

# PROJECT

## IOT BASED ON HOME AUTOMATION

**Emertxe Technologies**

**Internship : IoT**

*Presented by :*

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- IMPLEMENTATION

# TOPICS LEARNT DURING INTERNSHIP

## C Programming

Keywords

Basic data types --- int, char, float, double, void

Operators

Conditional constructs and Looping concepts

Arrays

Pointers Functions --- Built-in and User defined functions

Storage Classes Pre-processor directives and header files

# TOPICS LEARNT DURING INTERNSHIP

## C++ Programming

OOP concepts

- Introduction to IoT  
Definition of IoT  
IoT Architecture
- Introduction to Embedded systems  
Definition Types of Embedded systems  
Components of Embedded systems
- Peripherals  
LED  
Arduino Uno  
CLCD -- 14 pins description of CLCD  
ADC --- Use of ADC in Arduino

# Peripherals required for the Project

- LDR Sensor

To read the sensor values and based on the reading vary the brightness of LED(Garden lights).

- Temperature System

It consists of heater, cooler, LM35 (temperature sensor). We can read the temperature from the temperature sensor

- Serial Tank

We can read the volume of the water in the tank through serial communication

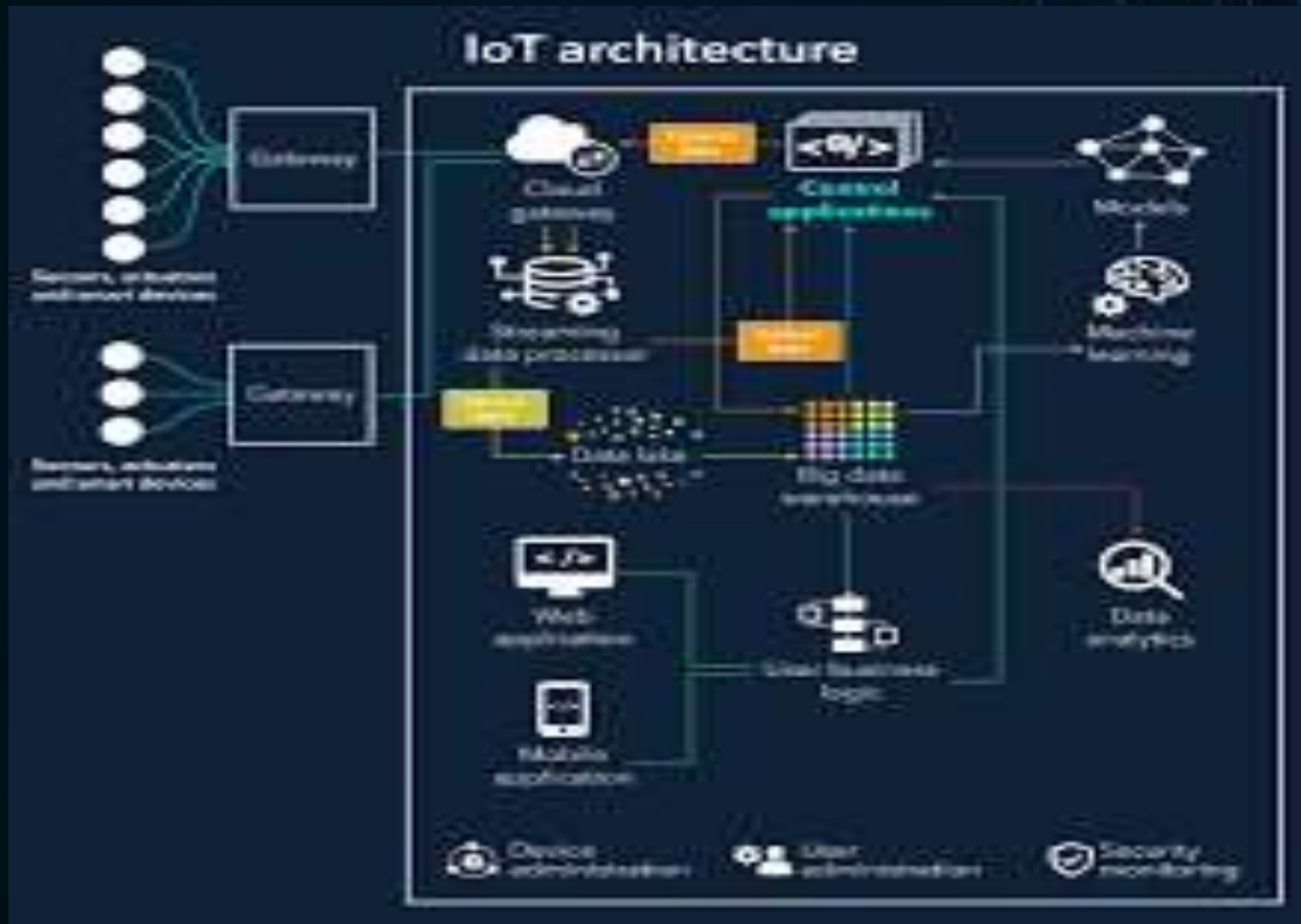
# WHAT IS IOT?

The Internet of Things (IoT) is the network of physical objects that contain embedded technology to communicate and sense or interact with their internal states or the external environment.

These devices range from ordinary household objects to sophisticated industrial tools. With more than 7 billion connected IoT devices today, experts are expecting this number to grow to 10 billion by 2020 and 22 billion by 2025.

