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IOT BASED URBAN GARBAGE COLLECTION AND SORTING SYSTEM

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Abstract : Increasing urbanization and population growth result in denser, larger cities that produce more municipal solid trash. To reduce the risk to the health and safety of patients, the general public, and the environment, waste must be carefully handled during segregation, management, transport, and disposal. Waste should be separated in order to best realize its economic worth. The goal of this project is to separate dry and wet garbage at the household level. An Ultrasonic sensor is used to keep track of the amount of waste being collected in the container. The control system office keeps track of this. In addition, a zone is constructed around the roadside rubbish container utilizing the load sensor concept to watch for any spillage of garbage.

IndexTerms - **segregation, automation, management, embedded system technology, dustbin, dry and wet waste**.

I. INTRODUCTION

There is one main issue, waste, which the bad stink all around us is and which we frequently deal with because the world is still in the scaling-up stage. Most of the time, we encounter waste bins that are already overflowing, but some individuals keep piling junk on top of them, making the area look messy. As a result of the enormous number of mosquitoes and other insects that breed there, this dirty environment is the source of numerous ailments. It has always been difficult to properly manage garbage, not just in India but also in some other regions of the world. Therefore, it is necessary to create a system that can minimize this issue. With this millennial generation, cleanliness is our first requirement, and cleanliness starts with our surrounds. Therefore, we must reject the old, traditional approach of manually collecting and sorting rubbish, which is ineffective, time-consuming, and adds to the effort. 60 million tons of trash are produced annually in India. Only India's major cities produce 10 million tons of garbage annually, which is a significant amount of waste that the government finds difficult to adequately handle without adding to their labor. The majority of countries have adopted the "waste management hierarchy" idea as the first stage in creating a municipal solid waste (MSW) control policy. As a result, we have suggested a useful Automated Waste Segregator and Monitoring System that aids in keeping track of the amount of waste in the bin. The notification to collect the waste as soon as feasible will be sent to the closest truck driver once the bin is 90% filled. which will stop the trash can from overflowing and keep the surrounding area clean.

II.AIM AND OBJECIVE

Aim: To create a suitable waste management system that can effectively separate dry and moist garbage.

Objective: Using a relay circuit driven by a comparator circuit, garbage can be divided into dry waste and moist waste at homes in the community. The container is where this trash is collected. The container features a sonar sensor that measures how much trash has been gathered inside of it. Using an RF module, a signal is provided to the control unit when rubbish exceeds a specific amount. Additionally, a location other than the trash cans at the roadside is used. The idea of a load sensor is used in this zone to detect any rubbish leaks from the container.

III.METHODOLOGY

For smart cities, we have created an efficient garbage collection system that is IoT and cloud enabled, and in which the trash can is fitted with various sensors to categories the wastes and gauge the volume of garbage. The bin also has a GPS module attached to it that sends information about its location to the cloud, which the truck driver may utilize to collect the trash.

Various sensors and modules are used in the bin's design. The top of it has a waste collection tray where the user can place their trash for disposal. A moisture sensor located in the waste collection pan identifies the type of trash. (dry or wet). Additionally, the waste collecting tray is equipped with two servo motors that allow it to tilt in the direction of the dry or wet collector bin. The Moisture Sensor is used to identify the type of trash when the user places it on the tray, and the relevant servo motors are then started to tilt the tray and drop the garbage into dry or wet bins. A fairly full level IR proximity sensor is installed on the side of each bin.

When the trash builds up to this amount, the sensor reading activates the GPS module, and the GPS module then contacts the Cloud Server using the Wi-Fi module to provide its present location. (latitude and longitude).

III. HARDWARE

COMPONENTS1.SERVO

MOTOR :

It is used to deflect the waste to the respective bins. A servomotor is defined by "a rotary actuator or linear actuator that takes into account exact control of angular or linear position, velocity and acceleration." A suitable motor is coupled to a sensor for obtaining position feedback. The digital or analog input control signal represents the position directed for the output shaft.

2. POWER SUPPLY :

We use 12v power supply in our project. It is mainly used to provide DC voltage to the components on board. 5V for NodeMCU.

