Project Defense Presentation

DEVELOPMENT OF A PORTABLE INCUBATOR FOR THE DETECTION OF COLIFORM IN WATER

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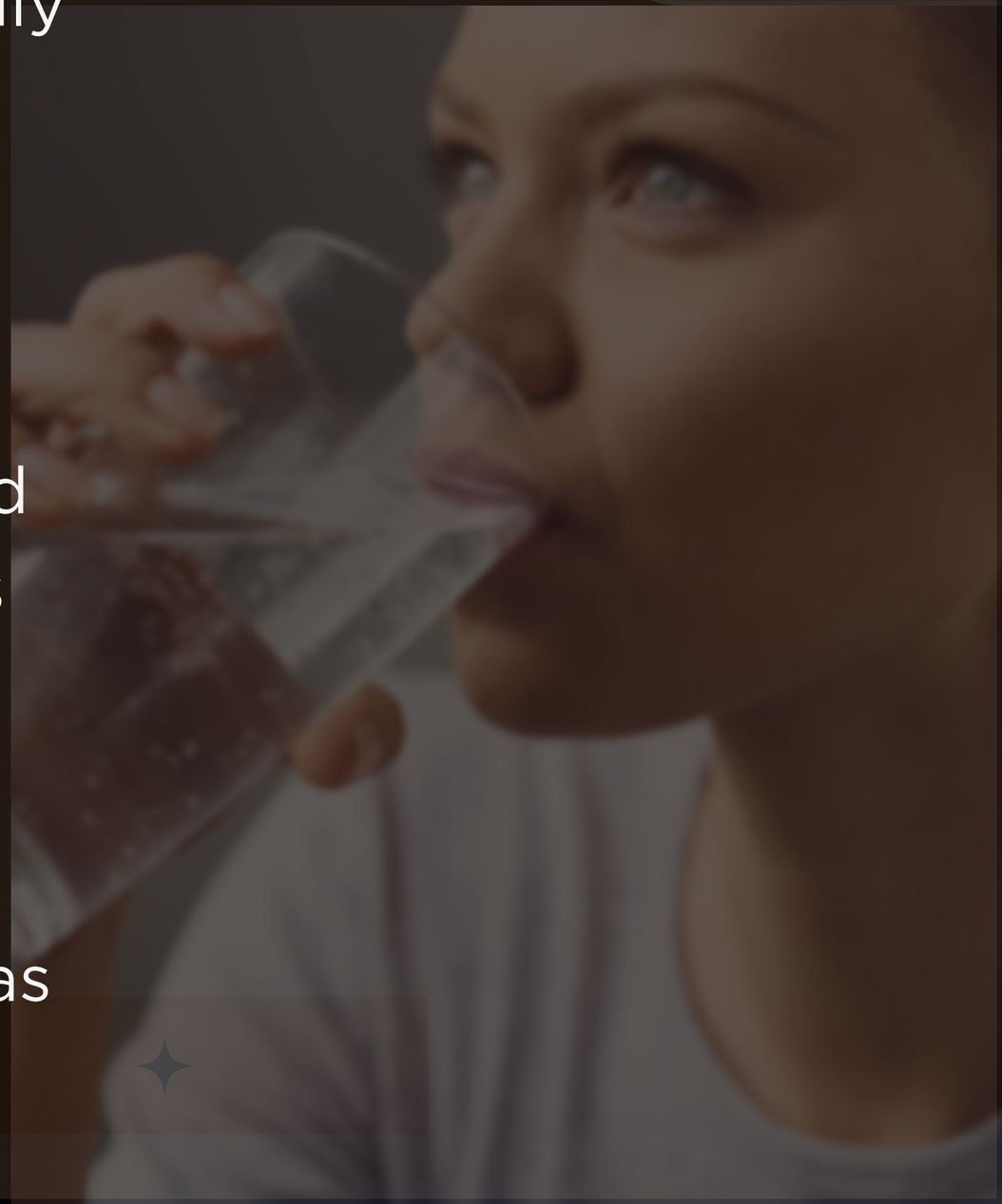
OVERVIEW

INTRODUCTION

Water is an essential component in our daily lives. All living things have a fundamental right to and need for safe and clean drinking water.