By means of low-cost computing, the cloud, big data, analytics, and mobile technologies, physical things can share and collect data with minimal human intervention. In this hyper connected world, digital systems can record, monitor, and adjust each interaction between connected things. The physical world meets the digital world-and they cooperate.

# IoT Architecture





# WHAT IS EMBEDDED SYSTEM?

- Any combination of hardware and software which is intended to do a specific task can be called an Embedded System
- It has 3 parts; software, firmware and hardware.
- Unlike computers, embedded systems perform few specific limited tasks.
- Embedded Devices have peripherals such as Serial Communication Interfaces (SCI), Synchronous Serial Communication Interface, Universal Serial Bus (USB), Multi Media Cards (SD cards, Compact Flash) etc.





# EMBEDDED SYSTEM

## Embedded system



# PROJECT REQUIREMENTS

- Control garden lights on basis of sunlight intensity: Lesser the sunlight brighter the garden lights
- Temperature system control: Switch heater and cooler ON or OFF remotely. Switch heater OFF automatically if temperature indoors exceeds 35' C.
- Water tank control: Switch inlet and outlet valve ON or OFF remotely. Switch inlet valve OFF automatically if the tank fills up. Switch inlet valve ON automatically if volume of tank drops below 2000L

# REQUIREMENTS

## ■ HARDWARE REQUIREMENTS

- ARDUINO UNO
- ETH-W5500
- PCF-8574
- TEMPERATURE SENSOR
- LCD HD44780
- LDR SENSOR
- LED

## ■ SOFTWARE REQUIREMENTS

- ARDUINO IDE : To code
- PICSIMLAB: For simulation
- NULL MODEM EMULATOR : To configure ports of serial remote tank
- Blynk IOT app : Cloud server

# ARDINO UNO

- Arduino UNO is based on an ATmega328P microcontroller.
- It is easy to use compared to other boards, such as the Arduino Mega board, etc. The board consists of digital and analog Input / Output pins (I/O), shields, and other circuits.
- The Arduino UNO includes 6 analog pin inputs, 14 digital pins , a USB connector, a power jack, and an ICSP (In-Circuit Serial Programming) header.
- It is programmed based on IDE, which stands for Integrated Development Environment. It can run on both online and offline platforms



