly concentrates on separating waste at a less cost.
- Reduced the time
- Reliability
- Compatibility

IV. DISADVANTAGES

- Unloaded only man working
- Cost high
- We couldn't use air pollution sensor so acquire bad smell for people

V. CONCLUSION

The proposed method is an efficient solution to the current waste management problem which effectively segregates metal, dry and wet waste. This system can be effectively deployed in industrial material segregation, scrap shops etc. The Sensor Based Smart waste segregation effectively employs humidity sensors to segregate. Our proposed work aims at segregation of waste materials in particular metal, wet and dry waste. It is the first step towards recycling. Recycling the waste materials has a huge impact on the economic condition of the country. Advanced processing techniques can be incorporated once the waste has been segregated.

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