

IOT BASED PORTABLE HOT AND COLD SMART DECANTER USING THERMO ELECTRIC EFFECT

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INTRODUCTION

OBJECTIVE

- Humans use both hot and cold water as needed, but must wait for the temperatures to change.
- Our objective is to provide instant access to both hot and cold water.
- We plan to achieve this by incorporating **Thermo Electric Coolers (TEC)** to control the temperature within a specially designed bottle.
- TEC technology will allow for quick variations in temperature, enabling users to have hot or cold water on demand.

LITERATURE SURVEY

[1] Najmie, M. S., and M. K. Fadzly. "**THERMOELECTRIC PORTABLE WATER COOLER USING ARDUINO UNO.**" In *AIP Conference Proceedings*, vol. 2129, no. 1, p. 020147. AIP Publishing LLC, 2019.

DRAWBACKS:

- It occupies large area .
- Cost efficient is high.

SOLUTION:

- To overcome this drawback, providing a design which requires small in size and it can be afford at low cost.

[2] Alsaif, Hussain F., and Mohammed A. Almaghrabi. "**SMART TRAVEL MUG FOR HOT AND COLD BEVERAGES.**" In *ASME International Mechanical Engineering Congress and Exposition*, vol. 58493, p. V014T07A015. American Society of Mechanical Engineers, 2017.

DRAWBACKS:

- Mug like structure which can hold paper cups.
- We cant use large containers.

SOLUTION:

- To overcome this drawback, a container which can change the temperature using this TEC container.

[3] Patil, Rajendra P., Pradhyumna Suryawanshi, Akshay Pawar, and Avdhoot Pawar.

"INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH
TECHNOLOGY THERMOELECTRIC REFRIGERATION USING PELTIER EFFECT."

DRAWBACKS:

- A box which can store specimens for preservation.

SOLUTION:

- This technology can be used for heating and cooling water or beverages.

- [4] Attavane, Pavan, G. B. Arjun, Rajath Radhakrishna, and Santhosh Rao Jadav. "**SOLAR POWERED PORTABLE FOOD WARMER AND COOLER BASED ON PELTIER EFFECT.**" In *2017 2nd IEEE International Conference on Recent Trends in Electronics, Information & Communication Technology (RTEICT)*, pp. 1975-1978. IEEE, 2017.

DRAWBACKS:

- Power consumption is high.

SOLUTION:

- It requires low power.

EXISTING SYSTEM

1. YECUP



- **Yecup 365** smart mug provides an initiative way to adjustable the temperature of your drink, and it reminds you of enjoying your drink at your desired temperature via your smartphone.

Yecup 365: Your All Season Smart Mug

The first temperature adjustable mug that can COOL DOWN or HEAT UP your drink, all day on the go!



Yecup

2 Campaigns | Wilmington, United States

₹33,529,474 INR by 2,574 backers

₹21,950,630 INR by 1,765 backers on May 9, 2016

DISADVANTAGE :

- Cost is high.
- Less capacity.
- It requires more time to hot and cold.

EXISTING SYSTEM

2. VSITOO S3 PRO



VSITOO S3 Pro Temperature Control Smart Mug with Lid, Coffee Mug Warmer with Mug for Desk Home Office, App Controlled Heated Coffee Cup, Self Heating Coffee Mug 14 oz, Electric Mug - Improved Design

VSITOO-Temperature Control Smart Mug

Make your each sip enjoyable.

VSITOO Team

vsitoo 1 Campaign | RM 603, 6/F HANG PONT COMM BLDG,
Hong Kong

₹44,453 INR

8 backers

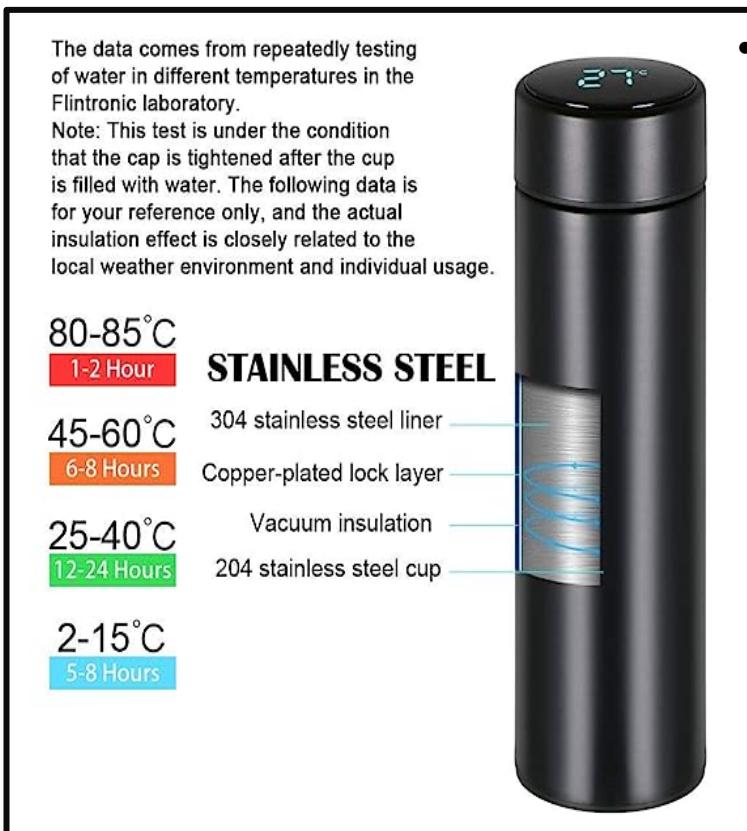
21% of ₹208,602 Flexible Goal

DISADVANTAGE :

- Cost is high.
- Less capacity.
- It can make hot only 3 beverages .

EXISTING SYSTEM

3. DECORHOMZ



Decorhomz Smart LED Active Temperature Display Indicator Insulated Stainless Steel Hot & Cold Flask Bottle (Black, 500ml)

Decorhomz Smart LED Active
Temperature Display Indicator
Insulated Stainless Steel Hot & Cold
Flask Bottle (Black, 500ml)

Brand: Decorhomz

★★★★★ 11 ratings

-64% ₹249

M.R.P.: ₹699

DISADVANTAGE :

- Less capacity.
- It can hold the temperature only.

PROPOSED SYSTEM

CH DECANTER

Fig 1.

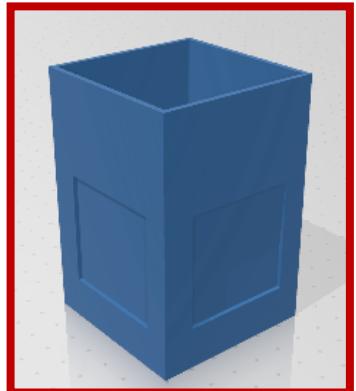


Fig 2.



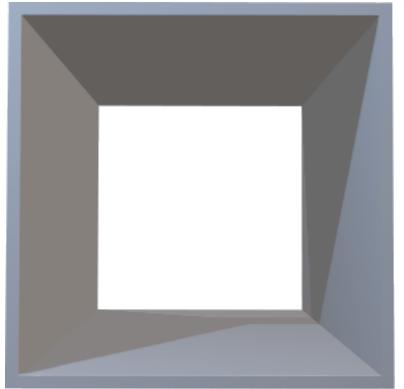
- **CH Decanter** smart bottle a novel method to regulate the temperature of your beverage, and it sends reminders to your smart phone to help you savor your drink at your preferred temperature.
- To address this issue, a compact water bottle has been developed that includes both cooling and heating systems.
- With this water bottle, users can enjoy either hot or cold water as per their requirements, all from a single device.

COST & CAPACITY :

- Rs. 2000/-
- 1 LITRE.