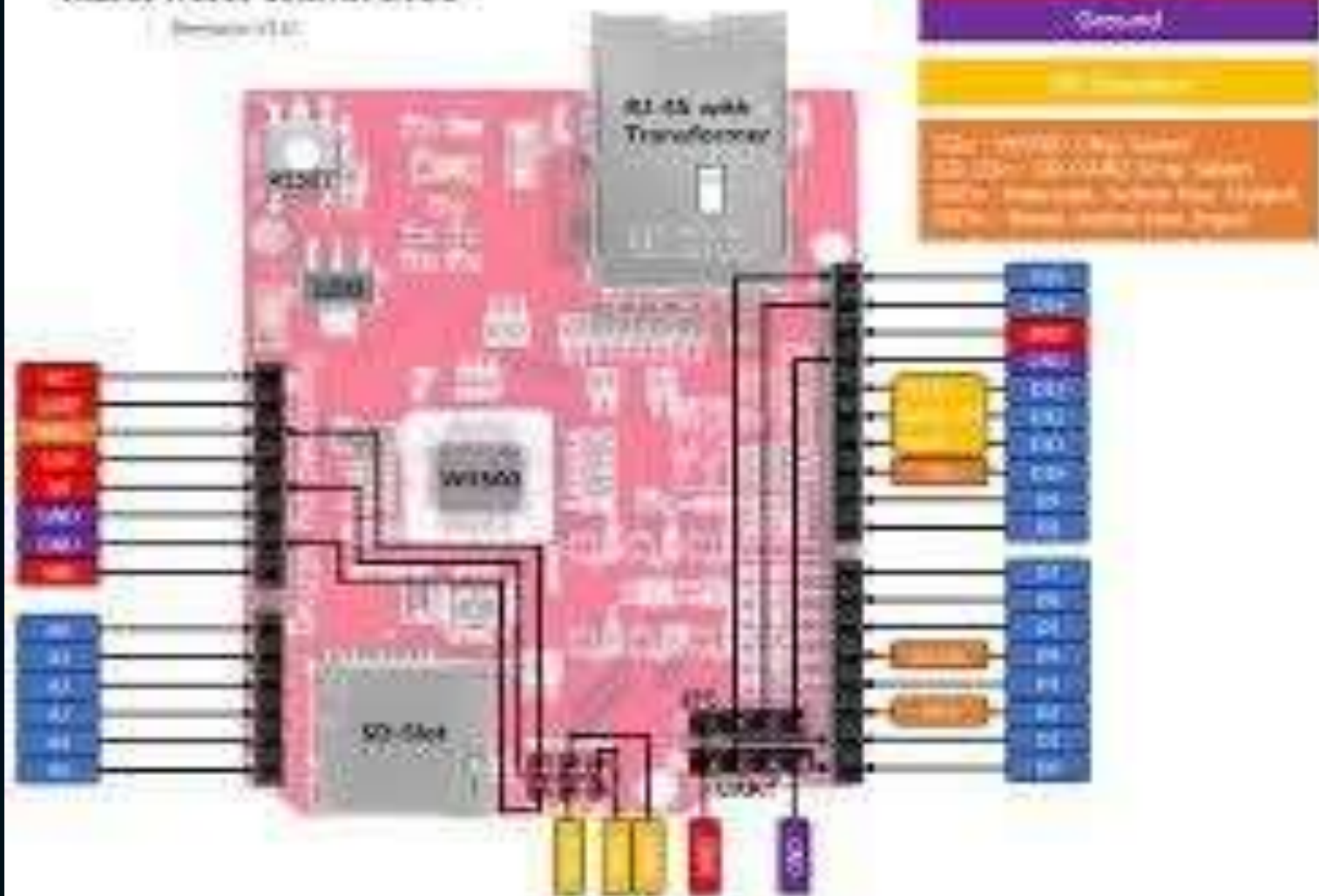
# ETH W5500

- The W5500 chip is a Hardwired TCP/IP embedded Ethernet controller that provides easier Internet connection to embedded system.
- W5500 enables users to have the Internet connectivity in their applications just by using the single chip in which TCP/IP stack, 10/100 Ethernet MAC and PHY embedded.
- Supports Power down mode.
- Supports Wake on LAN over UDP . Supports High Speed Serial Peripheral Interface(SPI MODE 0,3).



# WIZnet W5500 Ethernet Shield

Revision 1.1.1





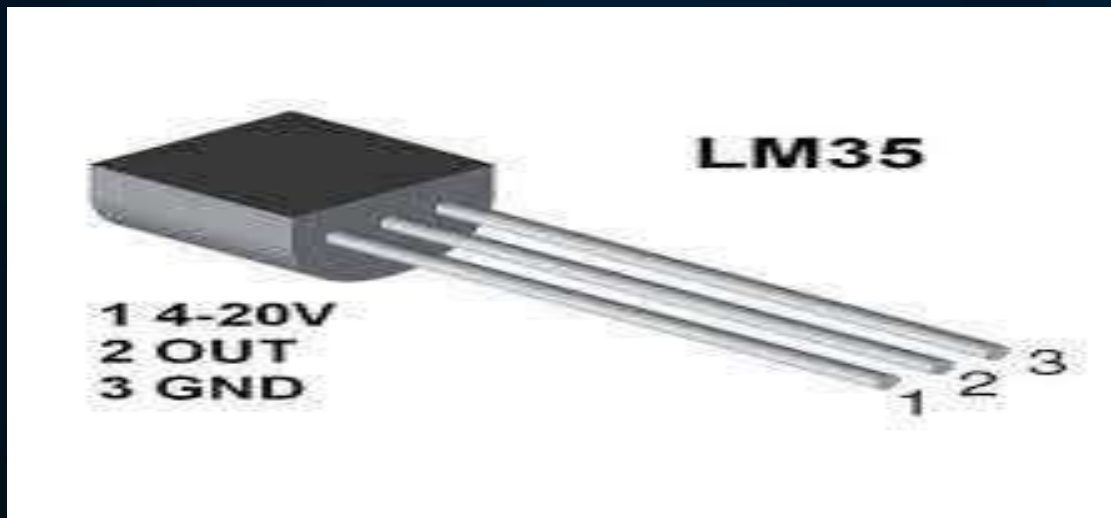
# PCF 8574

- The PCF8574 is a silicon CMOS circuit
- It provides general purpose remote I/O expansion for most microcontroller families via the two-line bidirectional bus (I2C).
- The device consists of an 8-bit quasi-bidirectional port and an I2C-bus interface.



# TEMPERATURE SENSOR

- A Temperature sensor is an electronic device that measure the temperature of its environment and converts the input data into electronic data to record, monitor, or signal Temperature changes.



# LCD HD44780

- LCD HD44780 is dot-matrix liquid crystal display controller and driver LSI displays alphanumeric and symbols .
- It can be configured to drive a dot-matrix liquid crystal display under the control of a 4 or 8-bit microprocessor.