However, man is now concerned and afraid of it because of its significance as a means of spreading pathogenic organisms

Consumption of coliform contaminated water could lead to serious illnesses such as cholera, polio, diarrhea, hepatitis and typhoid.



800,000

According to the World Health Organization (**WHO**), diarrheal illnesses are among the top 15 global causes of death globally which is as a result of consuming unsafe water. Diarrhea kills more children than both tuberculosis and malaria combined. Each year, poor water hygeine causes more than **800,000 deaths** worldwide. This makes water quality assesment a must before consumption.

PROBLEMS

Problem 1

Traditional methods of water quality assessment and coliform detection are often time-consuming, labor-intensive, and require specialized equipment and trained personnel.

Problem 2

The lack of portable and user-friendly solutions hinders real-time monitoring and early detection of coliform bacteria, which is crucial for ensuring water safety

AIM AND OBJECTIVES

Aim

- To develop a portable incubator for the detection of coliform in water using IOT technology.

Objectives

- To design and construct a portable incubator that maintains a temperature range of 35-37°C using a relay to control the turning on and off a heating source.

- To integrate an LDR sensor and a bulb to detect coliform bacteria growth through changes in its resistance.

- To integrate the results to the Blynk platform for real-time monitoring and data visualization of coliform levels.

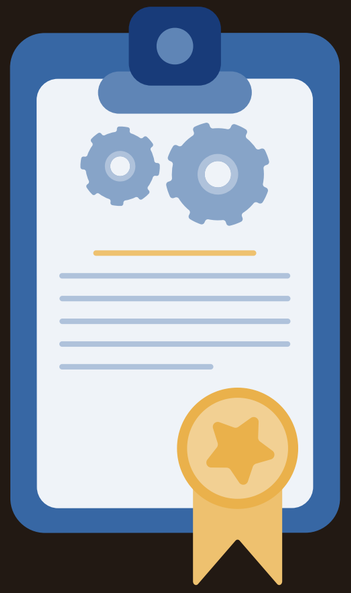
METHODOLOGY

The project follows the waterfall method which consists of the following phases:

- Requirement phase
- Analysis phase
- Design phase
- Implementation Phase
- Testing phase
- Deployment phase
- Maintenance phase

REQUIREMENTS

The requirements of the project are important as they serve as the foundation for the design, implementation and testing of the incubator. They include:



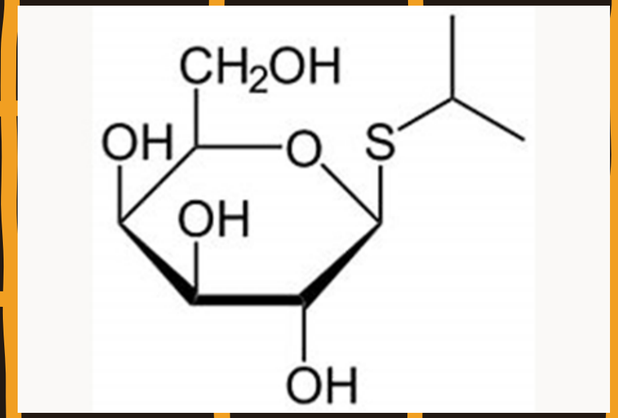
- **Functional requirements**
- **Performance requirements**
- **Power requirements**
- **Saftey requirements**

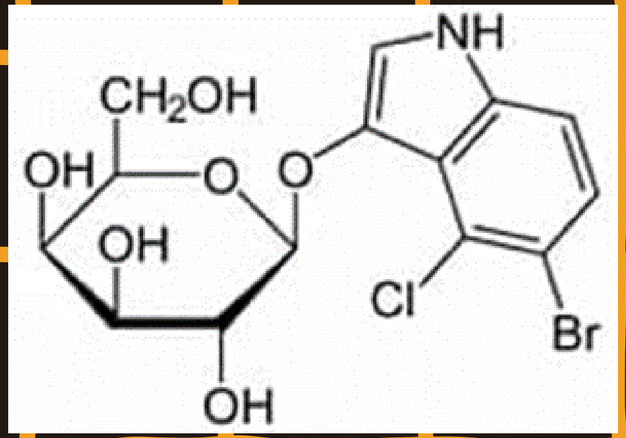
ANALYSIS

The analysis phase serves as the foundation for our testing phase.