3. NODEMCU:

NodeMCU is an open source Lua based firmware for the ESP8266 WiFi SOC from Espressif and uses an on-module flash- based SPIFFS file system. NodeMCU is implemented in C and is layered on the Espressif NON-OS SDK. The ESP8266 has 17 GPIO pins (0-16), however, you can only use 11of them, because 6 pins (GPIO 6 - 11) are used to connect the flash memory chip.The ESP8266 WiFi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor.layout of NODEMCU It's perfect for IoT applications, and other situations where wireless connectivity is required. This chip has a great deal in common with the Arduino – they're both microcontroller-equipped prototyping boards which can be programmed using the Arduino IDE. For those familiar with Arduino, using NodeMCU is a logical next step for a more compact, WiFi-equipped alternative.

4. ULTRASONIC SENSOR :

It is used to keep check on the garbage level of the bin. The acoustic Ultrasonic sensor is divided into three categories: receivers, transceivers and transmitters. The transmitters radiate the ultrasound by converting electrical signals into ultrasound. It is then reflected by the obstacle and received by the receiver that converts the ultrasound into electrical signal. The reflected signals are used to interpret the position of the garbage in the bin.

5. GPS MODULE :

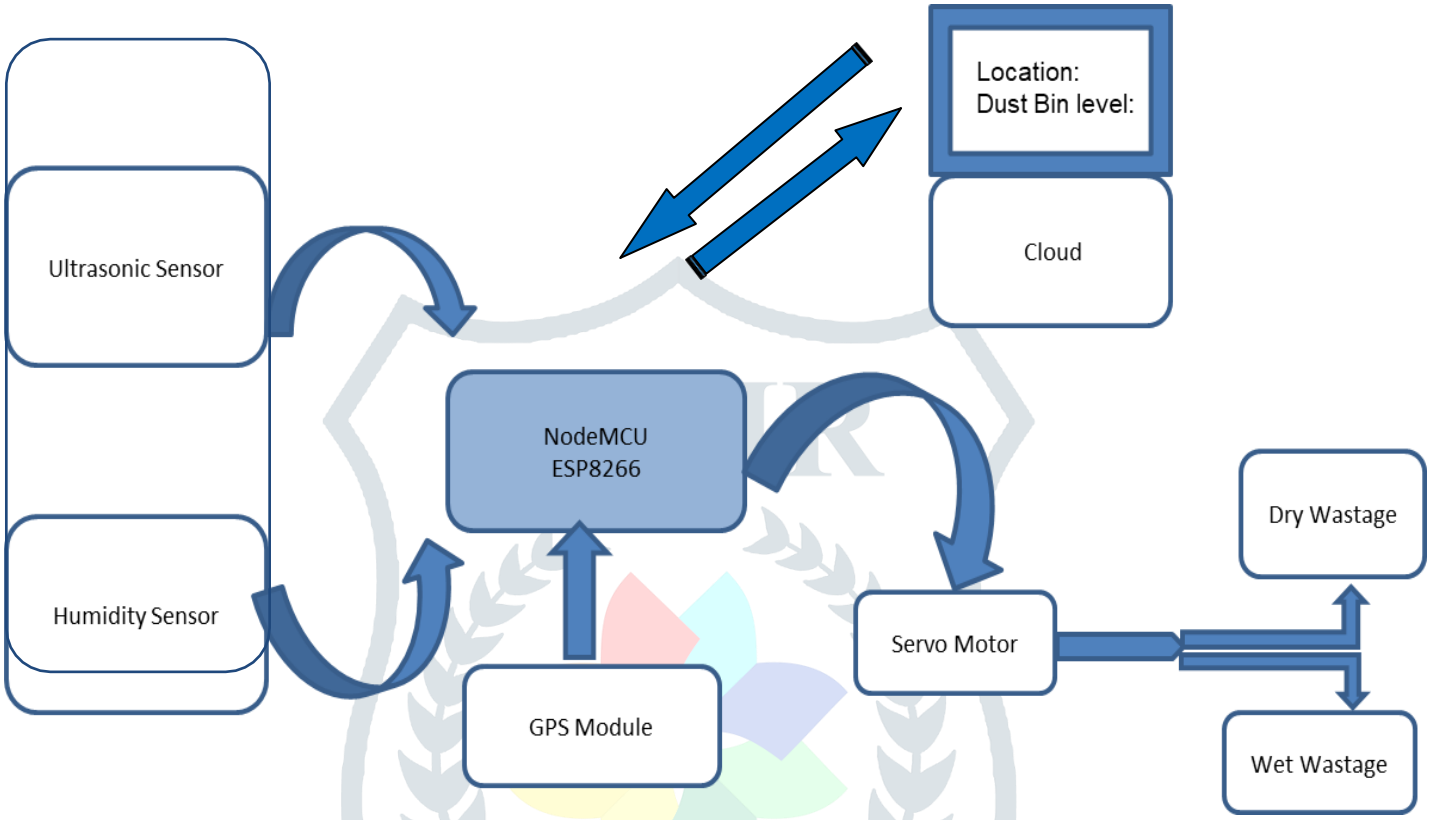
It is a routing device that is connected with the Arduino UNO that uses the Global Positioning System (GPS) to determinethe location of the bin. The recorded location is sent to the authorities using the GSM module embedded in the unit.