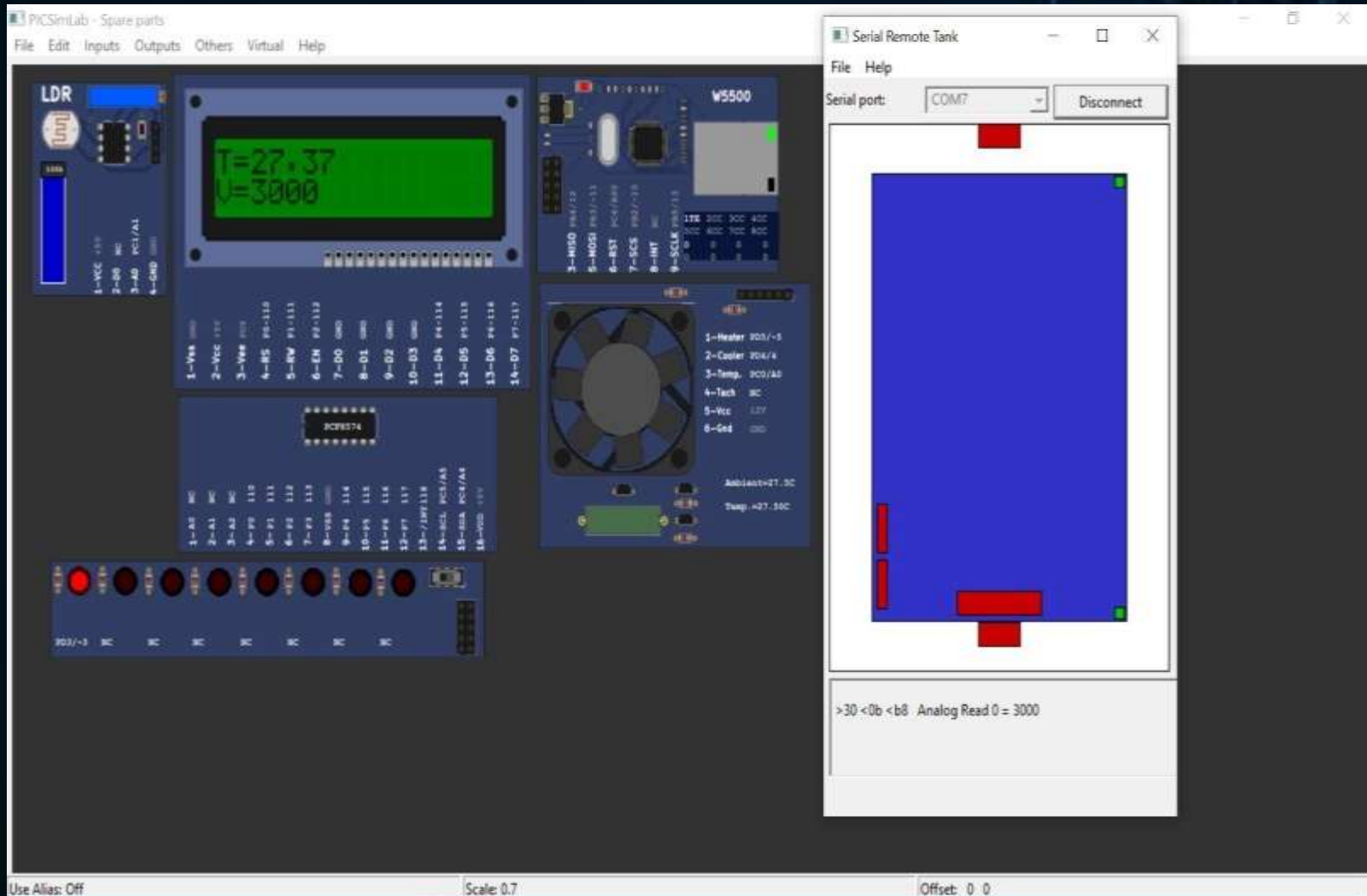


# LDR SENSOR

- An LDR is a component that has a (variable) resistance that changes with the light intensity that falls upon it. This allows them to be used in light sensing circuits .
- The resistance of a Photo resistor decreases with increasing incident light intensity. In other words, it exhibits photoconductivity.