Fig 1 – Represents the Inner part of the Decanter.
Fig 2 - Represents the Outer mold of the Decanter.

PROPOSED DESIGN



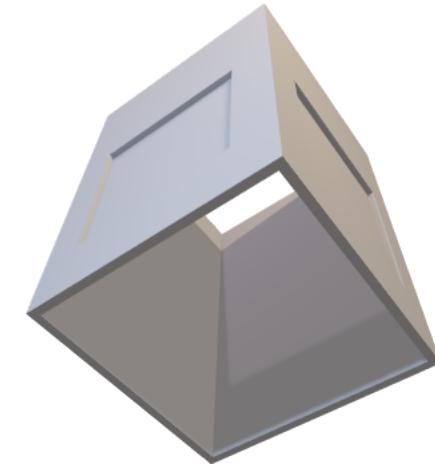
TOP VIEW



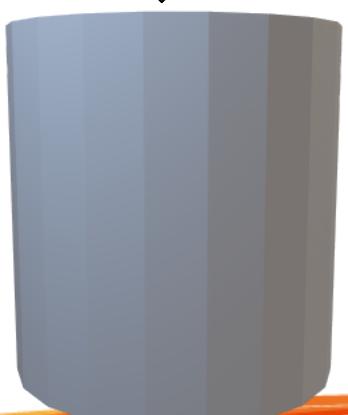
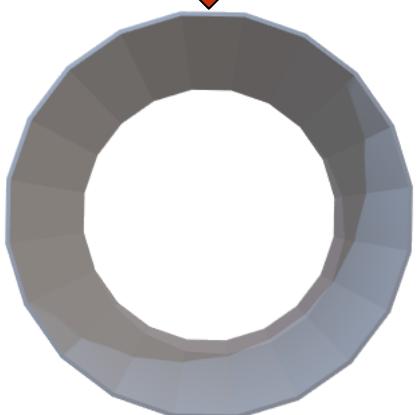
FRONT VIEW



SIDE VIEW

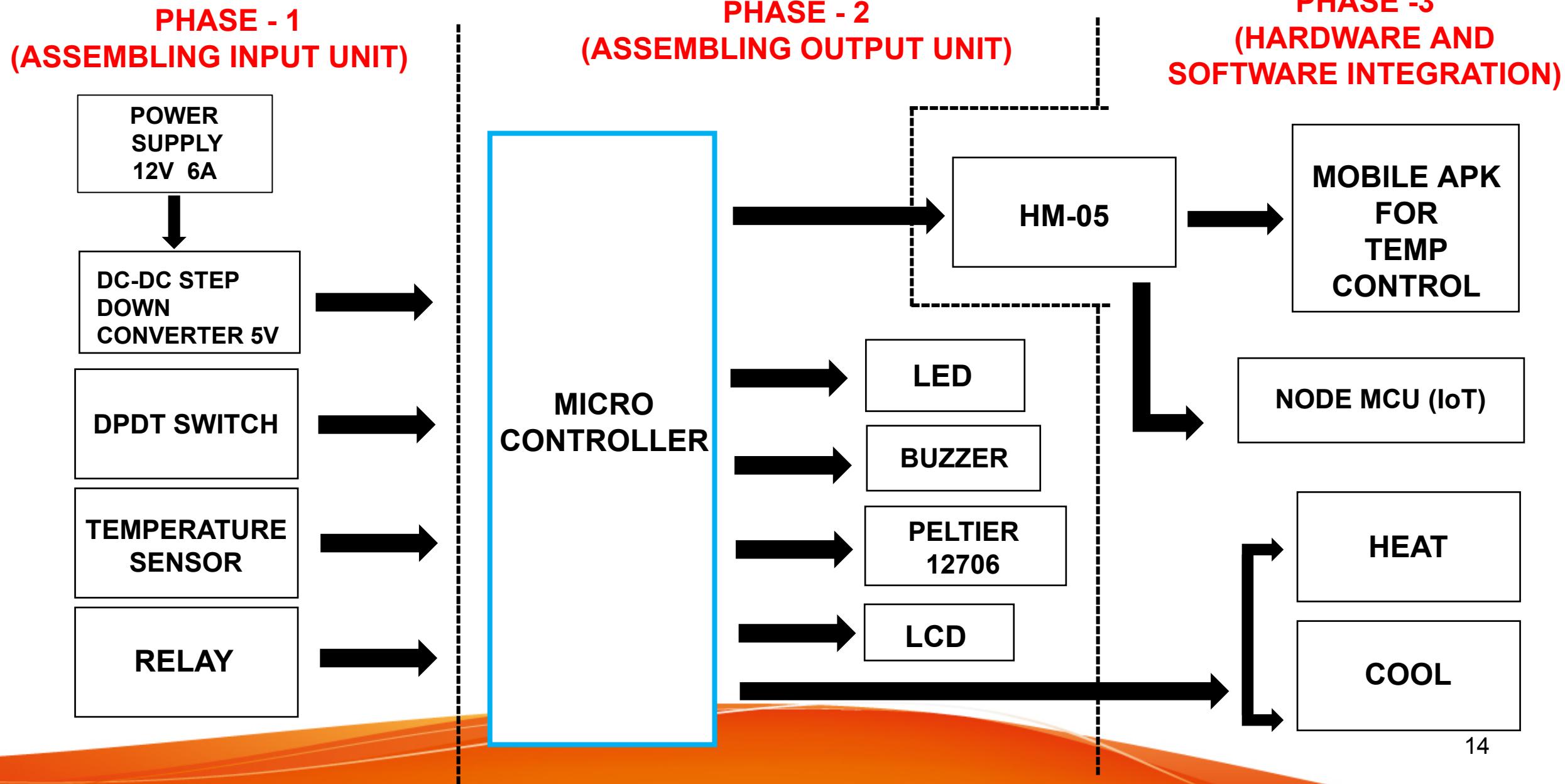


BOTTOM VIEW



FRONT AND SIDE VIEW WITH (TEC)

PROPOSED BLOCK DIAGRAM



PROJECT DELIVERY PLAN

PHASE -1	PHASE-2	PHASE-3
<ul style="list-style-type: none">• Study about the components used in this project.• Functions of the component we used.• Assembling of the input units.	<ul style="list-style-type: none">• Assembling the whole hardware components.• Testing process of assembled hardware.• Arduino coding.• Code testing.• Rectifying the errors occurred while running the hardware.	<ul style="list-style-type: none">• Hardware and software interface.• Testing application code.• Rectifying the errors occurred while running application.• Final product output.

PHASE - 1 (ASSEMBLING INPUT UNIT)

INPUT COMPONENTS :

- 1. POWER SUPPLY 12V 6A MODULE**
- 2. DPDT SWITCH**
- 3. TEMPERATURE SENSOR**
- 4. RELAY**

1. POWER SUPPLY 12V 6A MODULE

IMAGES



PARAMETERS	DC 12V 8A MODULE	DC 12V 10A MODULE	DC 12V 6A MODULE
OUTPUT CURRENT	8A	6A - 10A	4A - 6A
INPUT VOLTAGE	AC 85 - 265V	AC 150 - 285V	AC 100-265V
OUTPUT VOLTAGE	DC 12V	DC 12V	DC 12V
FREQUENCY	50 - 60 Hz	50 - 60 Hz	50 - 60 Hz
POWER OUTPUT	100W	100W	70W