6. HUMIDITY SENSOR :

By using a humidity sensor to detect the presence of moisture in the air, you can automatically separate dry and moist air without the need for manual intervention

IV. WORKING

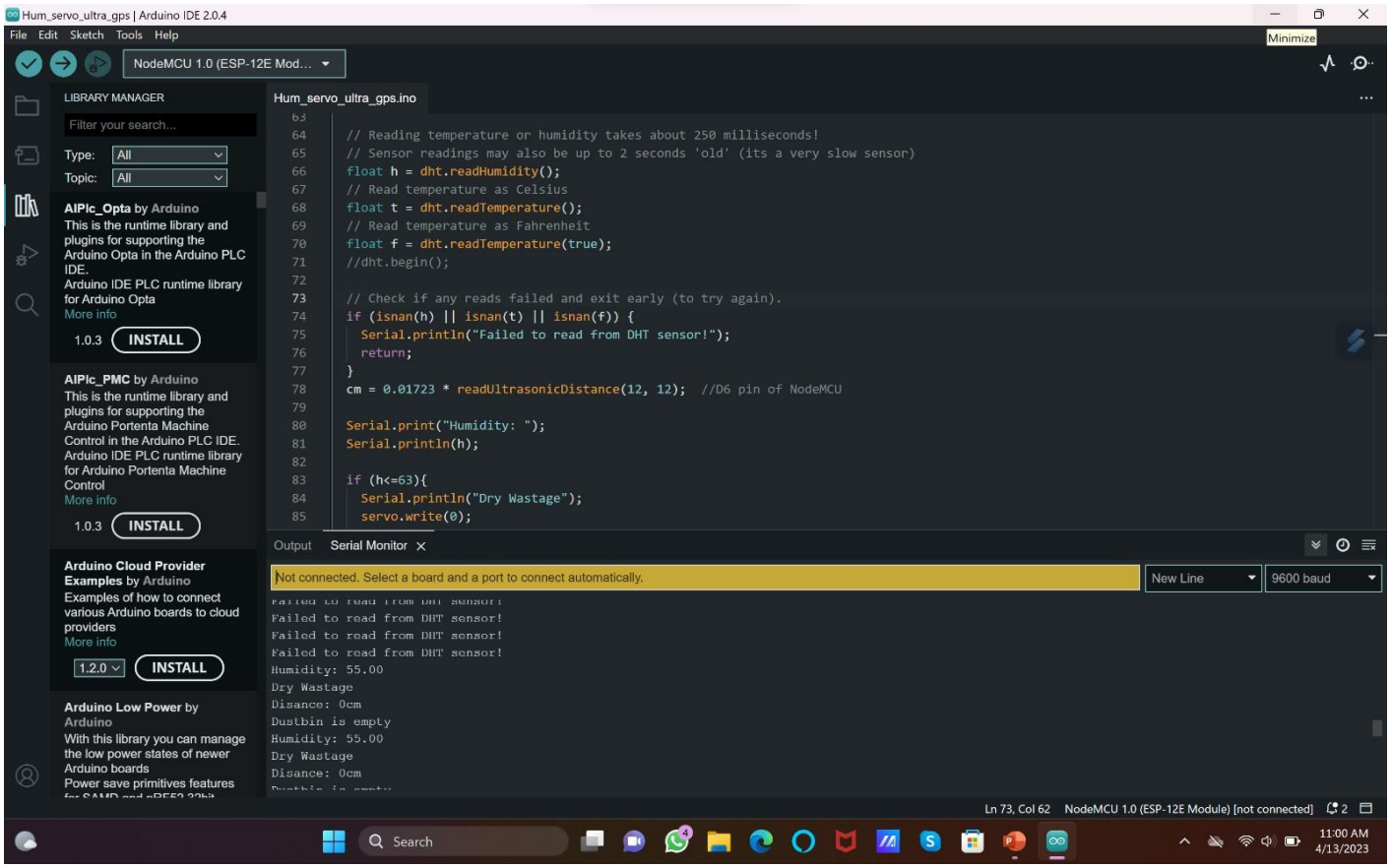
Using the Google Map package for Dynamic Routing is applied with the locations of the filled smart bins to generate a navigate map through the shortest Path Algorithm. Through this Navigation Map the truck drivers can devise a strategy to collect the wastes from the bins.