# Step 1 :- When we load the hex file





LDR is HIGH so LED is ON

LDR is LOW so LED is OFF





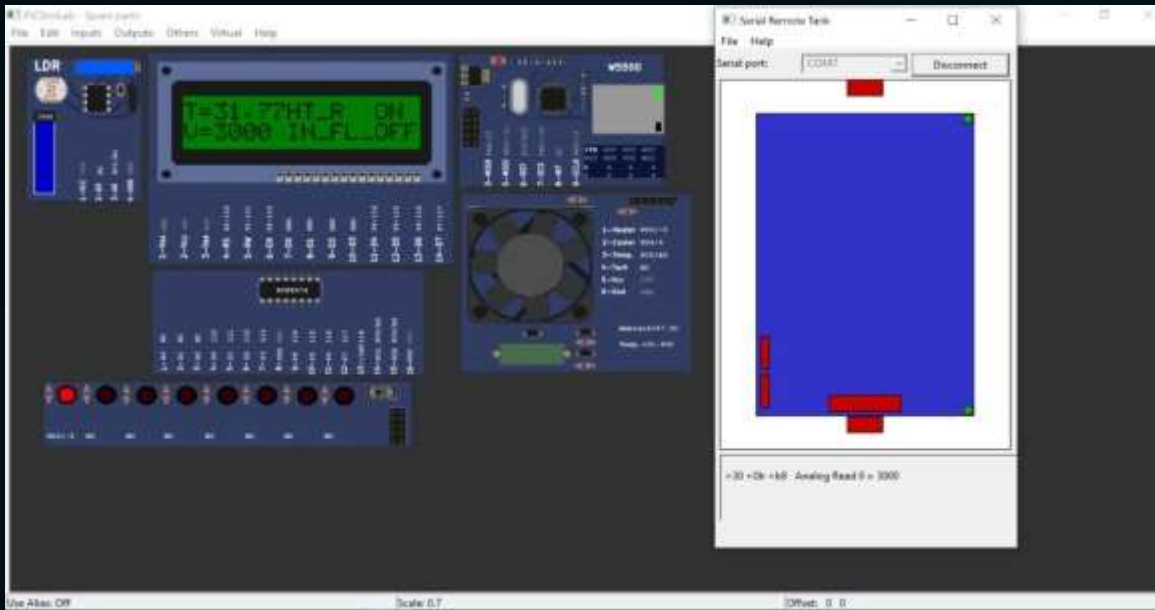


Cooler is ON

