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SMART WASTE MANAGEMENT USING ARDUINO

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ABSTRACT:

In this paper, a system is introduced to manage waste in big cities effectively without having to monitor the parts 24x7 manually. Here the problem of unorganized and non systematic waste collection is solved by designing an embedded IoT system which will monitor each dumpster individually for the amount of waste deposited. Here an automated system is provided for segregating wet and dry waste. A mechanical setup can be used for separating wet and dry waste into separate containers here sensors can be used for separating wet and dry. For detecting the presence of any waste wet or dry can be detected using an IR sensor in the next step for detecting wet waste a moister sensor can be used. In this process, if only IR is detected motor will rotate in the direction of the dry waste container if both the sensor detects the waste then it will go to the wet container. Both these containers are embedded with ultrasonic sensors at the top, the ultrasonic sensor is used for measuring distance. This makes it possible to measure the amount of waste in the containers if one of the containers is full then alert message will be sent to the corresponding personal

INTRODUCTION :

Today big cities around the world are facing a common problem, managing the city waste effectively without making city unclean. Today's waste management systems involve a large number of employees being appointed to attend a certain number of dumpsters this is done every day periodically. This leads to a very inefficient and unclean system in which some dumpsters will be overflowing some dumpsters might not be even half full. This is caused by variation in population density in the city or some other random factor this makes it impossible to determine which part needs immediate attention. Here a waste management system is introduced in which each dumpster is embedded in a monitoring system which will notify the corresponding personal if the dumpster is full. In this system, it is also possible to separate wet and dry waste into two separate containers. This system provides an effective solution to waste management problem

Existing method :

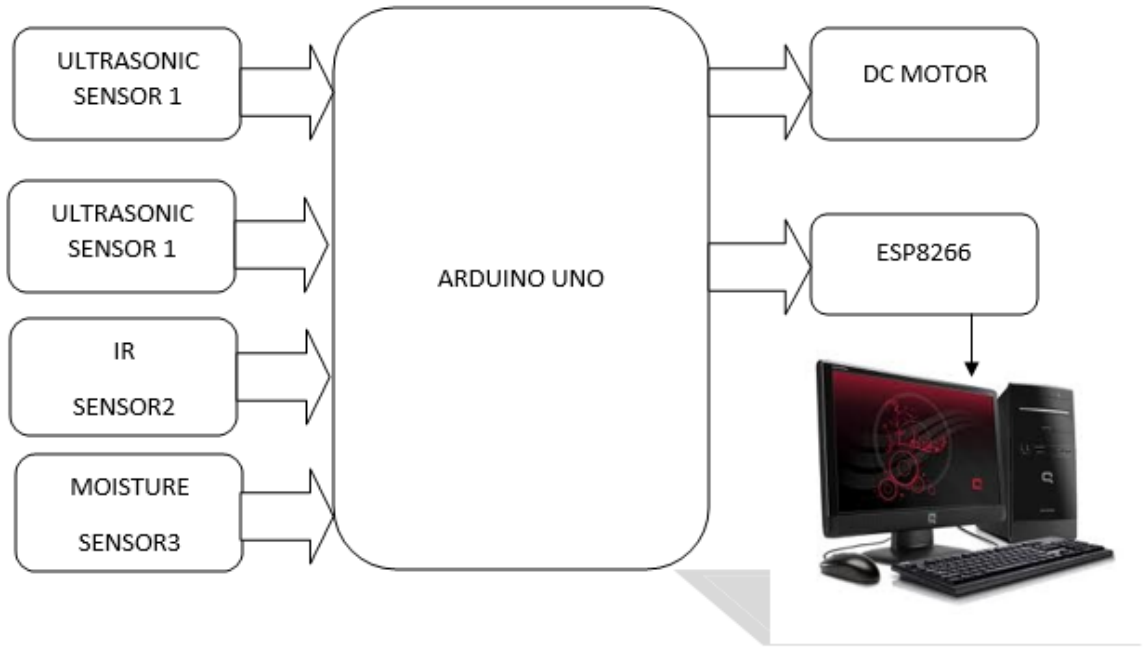
- No systematic approach towards clearing the dumpsters.
- Unclear about the status of a particular location

