AUTOMATIC WASTE SEGREGATION SYSTEM USING IOT

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ABSTRACT: In India, the municipal factories where large equipment is used to separate usable materials are where the domestic waste is separated. Separate bins for different refuse types have been implemented, but due to ignorance,poor cognitive function, and negligence they do not serve their intended purpose. The current municipal solid refuse collection system will have any suggestions to ensure proper disposal or timely maintenance. This essay suggests a stereotype of a municipal trash bigot who would immediately separate the drop refuse, producing a large amount of useful paper. The intelligent bin may be programmed to transmit information delivery ratios (PDR), and energy efficiencyabout the dropped trash so that a specific individual action may be performed. In this setup,various sensors and motors are connected to an Arduino board.

Keywords: Sensors, BLYNK server, IOT, waste management

1. INTRODUCTION

A smart town is a town that has been designed to use information and communication technology (ICT) to handlea variety of data in order to address any problems the town may have. The sensible town contains a variety of information,

including the department of local government data system, schools, libraries, facilities, hospitals, power plants, legislation, the traffic system, and waste management. A wise municipality aims to improve service effectiveness and integrate all data into a single system. Today's advancements in ICT, especially the internet of things (IoT), make it possible to create a smart city. The aforementioned idea is being carried out by using time systems and sensors, where information is first gathered from voters and objects (things), followed bytime-consuming processing. Eventually, (c), the collected data and associated derived data will provide the solutions to dealing with incompetence.

In this situation, trash management entails a variety of refuse bins with significant filling variations (over days, seasons, or locations) and a variety of removal requirements, from sporadic (a few times per week) to extremely frequent (several times a day). On the other hand, various waste types (such as agricultural, biomedical, chemical, electronic, mineral, organic/inorganic, and hot waste, etc.) are distinguished byparticular assortment points, uniform and unavoidable output, and equal, sometimes lengthy filling intervals. Due to the various irregularities of the waste-bin filling technique, such as the irregular form and consequently the form of the enclosed materials, it is challenging to determine the fill level for urban solid waste bins.

2. LITERATURE SURVEY:

"Automatic Waste Segregation System Using Internet of Things (IoT)" by P. Vinoth Kumar et al. (2020): This paper proposes an automatic waste segregation system that uses IoT technology to collect and classify different types of waste. The system includes various sensors that detect the type of waste and segregates it intoappropriate bins. The authors conducted experiments to evaluate the performance of the proposed system and reported an accuracy rate of95%.

"IoT-based Smart Waste Management System" by S. S. Gokhale and S. S. Kulkarni (2020): This paper presents an IoT-based smart waste management system that utilizes various sensors and devices to manage waste collection, transportation, and disposal. The proposed system uses machine learning algorithms to classify different types of waste and segregates them accordingly. The authors also conducted experiments to evaluate the performance of the system, and the results showed a significant improvement in waste management efficiency.

"Smart Waste Management System using IoT and Machine Learning" by S. Sharma et al. (2020): This paper presents a smart waste management system that uses IoT technology and machine learning algorithms to manage

waste collection, transportation, and disposal. The proposed system includes various sensors that detect the type of waste and segregates it into appropriate bins. The authors also conducted experiments to evaluate the performance of the system, and the results showed a significant improvement in waste management efficiency.

"Automatic Waste Segregation and Management System using IoT" by K. S. R. Abishek and S. K. Gokul. This 2019 paper describes an IoT-based waste segregation and management system that uses sensors to detect the type of waste and a mobile application to monitor and control the system.

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3. METHODOLOGY

Waste management is a critical challenge faced by many communities around the world. The increasing amount of waste generated every day has led to concerns about the impact on the environment and public health. The Internet of Things (IoT) technology and BLINK server methodology can help in effective waste management by optimizing waste collection and disposal processes.

IoT technology involves the use of sensors and smart devices that can connect to the internet and communicate with each other. In the context of waste management, IoT devices can be used to monitor the amount of waste generated in real- time, and optimize the collection and disposal processes. For example, sensors can be installed in waste bins to detect the level of waste andnotify the waste management authorities whenthe bin needs to be emptied. This can help reduce the frequency of waste collection and optimizethe use of resources.

The BLINK server methodology is a cloud-based technology that provides a secure and scalable platform for data management and analytics. It can be used to store and analyze the data generated by the IoT devices, and provide insights that can be used to optimize waste management processes. For example, the BLINK server can be used to analyze the data from waste sensors to identify patterns in waste generation and optimize the collection routes.

The combination of IoT and BLINK server methodology can provide a comprehensive waste management solution that can optimize waste collection and disposal processes, reduce costs, and improve the overall efficiency of waste management. Additionally, the data generated by the IoT devices and analyzed by the BLINK server can be used to make informed decisions about waste management policies and initiatives.

Overall, the use of IoT technology and BLINK server methodology can help in effective waste

management by optimizing the collection and disposal processes, reducing costs, and improving the overall efficiency of waste management.