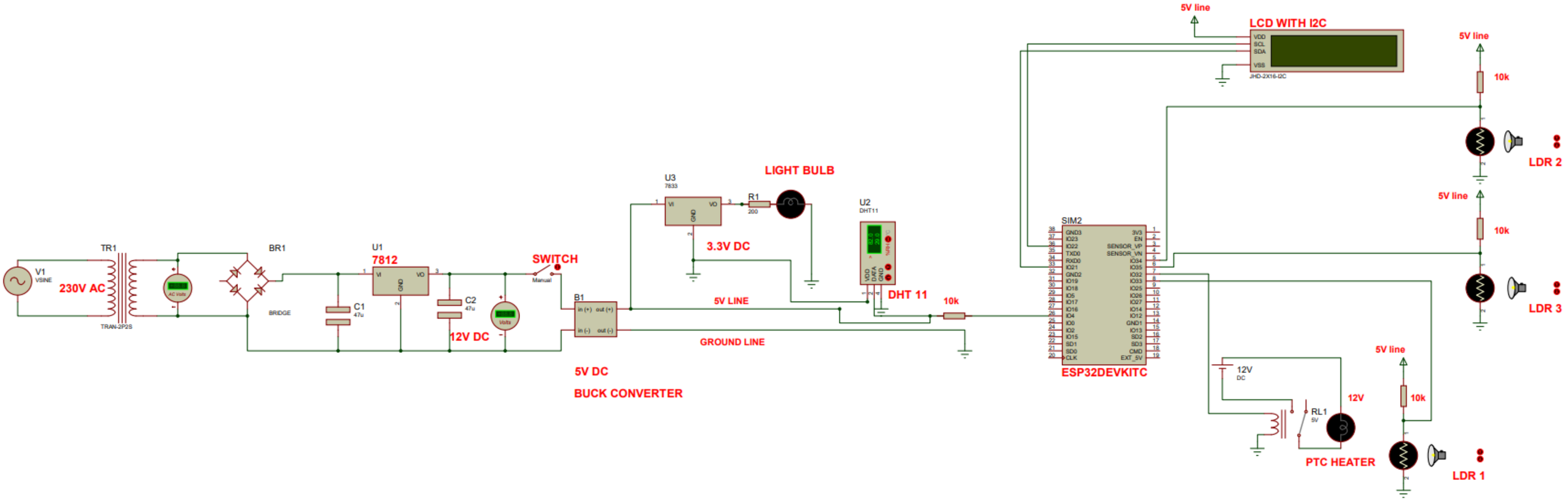
WATER DETECT COLIFORM

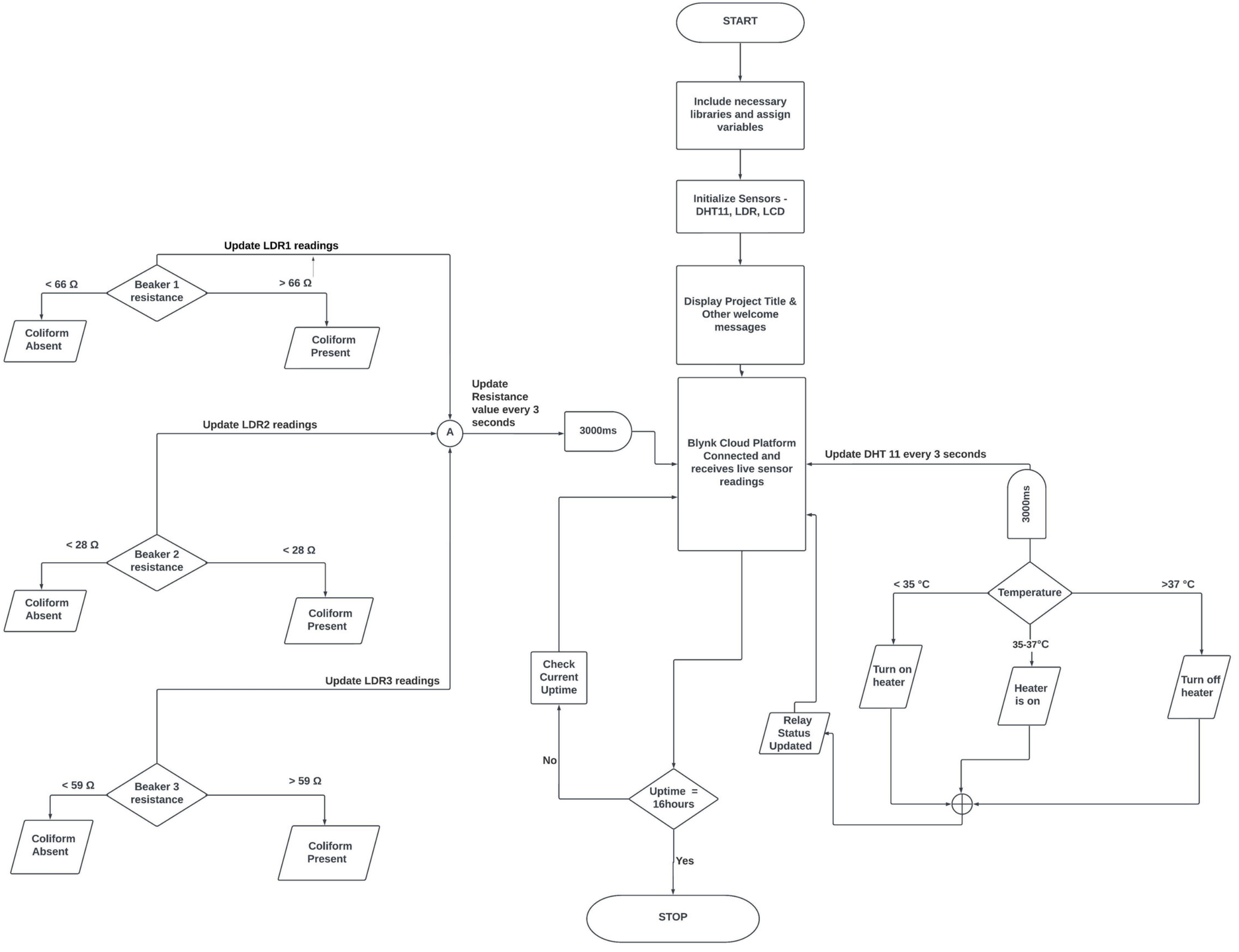
- **Isopropyl β-D-1-thiogalactopyranoside (IPTG)**
- **X-GAL (5-Bromo-4-chloro-3-indolyl-β-D-galactopyranoside)**
- **Sodium Lauryl Sulfate**