The working model of the proposed system is depicted in Block diagram. The IoT enabled Smart Bin- though the equipped sensors and modules is designed using Node MCU . The waste dropped into the bin is classified into the dry and wet waste using Moisture sensor DHT 11 is a capacitive moisture sensor and a thermistor. After identifying the type of waste the servomotors – MG995 are started in clockwise/anti-clockwise direction to drop the waste inappropriate sub-bin. The accurate angular movement required by the servomotor is 0Oclockwise for tilting the waste into wet bin and 180O anticlockwise for dry bin. Once the bin is filled with wastes, the Ultrasonic sensor detects the level and enables the GPS Module. The GPS Module in turn automatically communicates with Cloud Server through the WiFi module - ESP8266 to notify its current location (latitude and longitude) for waste collection. Required that cover all color space transformations. The data sent by the smart bin is stored in the cloud and it is available for access from anywhere through the internet. The continuously sensed data from the garbage bins are stored in the cloud server and can be further used by both Waste management authority like the Municipalities, Corporations etc and as well garbage collection truck drivers.

V. RESULT AND DISCUSSION

The components discussed earlier are connected with NODE MCU and integrated with Arduino ide platform and certain code has been developed to execute the desired commands. A mobile application has been developed using Blynk module and connected with cloud storage. The representation of the whole setup is completed and segregation is done successfullyand waste has been separated into dry and wet wastage in separate containers.