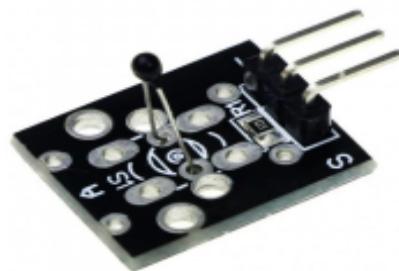
3. DPDT SWITCH

IMAGES



4. TEMPERATURE SENSOR

IMAGES



PARAMETERS	KY - 013	MAX6675	DS18B20
OPERATING VOLTAGE	5V DC	5V	3 - 5.5V
TEMP RANGE	-55 TO +125C	0 TO 1024 C	-55 TO +125 C
MEASUREMENT ACCURACY	0.5C	0.25 C	0.5 C

5. RELAY

IMAGES



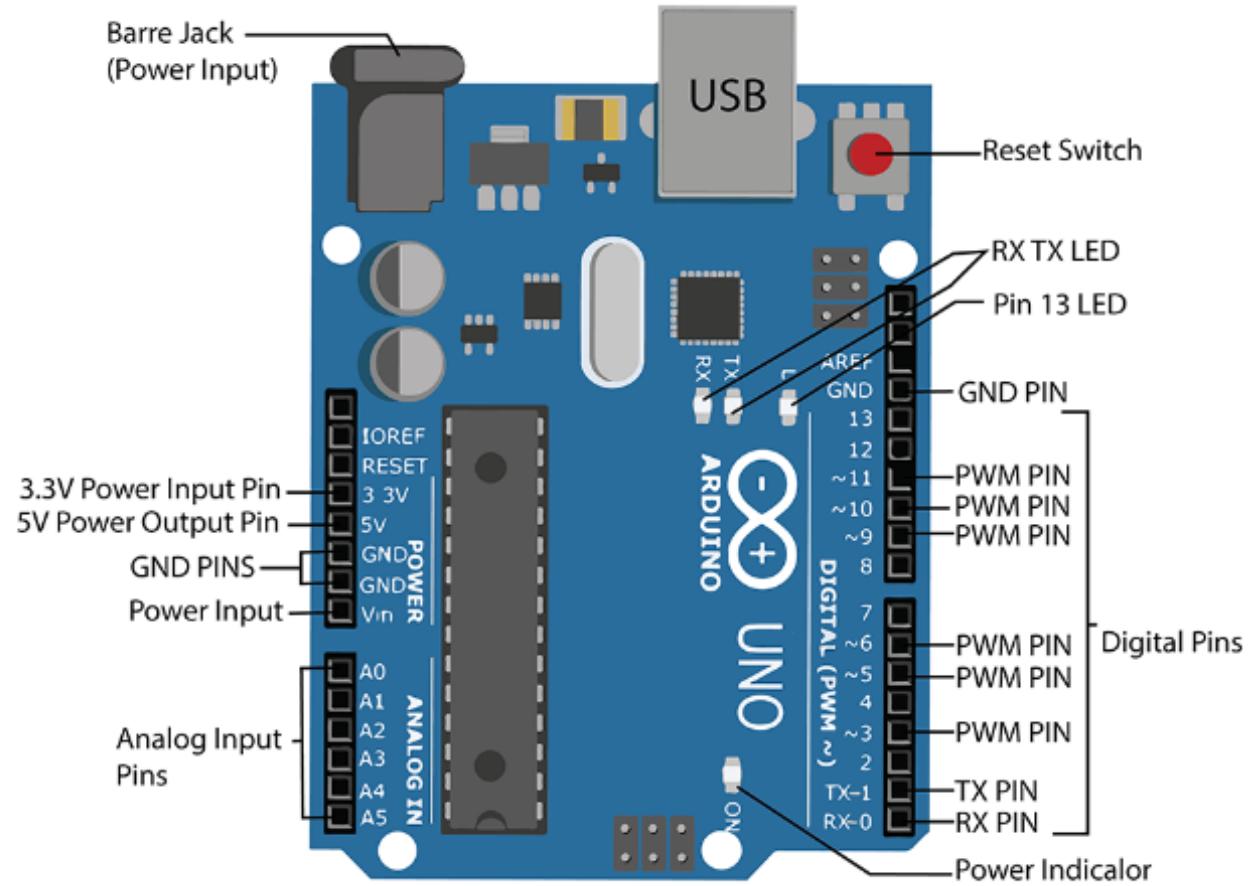
PARAMETERS	12v 2 CHANNEL	12V 4 CHANNEL	12V 2 CHANNEL
TRIGGER VOLTAGE	12V	12v	12V
TRIGGER CURRENT	20 mA	20 mA	20 mA
SWITCHING VOLTAGE AC	250 @ 10A	250@10A	10A @ 250V/ 12A@125V
SWITCHING VOLTAGE DC	30 @ 10A	30@10A	10A @ 30V/ 12A @ 28V

PHASE - 2 (ASSEMBLING OUTPUT UNIT)

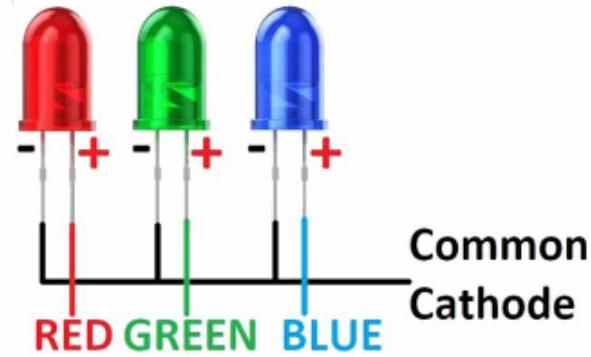
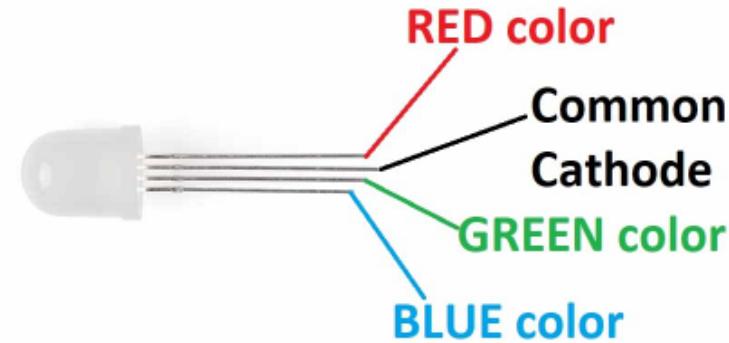
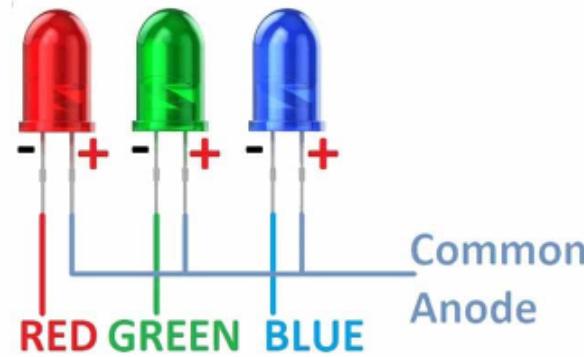
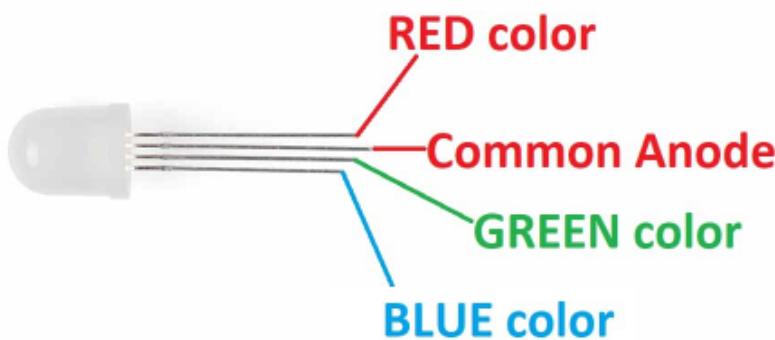
OUTPUT COMPONENTS :