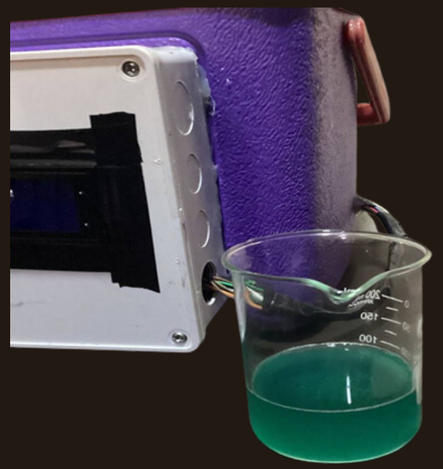
DESIGN

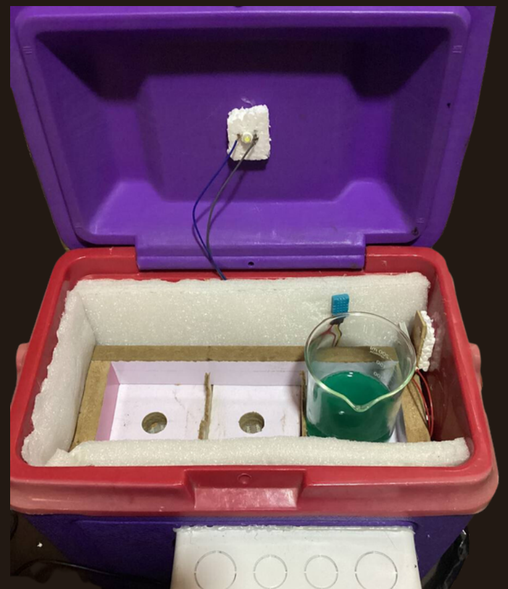

V1
VSINE
230V AC
TR1
TRAN-2P2S
BR1
BRIDGE
C1
47u
U1
7812
VI
GND
VO
C2
47u
12V DC
SWITCH
Manual
B1
in (+)
out (+)
in (-)
out (-)
5V DC
BUCK CONVERTER
U3
7833
R1
200
LIGHT BULB
3.3V DC
5V LINE
GROUND LINE
U2
DHT11
DHT 11
10k
SIM2
ESP32DEVKITC
5V line
LCD WITH I2C
VDD
SCL
SDA
VSS
JHD-2X16-I2C
10k
LDR 2
5V line
10k
LDR 3
5V line
12V
DC
RL1
5V
12V
PTC HEATER
10k
LDR 1

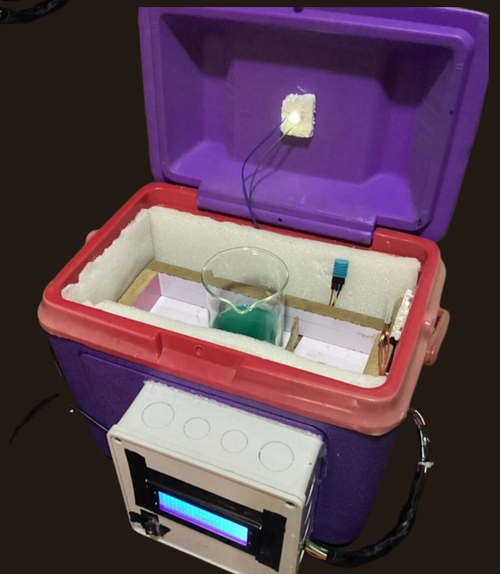

START
Include necessary libraries and assign variables
Initialize Sensors - DHT11, LDR, LCD
Display Project Title & Other welcome messages
Blynk Cloud Platform Connected and receives live sensor readings
Update Resistance value every 3 seconds
3000ms
A
Update LDR1 readings
Beaker 1 resistance
< 66 Ω
> 66 Ω
Coliform Absent
Coliform Present
Update LDR2 readings
Beaker 2 resistance
< 28 Ω
< 28 Ω
Coliform Absent
Coliform Present
Update LDR3 readings
Beaker 3 resistance
< 59 Ω
> 59 Ω
Coliform Absent
Coliform Present
Update DHT 11 every 3 seconds
3000ms
Temperature
< 35 °C
35-37°C
>37 °C
Turn on heater
Heater is on
Turn off heater
Relay Status Updated
Check Current Uptime
Uptime = 16hours
No
Yes
STOP

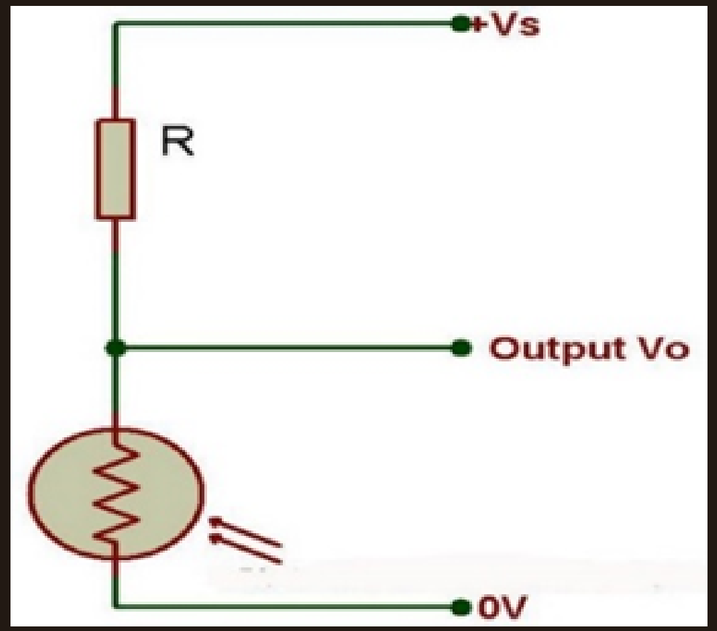
TESTING

The testing phase comes after the actual system has been implemented based on the design specifications.