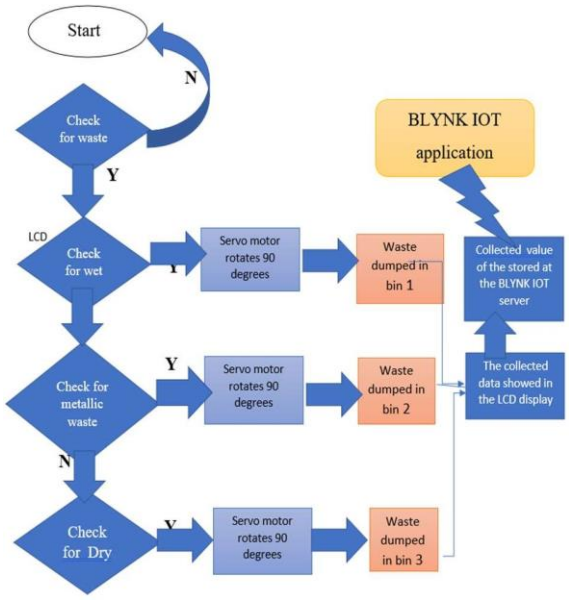


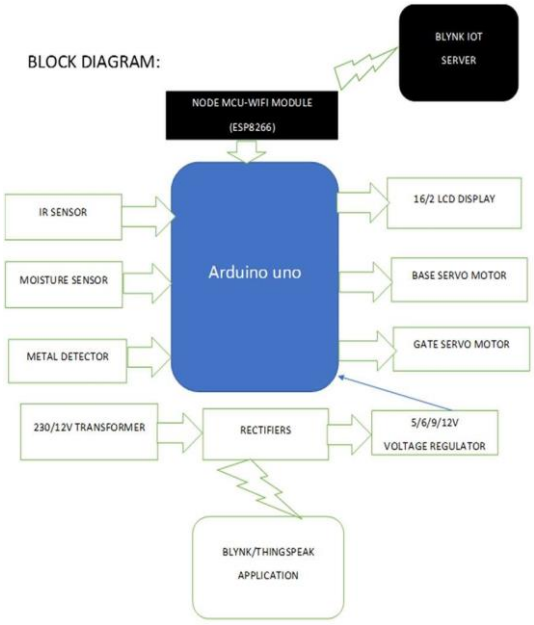
Fig: Flowchart of proposed model

Above diagram shows that the flow diagram or working of the model, when we switch on the model, It checks for waste if the waste is dumped it goes for the segregation part on that part itchecks the dumped waste is wet or not if no it alsochecks the the metal waste if yes the base servo motor rotates 90 degrees and it is dumped in the metal bin. If that waste is not metal it simply dumped in the dry bin. The collected waste is shown on the lcd display, the collected data in thelcd is stored at the blynk iot server by using nodemcu module. The stored data accessed by using blynk IOTapplication.

4. BLOCK DIAGRAM & IMPLEMENTATION

In the block diagram having Arduino UNO whichis used for interface between all the devices and also it is used for programmed using ArduinoIDE, The Arduino is connected to the 3 input sensors named as IR sensor, Moisture sensor and metal detector which is used for detect the dry, wet, metal wastes respectively. The diagram is also having two servo motors which is used for one is connected to the gate it is named as gate servomotor and another is connected to the base material named as base servomotor. The gate servomotor is used for open the gate when the waste is detected and the base servomotor is used for to rotate the bins clockwise and anticlock wiserespectively.

BLOCK DIAGRAM:



A. ARDUINO UNO

Arduino Uno is an open-source microcontroller board that is designed for electronics prototyping and DIY projects. It is based on the ATmega328P microcontroller and features a set of digital input/output pins, analog input pins, and other useful components like a USB interface, a power jack, and an ICSP header. The board can be programmed using the Arduino Integrated Development Environment (IDE) which provides a user-friendly platform for coding, uploading,and debugging code. With its versatile hardware and software capabilities, Arduino Uno can beused in a wide range of applications such as robotics, home automation, Internet of Things (IoT), and more. It is an affordable and accessibletool that has made electronics and programming accessible to hobbyists, students, andprofessionals alike.

B. IR SENSOR

The IR sensor is having two parameters named as tramitter and receiver. The transmitter is used for transmit the infrared rays, if any object is detected the sound waves traceback to the receiver.In our project IR sensor is used for detect the dry waste. There are several types of ir sensors named as optical sensors magnetic sensors, ultrasonic sensoers, infrared sensors ,gas sensors.