- 1. ARDUINO UNO**
- 2. LED**
- 3. BUZZER**
- 4. PELTIER 12706**
- 5. LCD**

1 . ARDUINO UNO



2 . LED

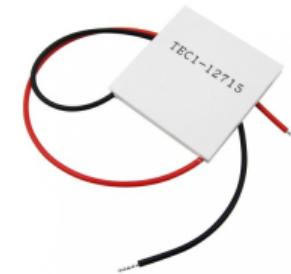


3 . BUZZER

PARAMETERS	MINI PIEZO	PIEZO BUZZER	BUZZER SPEAKER
FREQUENCY	3.3Hz	4kHz	2.8kHz
BUZZER CURRENT	15mA	3mA	5mA
OPERATING VOLTAGE	3 – 16v	3 – 30v	3 – 12v
MAKE	JAPAN	INDIA	CHINA

4 . PELTIER 12706

IMAGES



PARAMETERS	TEC 1- 12704	TEC 1- 12706	TEC 1- 12715
OUTPUT POWER	36 W	92 W	230 W
BUZZER CURRENT	4 A	6 A	15 A
OPERATING VOLTAGE	12v	12v	12v
MAKE	CHINA	CHINA	CHINA

5 . LCD

IMAGES



PARAMETERS	JHD 16x1	JHD 16x2	JHD 8x2
DISPLAY	16 X 1	16 X 2	8 X 2
OUTLINE	80.0 X 36.0 X 14.5	80.0 X 36.0 X 14.5	58.0 X 32.0 X 10.0
CONTROLLER	SPLC780D	SPLC780D	SPLC780D
MAKE	CHINA	CHINA	CHINA

PHASE - 3

(HARDWARE AND SOFTWARE INTEGRATION)

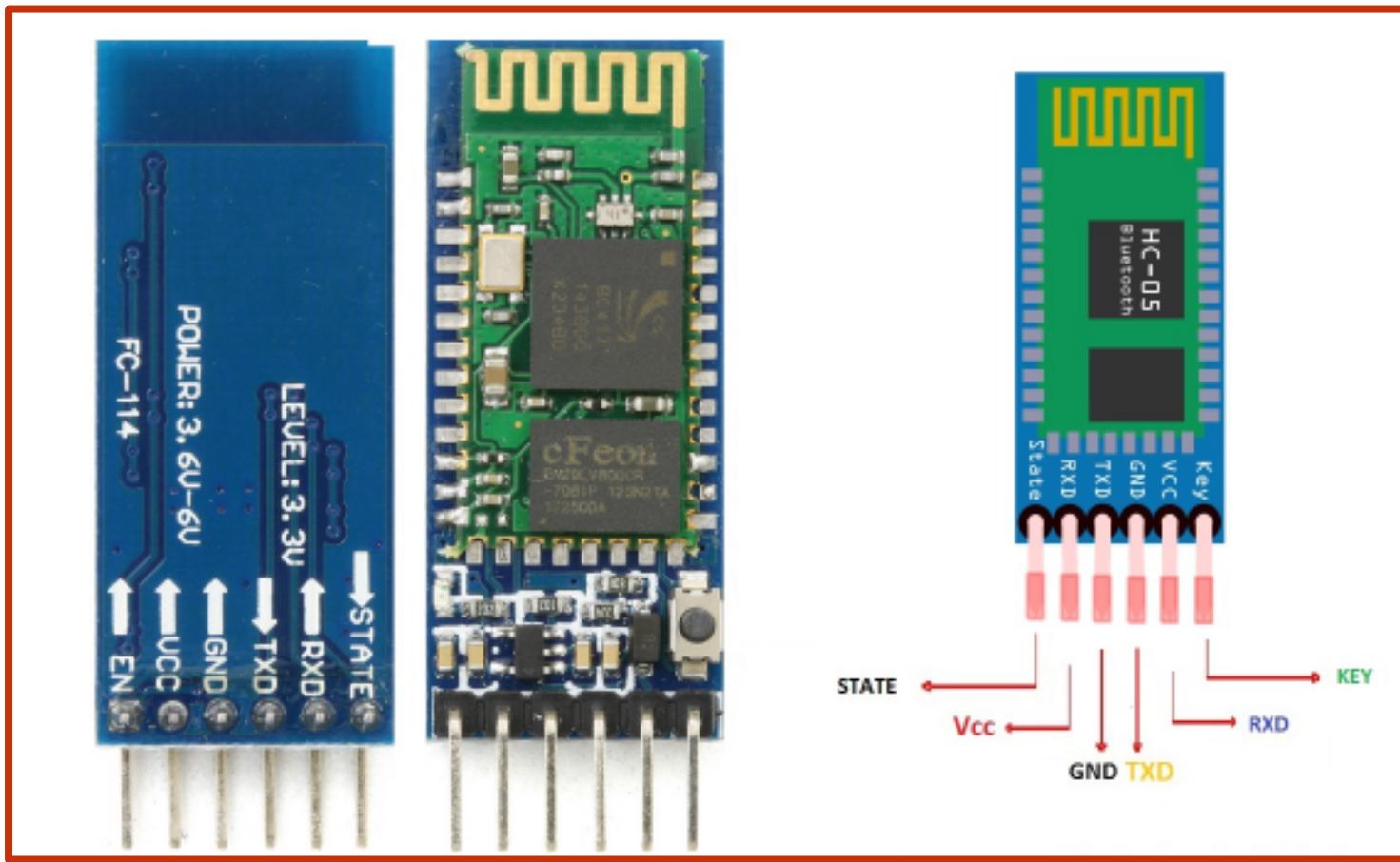
HARDWARE COMPONENTS :

- 1. HC-05**
- 2. NODE MCU**

REQUIRED SOFTWARE :