RESULTS

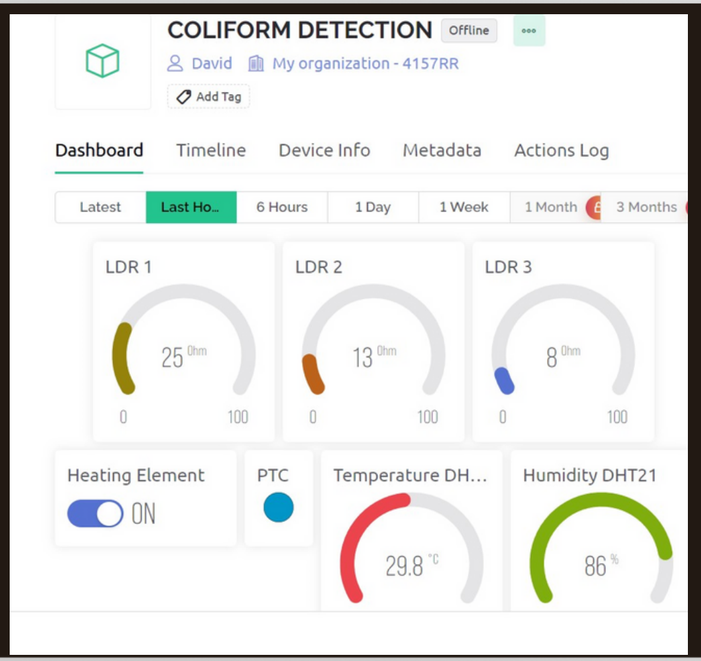

```
03:16:40.049 -> ldr value1 is: 66
03:16:40.049 -> ldr value2 is: 28
03:16:40.049 -> ldr value3 is: 59
```

ESP32 Dev Module

blynk.ino

```
176 if (ldr1_value < 66) {
177   lcd.clear();
178   lcd.setCursor(0, 0);
179   lcd.print("Beaker 1");
180   lcd.setCursor(0, 1);
181   lcd.print("Possible Absence");
182   lcd.setCursor(0, 2);
183   lcd.print("of Coliform");
184   lcd.setCursor(0,3);
185   lcd.print("Resistance: " + String(ldr1_value));
186   delay(3000);
187  }
188 else{
189   lcd.clear();
190   lcd.setCursor(0, 0);
191   lcd.print("Beaker 1");
192   lcd.setCursor(0, 1);
193   lcd.print("Possible Presence");
194   lcd.setCursor(0, 2);
195   lcd.print("of Coliform");
196   lcd.setCursor(0,3);
197   lcd.print("Resistance: " + String(ldr1_value));
```

```
200 lcd.clear(); // clear the LCD after displaying the status of
201 if(ldr2_value < 28){
202   lcd.clear();
203   lcd.setCursor(0, 0);
204   lcd.print("Beaker 2");
205   lcd.setCursor(0, 1);
206   lcd.print("Possible Absence");
207   lcd.setCursor(0, 2);
208   lcd.print("of Coliform");
209   lcd.setCursor(0,3);
210   lcd.print("Resistance: " + String(ldr2_value));
211   delay(3000);
212 }
213 else{
214   lcd.clear();
215   lcd.setCursor(0, 0);
216   lcd.print("Beaker 2");
217   lcd.setCursor(0, 1);
218   lcd.print("Possible Presence");
219   lcd.setCursor(0, 2);
220   lcd.print("of Coliform");
221   lcd.setCursor(0,3);
222   lcd.print("Resistance: " + String(ldr2_value));
223   delay(3000);
224 }
```



RECOMMENDATION

Using a Swarm M138 Satellite Transceiver

CONCLUSION

Successful design and construction

Contribution towards SDG goal

Easier access


Thank You
Asante
Arigato
obrigado
Dank Je
Mochchakkeram
Matur NUWUN
Matondo
Dankon
Ua Tsaug Rau Koj
obrigado
Mochchakkeram
Multumesc
Spasibo
Spasibo
Grazie
cam on ban
Merci
Nirringrazzjak
Salamat
Vinaka
Mochchakkeram
Terma Kasih
Raibh Maith Agat
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Mochchakkeram
Ua Tsaug Rau Koj
Maake
Matondo
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Asante
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