Cooler is OFF



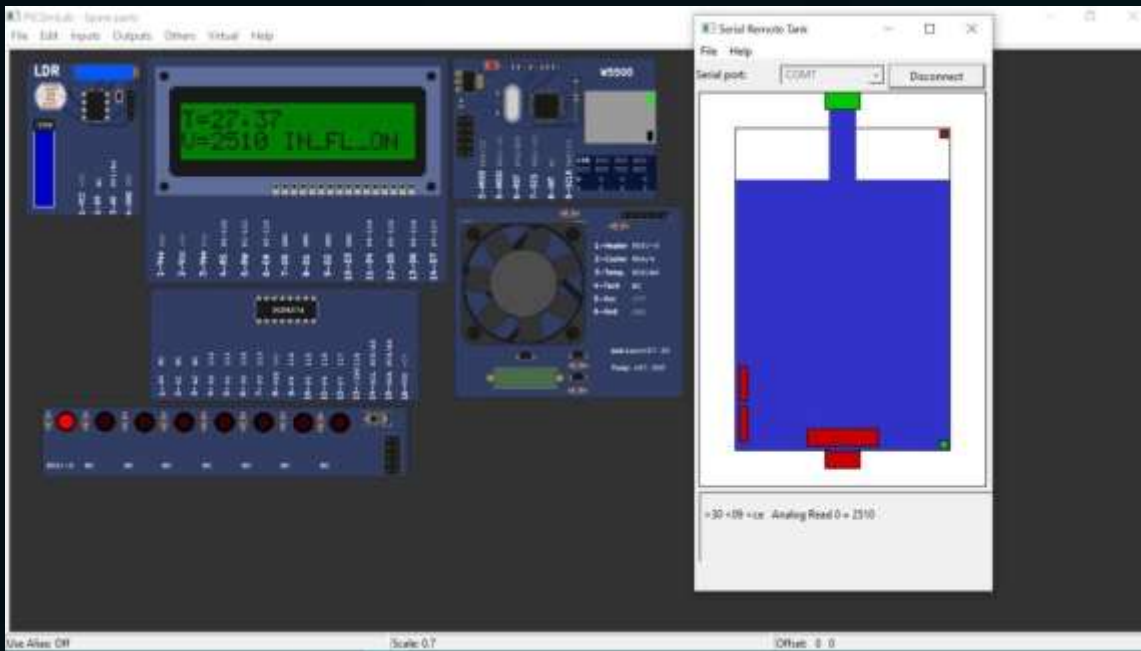




Heater is ON

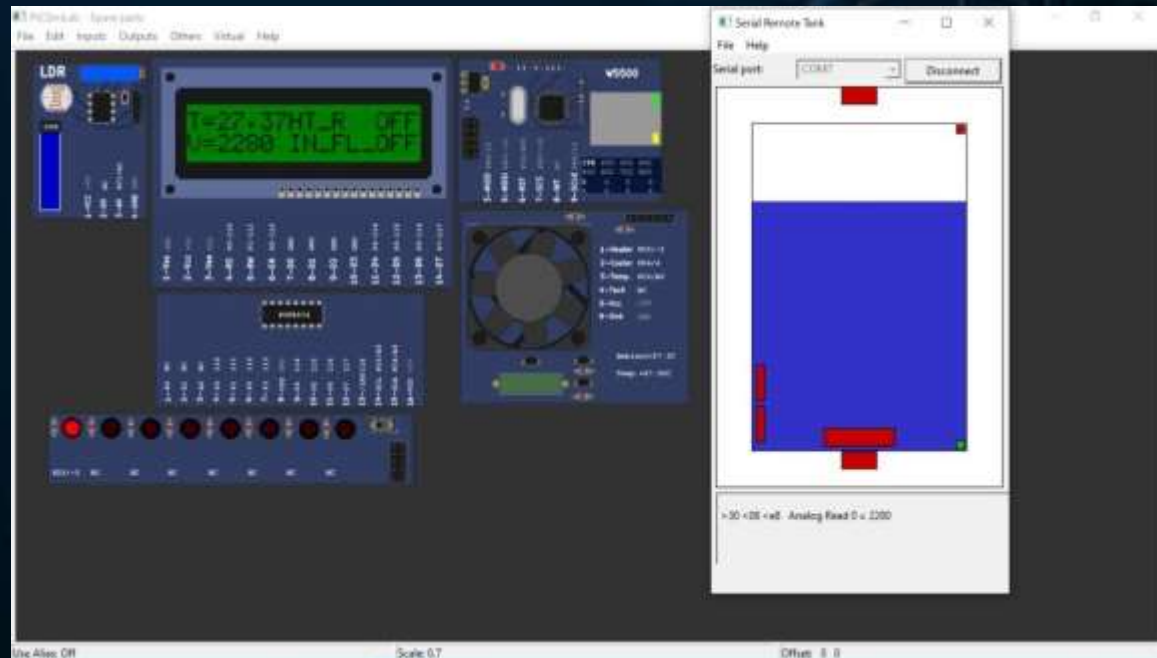
Heater is OFF

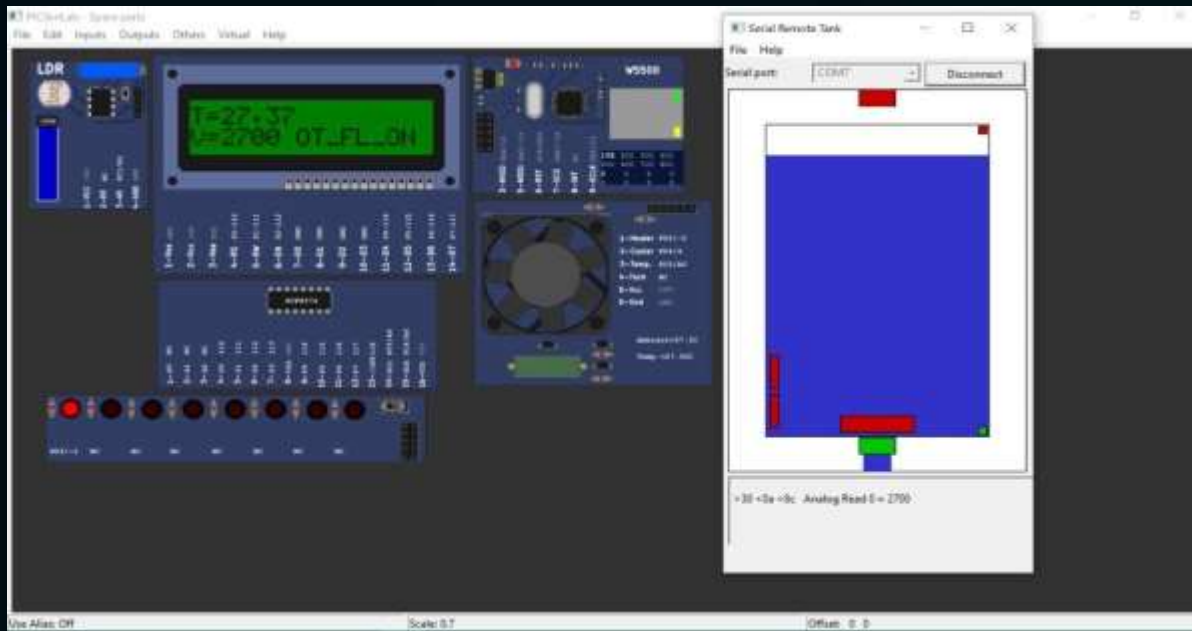