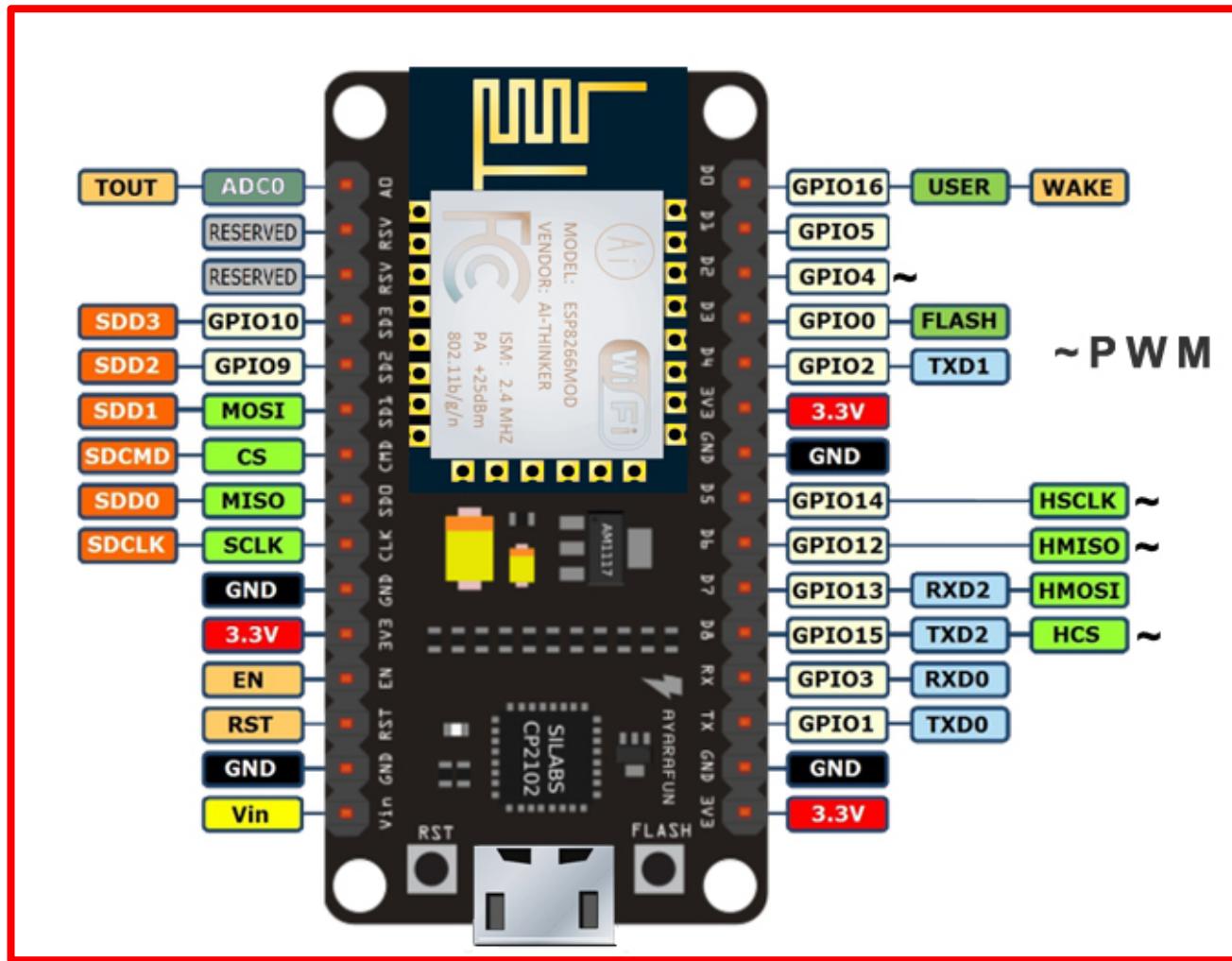
- 1. ARDUINO BLUE CONTROLLER (Apk)**
- 2. UBI DOTS (WEB)**

1 . HC – 05 (BLUETOOTH MODULE)



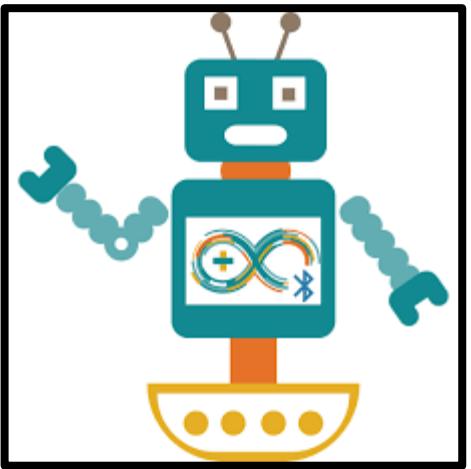
HC – 05 FULL FORM : (HOST CONTROLLER BLUETOOTH MODULE VERSION 5)

2 . NODE MCU (ESP8266 WIFI MODULE)



REQUIRED SOFTWARE :