- Employees are unaware of the need for a particular location
- Very less effective in cleaning city
- Manual systems in which employees clear the dumpsters periodically

PROPOSED METHOD:

- In this system, a 24×7 monitoring system is designed for monitoring dumpsters
- Here a smart and organized system is designed for selective clearing
- The ultrasonic sensor is used for measuring the level of waste in the dumpster
- DC motor powered platform is used for segregating wet and dry waste
- IR sensor and moisture sensor is used for separating wet and dry waste
- If either of the containers is full then an alert message is sent from the dumpster
- In turn, employees can clear the corresponding dumpster
- All these sensors are connected to an Arduino Uno board
- It can be used for controlling all mechanical setup based on current conditions

BLOCK DIAGRAM :



Here, the figure represents an integration of Smart Waste Management System with a 3-tier sensor processor device system.

• Ultrasonic sensor measure distances by using ultrasonic waves. The sensor emits an ultrasonic wave and receives the reflected wave back from the target.

• IR Sensor emits in order to sense some aspects of the surroundings

. • Moisture Sensor measures the volumetric water content in the soil. Reflected microwave radiation is affected by the soil moisture and is used for remote sensing hydrology and agriculture.

• DC motor which is connected to the digital pins of Arduino

HARDWARE REQUIREMENTS

- Arduino Uno
- Ultrasonic Sensor
- IR Sensor
- Moister Sensor
- Dc Motor

SOFTWARE REQUIREMENTS

Arduino IDE

- Tnings speak

HARDWARE COMPONENTS

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 1.1.1.1-Module Diagram for Arduino Uno Processor

ULTRASONIC SENSOR :

Ultrasonic (US) sensor is a 4-pin module, whose pin names are Vcc, Trigger, Echo and Ground respectively. This detector could be a very-about detector utilized This detector could be utilized in several applications wherever mensuration distance or sensing objects are needed. The module has 2 eyes like accompanies like robot at the front that frames the ultrasupersonic transmitter and recipient. The locator works with the simple secondary school recipe that Distance = Speed × Time

Fig 1.1.2.1 Module Diagram for Ultrasonic Sensor

IR SENSOR :

An infrared sensor is an electronic device that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measures only infrared radiation rather than emitting it that is called as a passive IR sensor.Usually in the infrared spectrum, all the objects radiate some form of thermal radiations. These types of radiations are invisible to our eyes that can be detected by an infrared sensor. The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the IR LED. When IR light falls on the photodiode, the resistances and these output voltages, change in proportion to the magnitude of the IR light received.

Fig 1.1.2.2 Module Diagram for IR Sensor

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

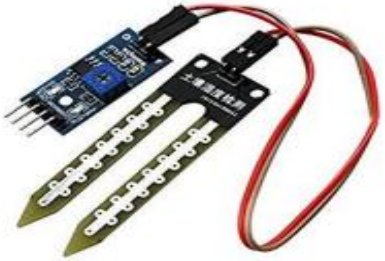


Fig 1.1.2.3 Module Diagram for Moisture Sensor

DC MOTOR :

A DC motor is any of a class of rotational electrical machines that changes over direct flow electrical energy into mechanical energy. The most well-known sorts depend on the powers delivered by magnetic fields. About a wide range of DC engines have some internal mechanism, either electromechanical or electronic, to intermittently alter the course of current stream in part of the engine .we use 500rpm and 12v DC motor is used in this project .This DC motor is used for segregating the wet and dry waste.

Fig 1.1.4. Module Diagram for DC Motor

SOFTWARE COMPONENTS :

ARDUINO IDE :

The source code for the IDE is discharged under the GNU General Public License. The Arduino IDE underpins the dialects C and C++ utilizing uncommon guidelines of code organizing. The Arduino IDE supplies a product library from the Wiring venture, which gives numerous normal information and yield methodology. Client

composed code just requires two essential capacities, for beginning the sketch and the principle program circle, that are aggregated and connected with a program stub fundamental () into an executable cyclic official program with the GNU toolchain, additionally included with the IDE distribution

This environment supports both C and C++

Fig 1.1.3.1 Module Screenshot for Arduino IDE

THINGS SPEAK :

ThingSpeak is an IoT analytics platform service that allows you to aggregate, visualize and analyze live data streams in the cloud. ThingSpeak provides instant visualizations of data posted by your devices to ThingSpeak. With the ability to execute MATLAB code in ThingSpeak you can perform online analysis and processing of the data as it comes in. ThingSpeak is often used for prototyping and proof of concept IoT systems that require analytics.