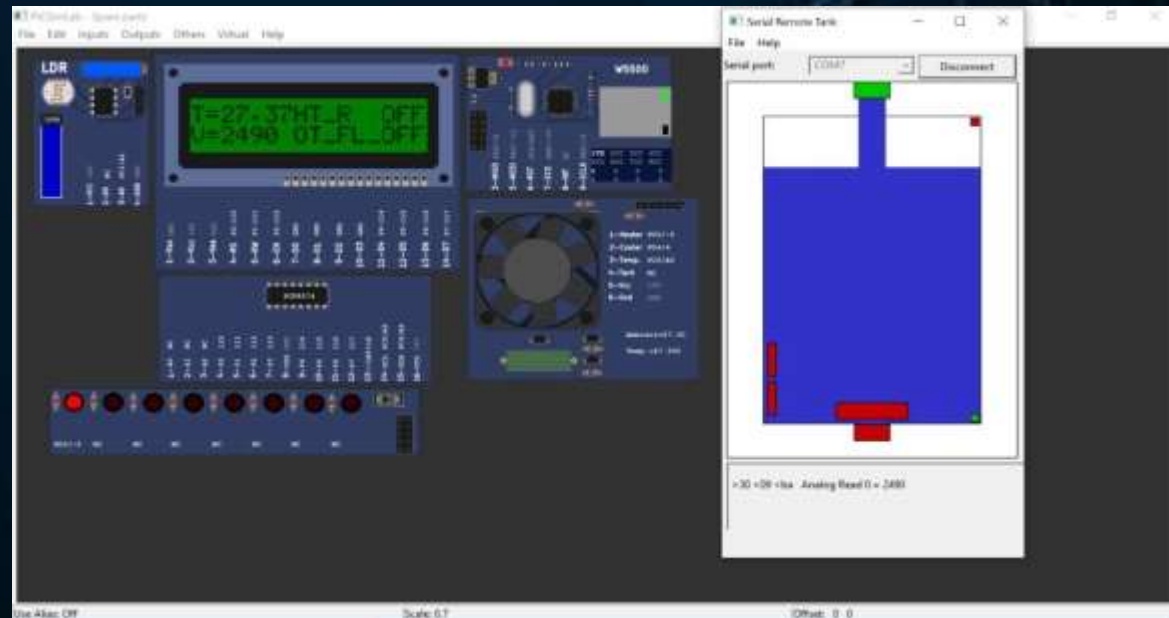
Inlet Valve is ON

Inlet Valve is OFF

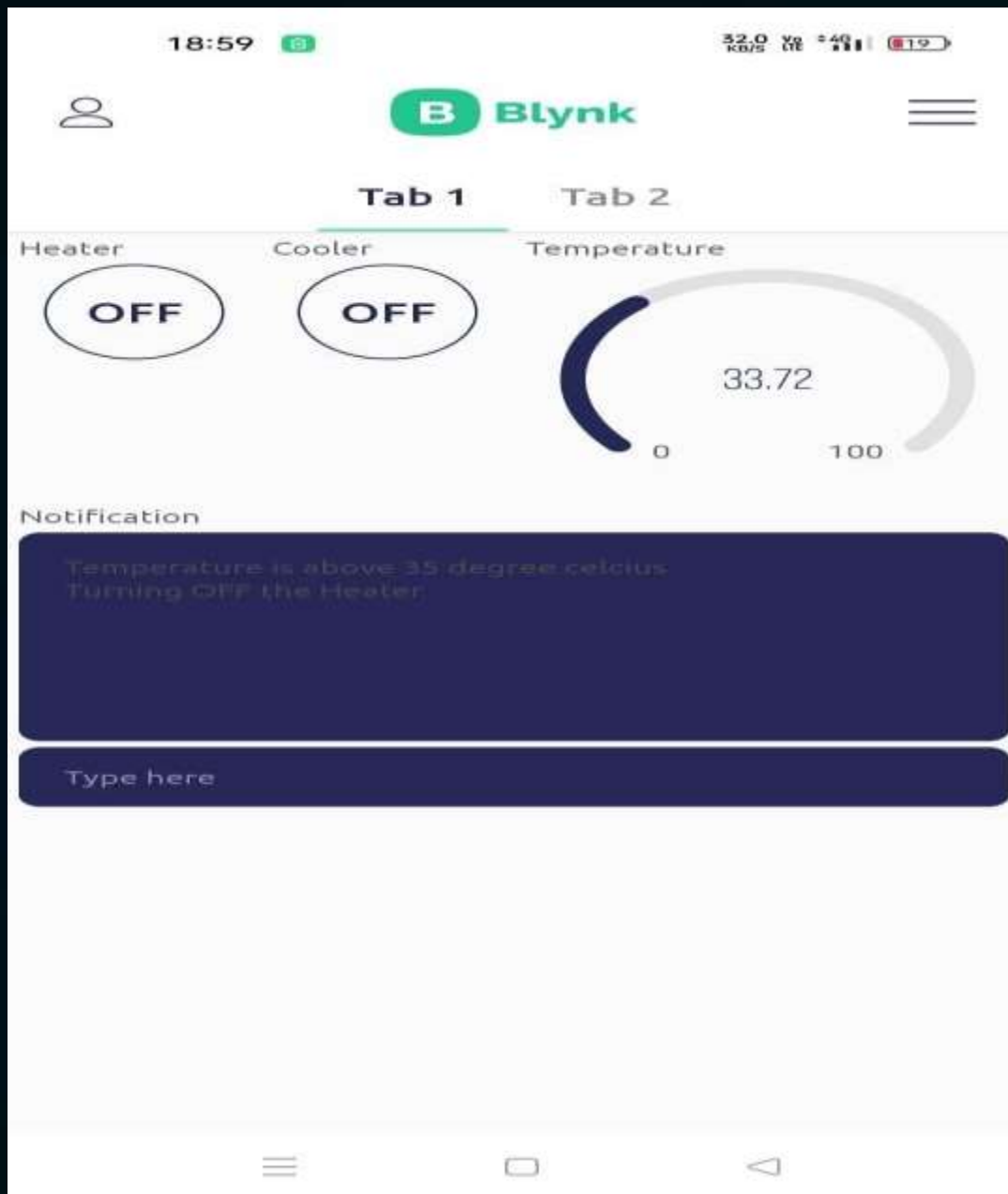