1. ARDUINO BLUE CONTROLLER

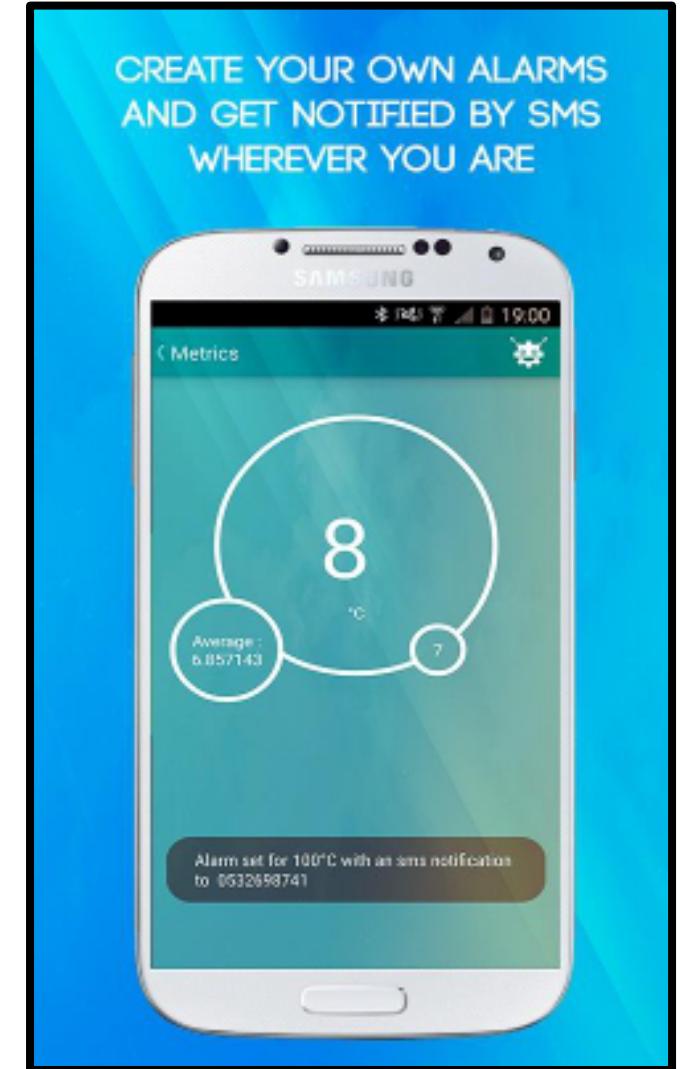


APK LOGO

THIS APPLICATION CAN BE USED
FOR SENDING THE DATA TO
ARDUINO THROUGH BLUETOOTH
MODULE

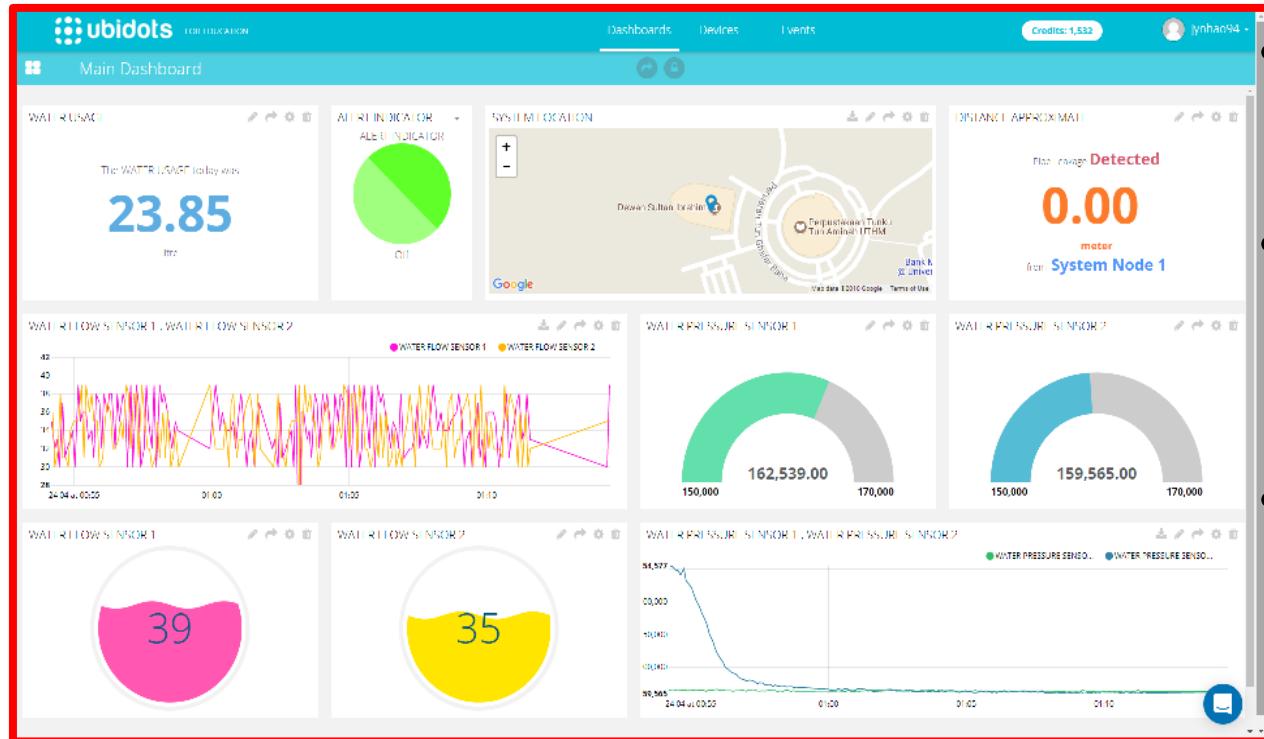


HOME PAGE INTERFACE



2. UBIOTS

DASHBOARD



- Ubidots is an IoT platform that simplifies data collection, visualization, and analysis.

- The website offers scalable and customizable solutions for building IoT applications without managing complex infrastructures.

- Ubidots provides a user-friendly interface, comprehensive documentation, and flexible pricing options.



LOGO

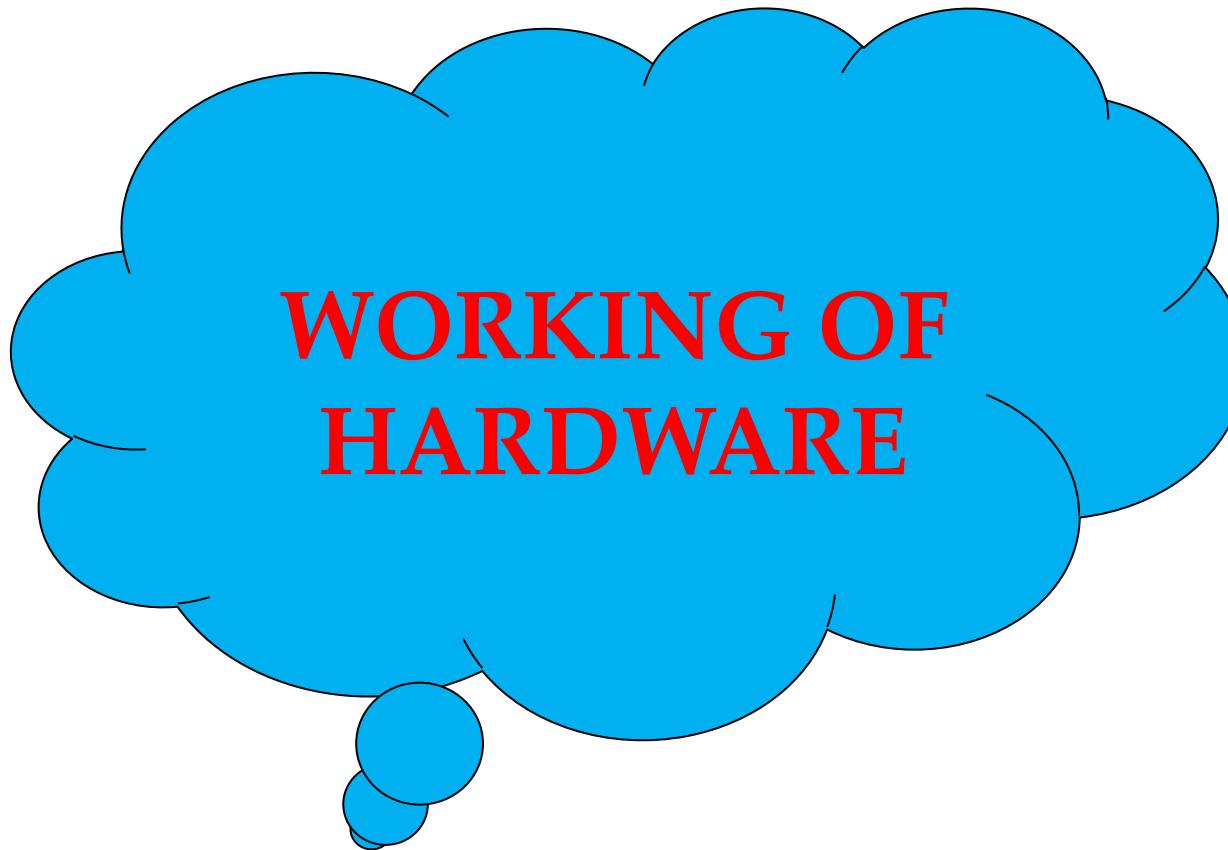
The ESP8266, a popular Wi-Fi module. With Ubidots, users can easily create custom dashboards, alerts, and rules for their ESP8266 devices without having to worry about the complexities of managing the underlying infrastructure.

HARDWARE WORKING

- The IoT-based portable hot and cold smart decanter consists of several hardware components that work together to achieve the desired functionality. The power supply unit provides a regulated 12V DC input to power the system. The thermoelectric module generates hot and cold temperatures through two sides that get hot and cold when a voltage is applied. The temperature generated is regulated using a temperature sensor.
- The microcontroller receives temperature readings from the sensor and controls the system's components, including the LCD display, Bluetooth module, and relay and DPDT switch. The LCD display shows the current temperature, setpoints, and system status. The Bluetooth module allows for remote control and monitoring via a smartphone app.
- The relay and DPDT switch switch between heating and cooling modes, activating the heating element or cooling element as necessary. The buzzer and LED provide audio and visual alerts for temperature beyond the setpoint or system errors.

SOFTWARE WORKING

- The IoT-based smart decanter software consists of two main components: microcontroller code and mobile application code. The microcontroller code is written in the Arduino IDE and reads the temperature sensor data, controls the thermoelectric module, and communicates with the mobile application via Bluetooth. The code compares the current temperature to the target temperature for the hot or cold mode and turns on the thermoelectric module accordingly. The LCD display is updated with the temperature and mode information.
- The mobile application is developed using the Ubidots platform and displays the temperature data and allows remote temperature mode control. The application is connected to the microcontroller through Bluetooth and receives temperature data and mode information. The user can switch between hot and cold modes by clicking the respective buttons on the application, which sends a command to the microcontroller to update the mode value and adjust the thermoelectric module operation.