Hum_servo_ultra_gps | Arduino IDE 2.0.4
File Edit Sketch Tools Help
NodeMCU 1.0 (ESP-12E Mod...
LIBRARY MANAGER
Filter your search...
Type: All
Topic: All
AIPlc_Opta by Arduino
This is the runtime library and plugins for supporting the Arduino Opta in the Arduino PLC IDE.
Arduino IDE PLC runtime library for Arduino Opta
More info
1.0.3 INSTALL
AIPlc_PMC by Arduino
This is the runtime library and plugins for supporting the Arduino Portenta Machine Control in the Arduino PLC IDE.
Arduino IDE PLC runtime library for Arduino Portenta Machine Control
More info
1.0.3 INSTALL
Arduino Cloud Provider Examples by Arduino
Examples of how to connect various Arduino boards to cloud providers
More info
1.2.0 INSTALL
Arduino Low Power by Arduino
With this library you can manage the low power states of newer Arduino boards
Power save primitives features
Hum_servo_ultra_gps.ino
// Reading temperature or humidity takes about 250 milliseconds!
// Sensor readings may also be up to 2 seconds 'old' (its a very slow sensor)
float h = dht.readHumidity();
// Read temperature as Celsius
float t = dht.readTemperature();
// Read temperature as Fahrenheit
float f = dht.readTemperature(true);
//dht.begin();
// Check if any reads failed and exit early (to try again).
if (isnan(h) || isnan(t) || isnan(f)) {