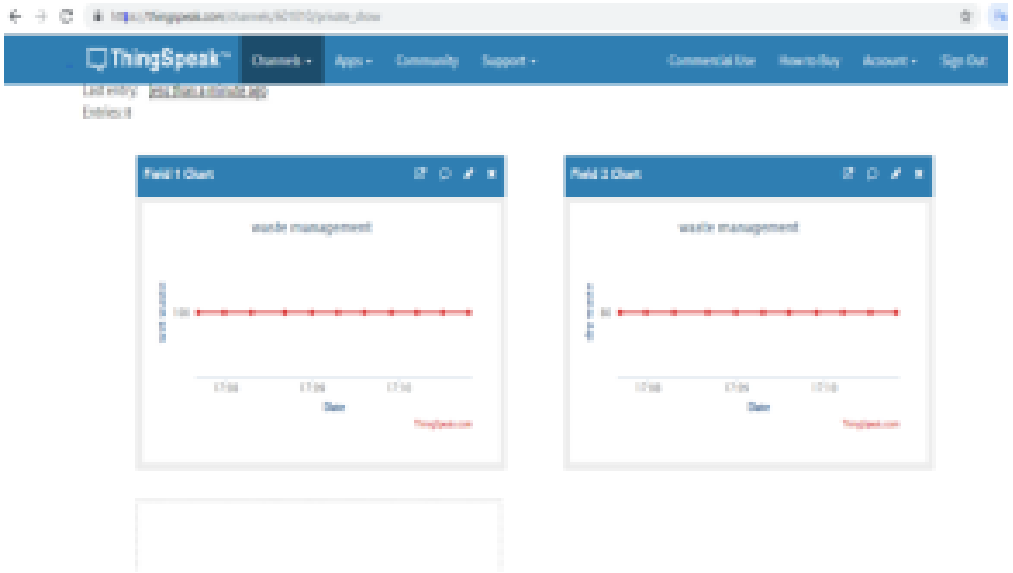
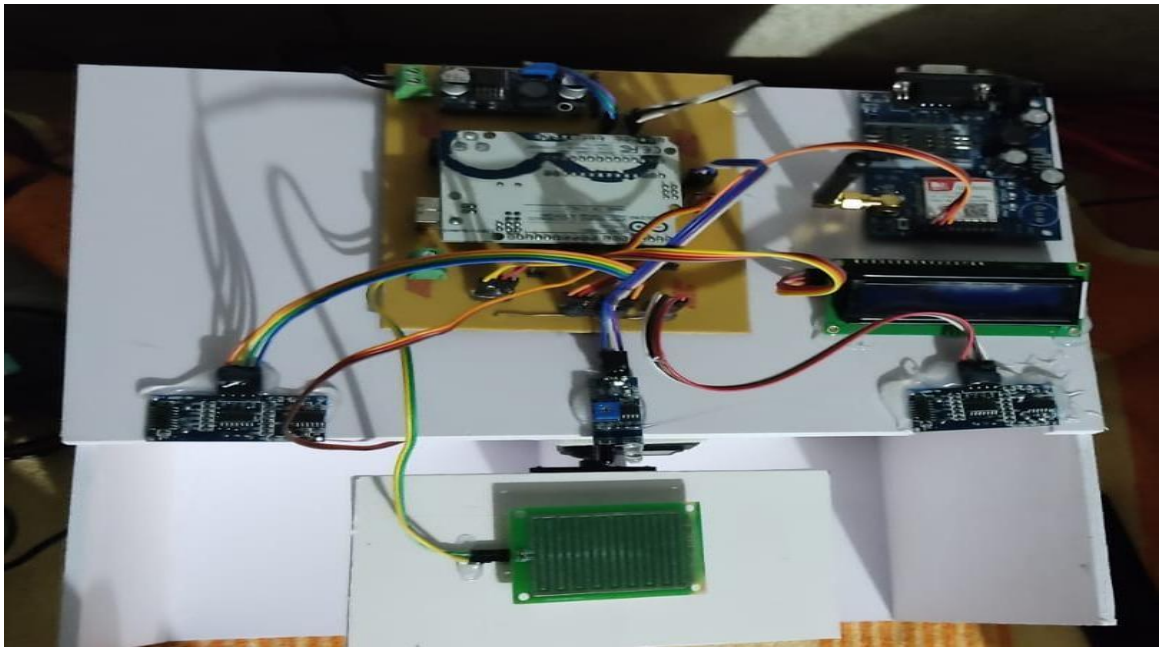
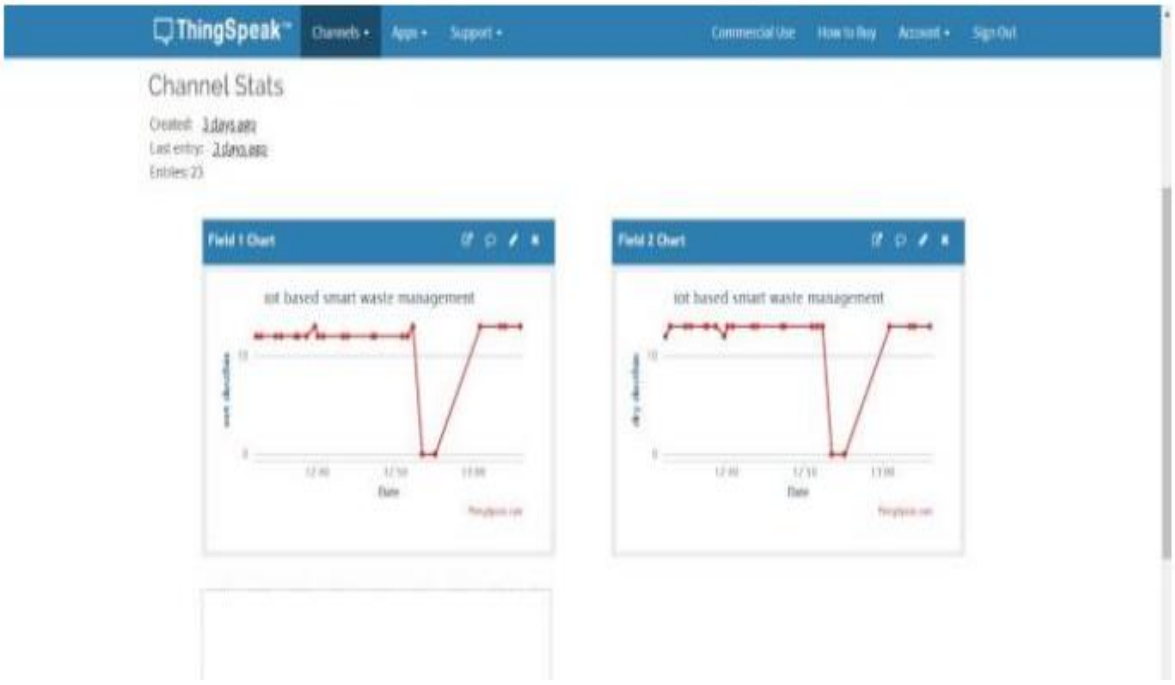


Fig 1.1.3.2 Module Screenshot for BLYNK App

Results:





Advantages :

- Prevent the overflow of the garbage.
- Reduces environmental pollution.
- Maintains the environment hygiene.
- Makes public be comfortable since the garbage is collected on time to time basis.

Conclusion :

This paper has narrated that however sensible waste management system is perform. By mistreatment this technique we are able to decrease human try. It helps in reducing pollution, traffic flow, man power, time rebuke. With the assistance of correct technology. we are able to manage the trucks in choosing the shortest path for garbage pickup. This project will add a grip to the cities focus to urge and sharp and people-friendly. The outputs from the conducted tests show that everyone the practicality of the system has performed properly. The planned system is appropriate to be enforced altogether flat residential areas, thanks to its usefulness, dependability and cheap value.

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