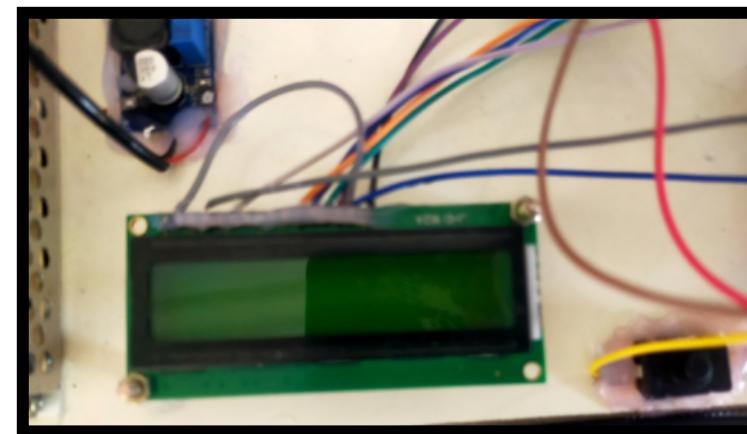
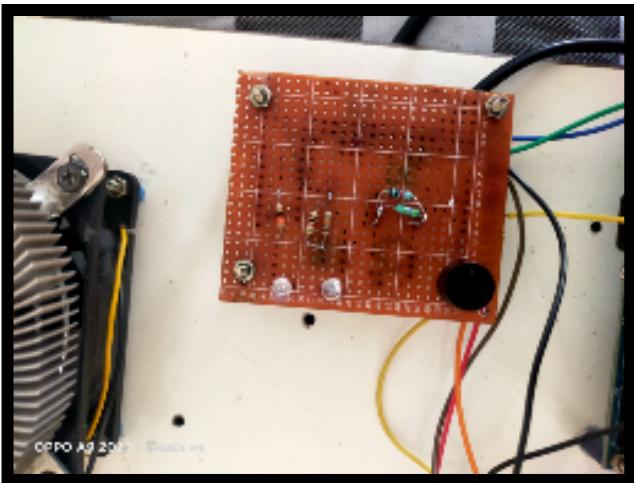
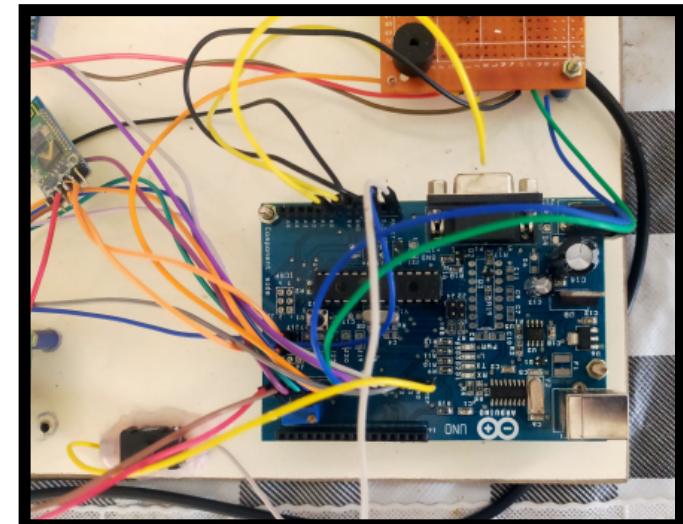
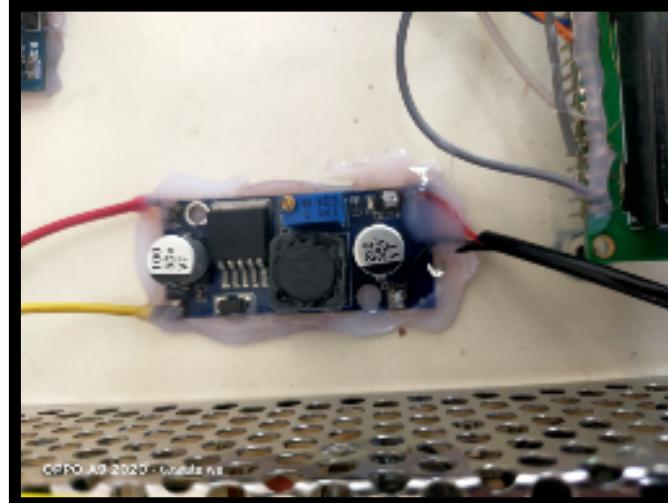
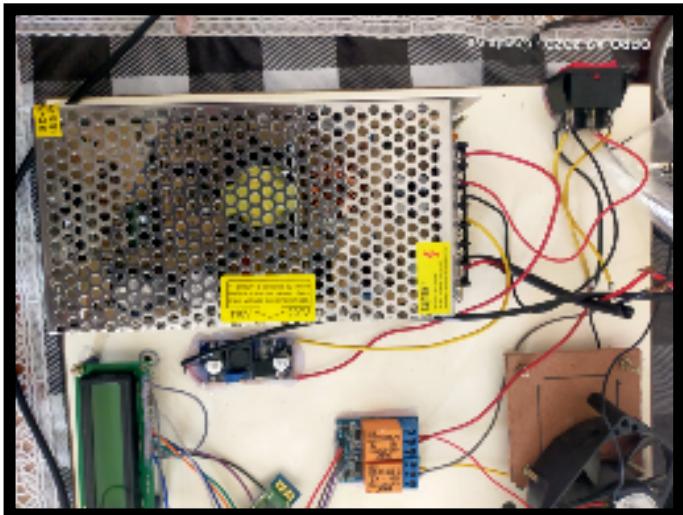


WORKING OF HARDWARE

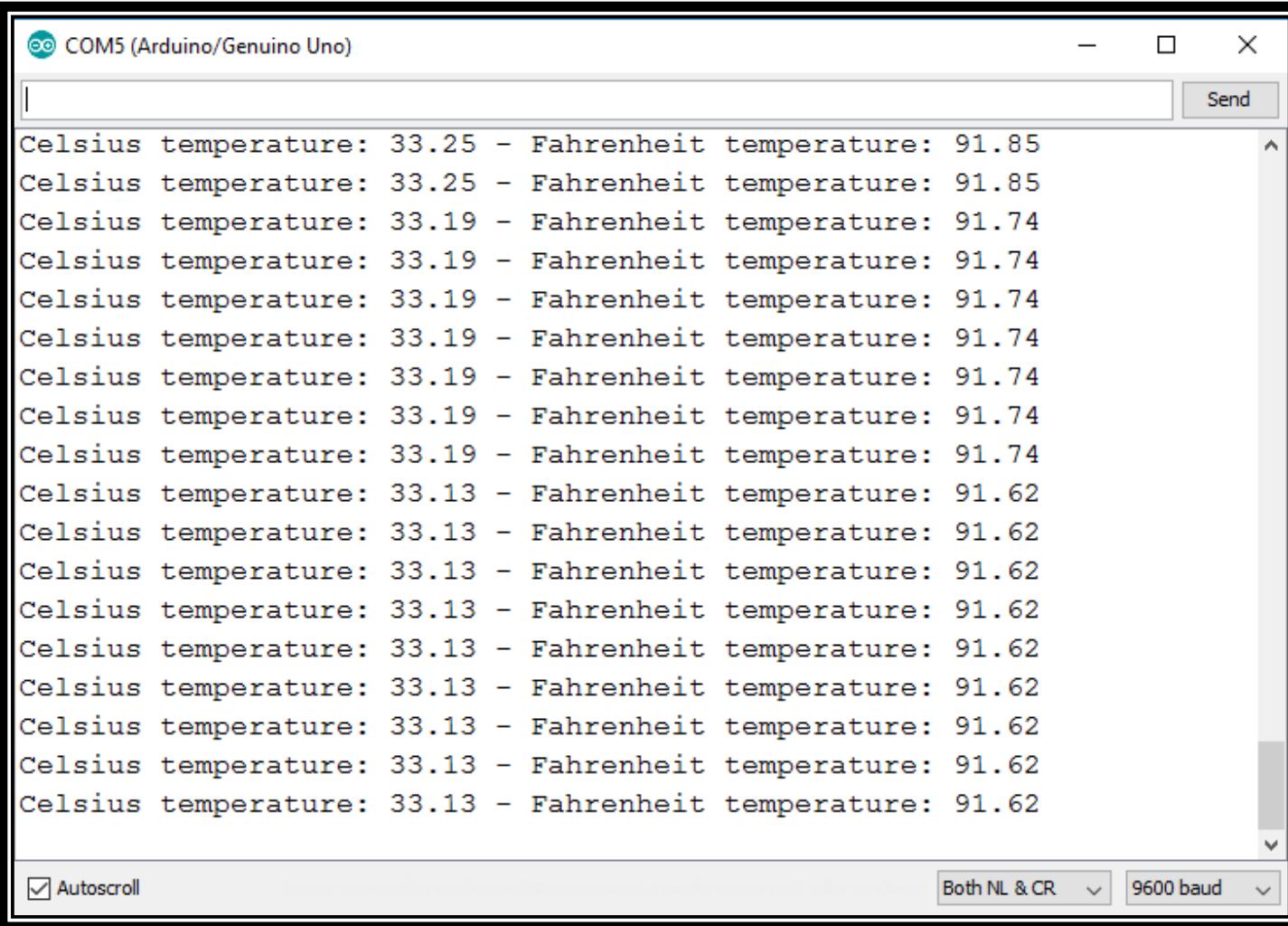
HARDWARE WORKING DEMO LINK :