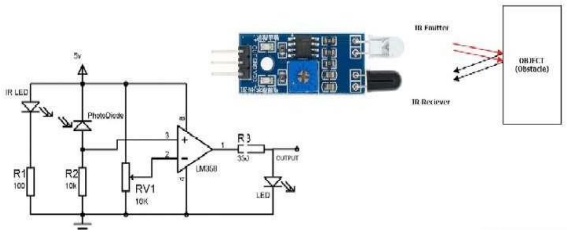


Fig.3 circuit diagram of IR sensor

C. NODE MCU:

NodeMCU is an open-source IoT platform basedon the ESP8266 system-on-a-chip (SoC). Itprovides a convenient and easy-to-use development platform for building Wi-Fi- enabled IoT applications. NodeMCU comes with an integrated development environment (IDE) that allows users to write Lua scripts and upload them to the board over USB. It also has a range of input/output pins that can be used to interface with sensors, actuators, and other electronic components. NodeMCU has a built-in Wi-Fi module that enables it to connect to the internet and communicate with other devices, making it ideal for IoT applications. It is also compatible with the Arduino IDE, which means that users can program it using Arduino libraries and use it with a wide range of sensors and modules. NodeMCU is widely used in smart home automation, industrial automation, and other IoT applications due to its low cost, easy-to-use interface, and powerful capabilities.

D. Metal detector

A metal detector is a device that is used to detect metallic objects hidden underground or underwater. It works on the principle of electromagnetic induction and consists of a coil of wire that produces a magnetic field when a current is passed through it. When the magnetic field encounters a metallic object, it induces a current in the object, which in turn produces a magnetic field. This magnetic field interacts with the coil in the metal detector, causing a change in the electromagnetic field that can be detected by the device.

Metal detectors come in a variety of shapes and sizes, and they are used in a wide range of applications. Some metal detectors are hand-held and are used by law enforcement personnel to locate weapons, while others are mounted on vehicles and are used to detect landmines. There are also industrial metal detectors that are used in manufacturing plants to detect metal contaminants in food products and othermaterials.

E. Moisture sensor

Moisture sensors are electronic devices used to measure the moisture content in soil, air, andother materials. They work by measuring changes in the electrical conductivity of the material being tested. When moisture is present, it changes the electrical properties of the material, and this change is detected by the sensor.

Moisture sensors are widely used in agriculture and horticulture to monitor soil moisture levels and help farmers optimize irrigation. They are also used in construction to monitor the moisture levels in building materials such as concrete, and in HVAC systems to monitor the humidity levels in the air.

Some moisture sensors are designed for single- use applications, while others are reusable and can be used over an extended period. They can be calibrated to specific materials and environments, making them a highly useful tool in a range of industries.

F. Stepper motor

A stepper motor is a type of electric motor that converts electrical pulses into precise mechanical movements. It is composed of a rotor and a stator, with the rotor consisting of a series oftoothed poles that align with the electromagnetic fields of the stator. The stator is composed of coils of wire that are energized in sequence to create a rotating magnetic field, causing the rotor to move in small, precise steps.

Stepper motors are widely used in a variety of applications, including robotics, automation, 3D printing, and CNC machines. They are valued for their ability to provide precise control over

motion, as well as their ability to hold a position without the need for a holding torque. They are available in different sizes and configurations, including bipolar and unipolar types, and can be controlled using a range of control techniques, such as full-step, half-step, and micro stepping. Stepper motors are often used in applications where accuracy, precision, and repeatability are critical.

5.RESULTS AND DISCUSSIONS

This project can significantly increase the efficiency of waste management systems. By using sensors and smart devices, it is possible to collect and sort waste automatically, which can save Time and money.This project allows real-time monitoring of waste disposal systems. This enables authorities to identify issues such as overfilled bins ,missed pickups ,and other problems that can impact the efficiency and effectiveness of waste management systems . This can also help authorities identify areas with high volume of certain types of waste allowing them to develop targeted waste management strategies.By properly segregating waste it can reduce the amount of waste that ends up in landfills, promote recycling and composting, and ultimately have a positive impact on the environment. This can also leads to cost saving associated with the waste disposal.

Fig: Local monitoring using LCD display

The above figures are the output shown in the lcd display First initially project is power on the lcd display shows the project name then it asks enter waste ,when the waste is entered to the collecting duct the lcd shows waste is detected i.e., dry, metal or wet waste.

Fig; Monitoring on BLYNK IOT application

The above figure is the we can also monitor the waste in android application named as BLYNK IOT application. The collected waste showed in the lcd display that can be stored at the BLYNK IOT server using NODEMCU .By using the BLYNK IOT application we can monitor or access the data or waste from anywhere

CONCLUSION

In conclusion, the implementation of a waste segregation system using IoT and Blink server technology can have numerous benefits. This system can improve waste management by ensuring that recyclable materials are properly sorted and disposed of, thereby reducing the amount of waste that ends up in landfills. Using IoT sensors, waste bins can be monitored in real-time to detect when they are full and need to be emptied. This can help to reduce the cost and time associated with waste collection as bins can be emptied only when necessary. Additionally, the use of Blink server technology allows foreasy and secure data management and processing. The system can collect and analyse data on waste generation, bin fill levels, and disposal patterns to provide insights into the effectiveness of the waste management system. Overall, a waste segregation system using IoT and Blink server technology can help to reduce waste, lower costs, and improve the efficiency of waste management. It can also contribute to a more sustainable and eco-friendlier.

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