Serial.println("Failed to read from DHT sensor!");
return;
}
cm = 0.01723 * readUltrasonicDistance(12, 12); //D6 pin of NodeMCU
Serial.print("Humidity: ");
Serial.println(h);
if (h<=63){
Serial.println("Dry Wastage");
servo.write(0);
Output Serial Monitor
Not connected. Select a board and a port to connect automatically.
New Line 9600 baud
Failed to read from DHT sensor!
Failed to read from DHT sensor!
Failed to read from DHT sensor!
Failed to read from DHT sensor!
Humidity: 55.00
Dry Wastage
Disance: 0cm
Dustbin is empty
Humidity: 55.00
Dry Wastage
Disance: 0cm
Ln 73, Col 62 NodeMCU 1.0 (ESP-12E Module) [not connected]
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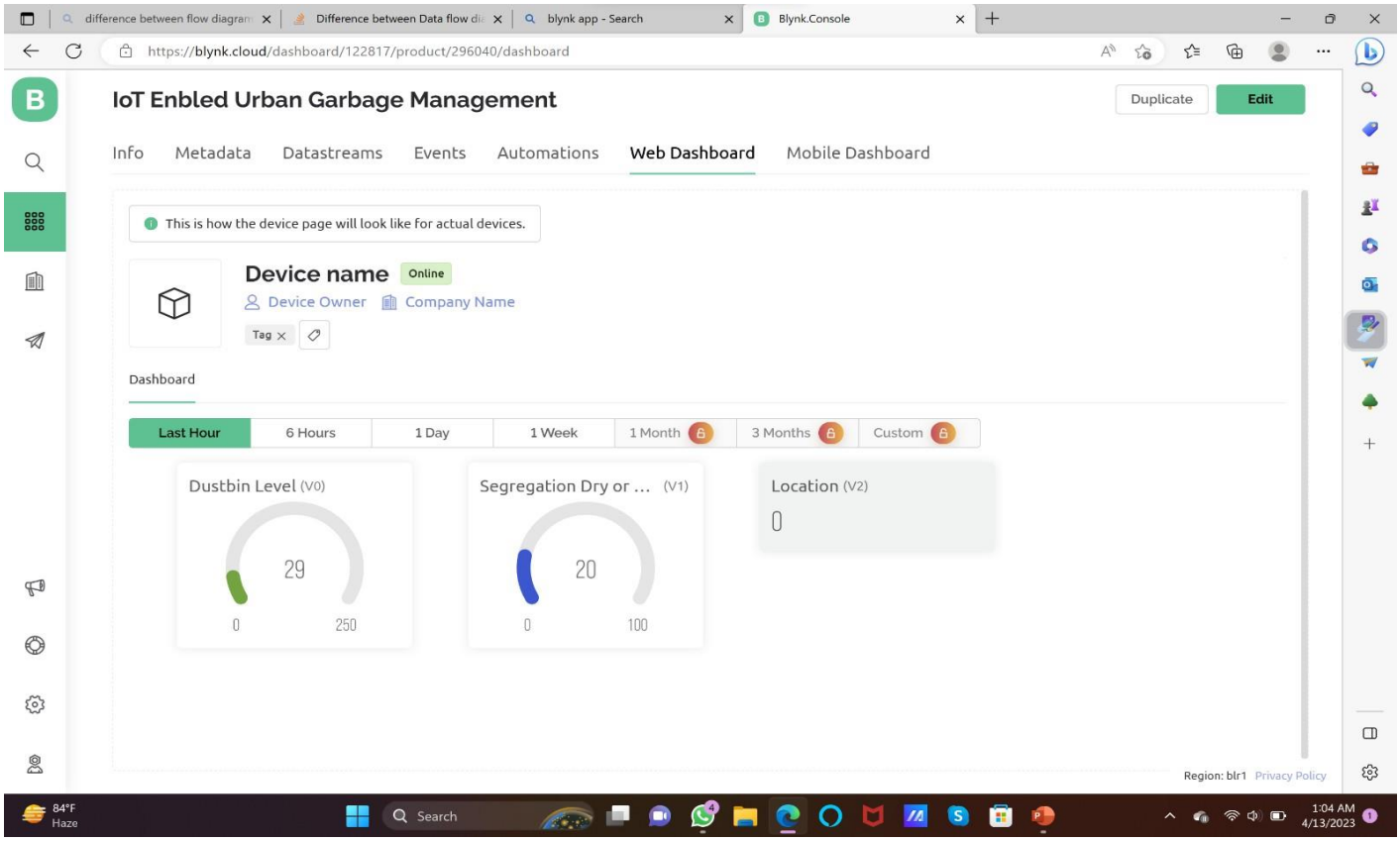
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IoT Enbled Urban Garbage Management
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Edit
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This is how the device page will look like for actual devices.
Device name Online
Device Owner Company Name
Tag
Dashboard
Last Hour 6 Hours 1 Day 1 Week 1 Month 3 Months Custom
Dustbin Level (V0)
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0 250
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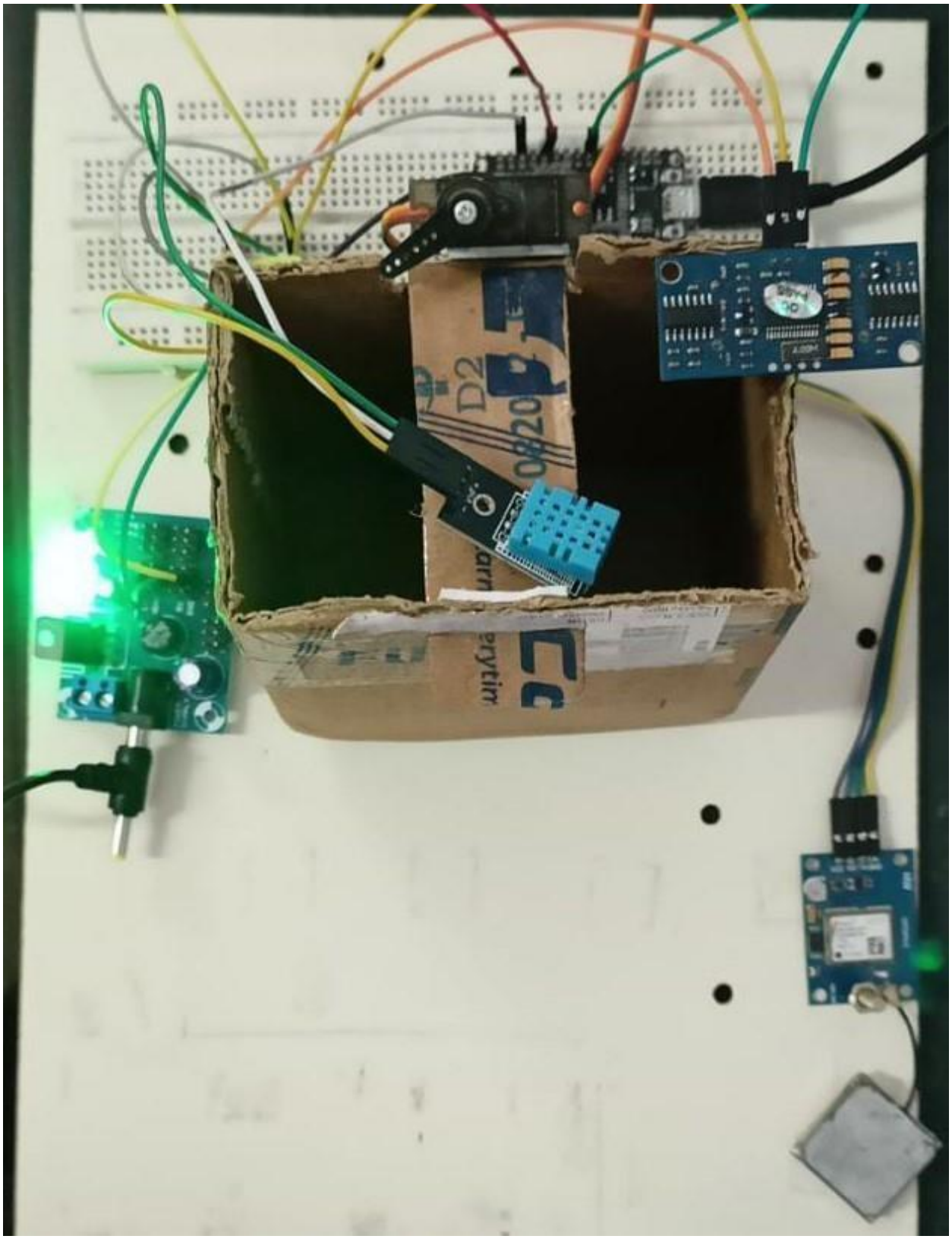

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