<https://drive.google.com/file/d/19liH5KSQmK642vPkfkRXpbsmkwwBsyl8/view?usp=sharing>

HARDWARE INPUT IN ARDUINO



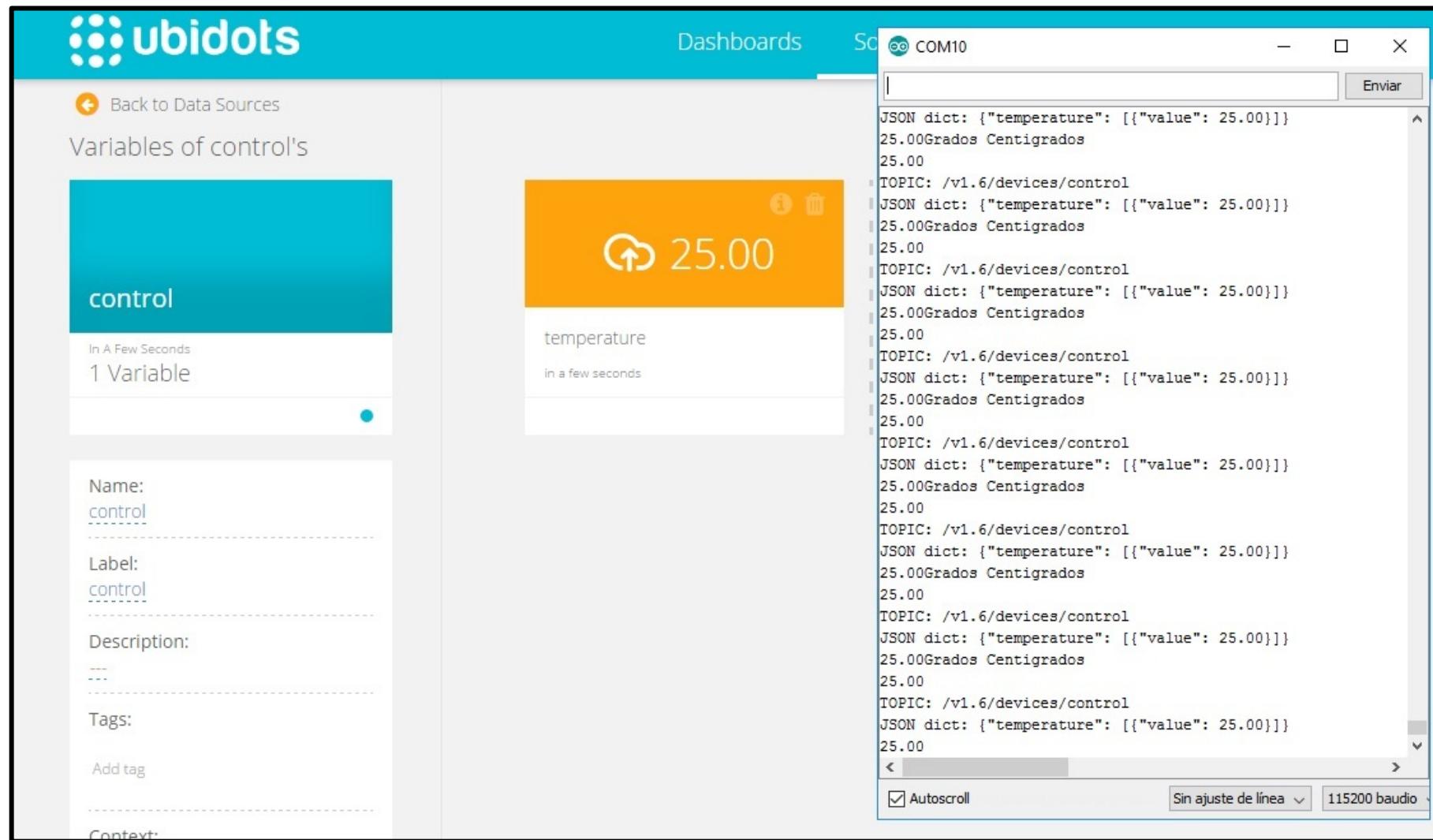
HARDWARE OUTPUT IN ARDUINO



The screenshot shows the Arduino Serial Monitor window titled "COM5 (Arduino/Genuino Uno)". The window displays a series of temperature readings. Each reading consists of two lines: "Celsius temperature: 33.25" followed by "Fahrenheit temperature: 91.85". The readings are repeated multiple times. At the bottom of the window, there is a checkbox labeled "Autoscroll" which is checked, and two dropdown menus for "Both NL & CR" and "9600 baud".

```
Celsius temperature: 33.25 - Fahrenheit temperature: 91.85
Celsius temperature: 33.25 - Fahrenheit temperature: 91.85
Celsius temperature: 33.19 - Fahrenheit temperature: 91.74
Celsius temperature: 33.13 - Fahrenheit temperature: 91.62
```

SOFTWARE OUTPUT IN UBIQOTS



ABSTRACT

This project proposes the development of a portable hot and cold smart decanter based on the Internet of Things (IoT) technology and the thermoelectric effect. The proposed device aims to provide users with a convenient and efficient way to regulate the temperature of their drinks while on the go. The decanter consists of a thermoelectric module, which can cool or heat the liquid inside the container. The module is controlled by an IoT-enabled microcontroller that receives temperature and user input data from a mobile application. The application allows users to set their desired temperature and monitor the temperature of the liquid in real-time. The device's design also incorporates a rechargeable battery, which ensures that it remains operational while on the move. The container's ergonomic design makes it easy to carry around, and the user-friendly application interface ensures ease of use. The project's main objective is to design a portable smart decanter that can regulate the temperature of beverages, making it ideal for individuals who enjoy hot or cold drinks while on the go. The proposed device's potential applications include outdoor activities, traveling, and commuting.

REFERENCES

- [1] Najmie, M. S., and M. K. Fadzly. "Thermoelectric portable water cooler using Arduino Uno." In *AIP Conference Proceedings*, vol. 2129, no. 1, p. 020147. AIP Publishing LLC, 2019.
- [2] Alsaif, Hussain F., and Mohammed A. Almaghrabi. "Smart Travel Mug for Hot and Cold Beverages." In *ASME International Mechanical Engineering Congress and Exposition*, vol. 58493, p. V014T07A015. American Society of Mechanical Engineers, 2017.
- [3] Patil, Rajendra P., Pradhyumna Suryawanshi, Akshay Pawar, and Avdhoot Pawar. "INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH TECHNOLOGY THERMOELECTRIC REFRIGERATION USING PELTIER EFFECT."
- [4] Attavane, Pavan, G. B. Arjun, Rajath Radhakrishna, and Santhosh Rao Jadav. "Solar powered portable food warmer and cooler based on peltier effect." In *2017 2nd IEEE International Conference on Recent Trends in Electronics, Information & Communication Technology (RTEICT)*, pp. 1975-1978. IEEE, 2017.

THANK YOU