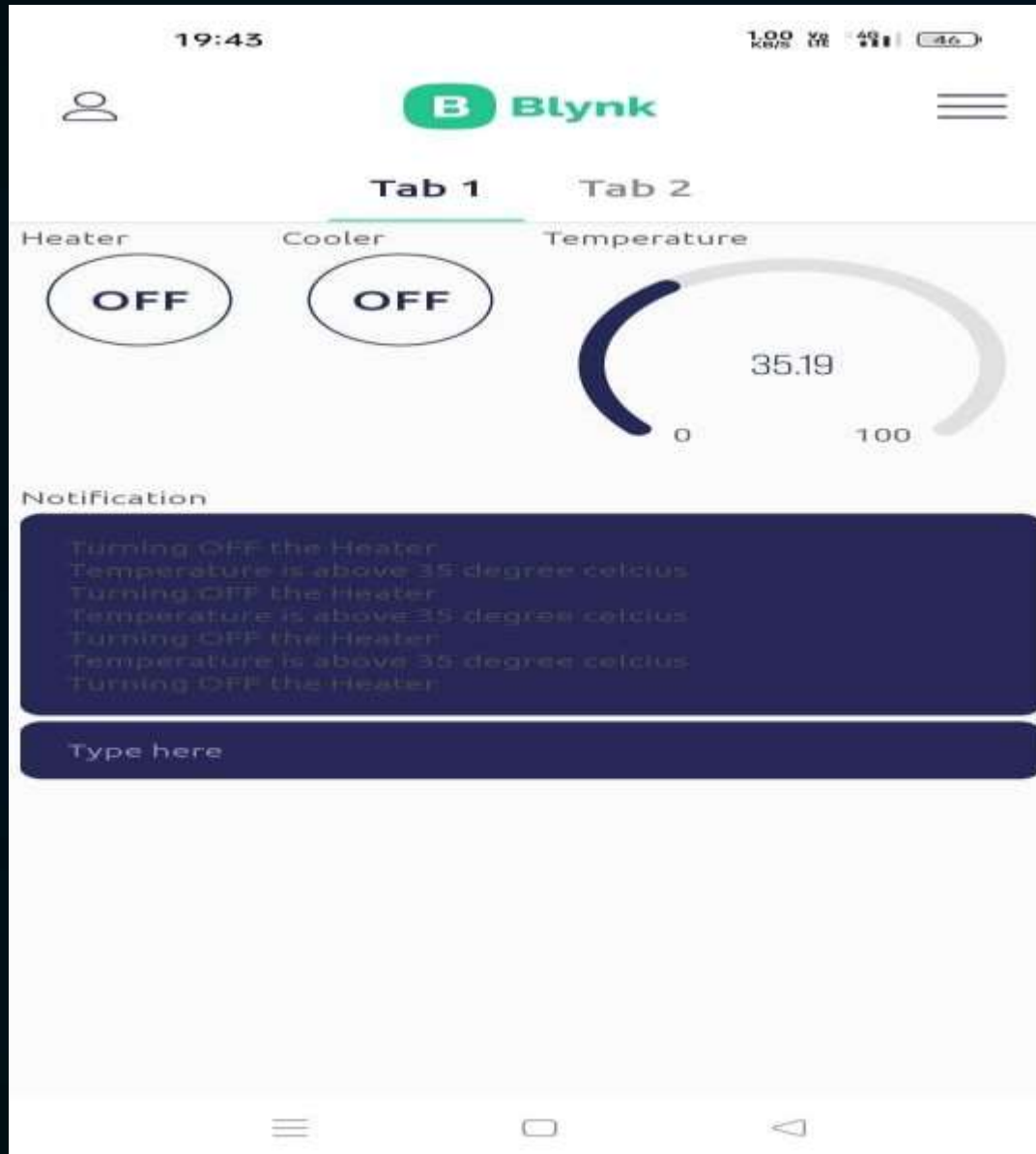
Outlet Valve is ON



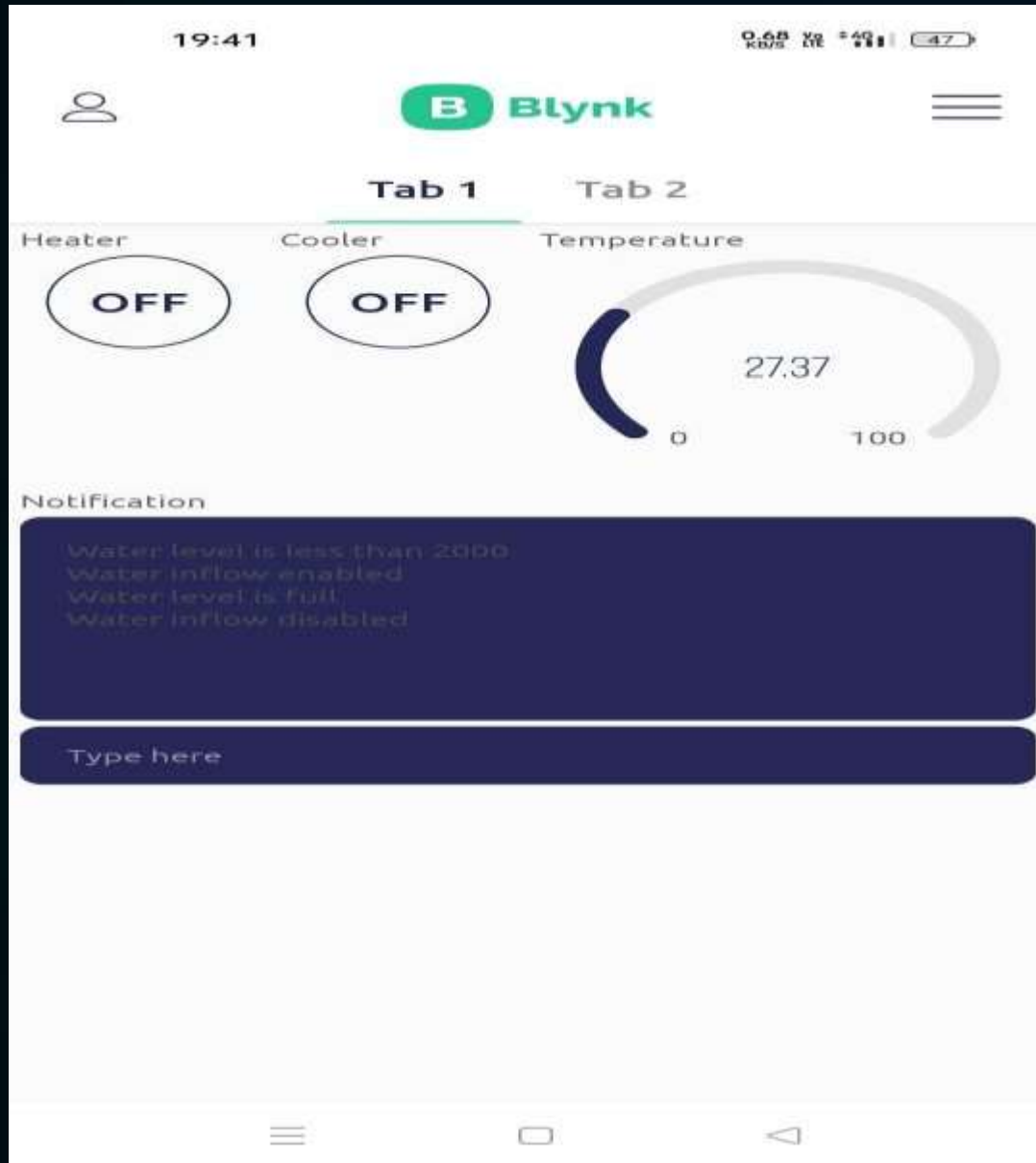
Outlet Valve is OFF



Notification of  
heater temperature

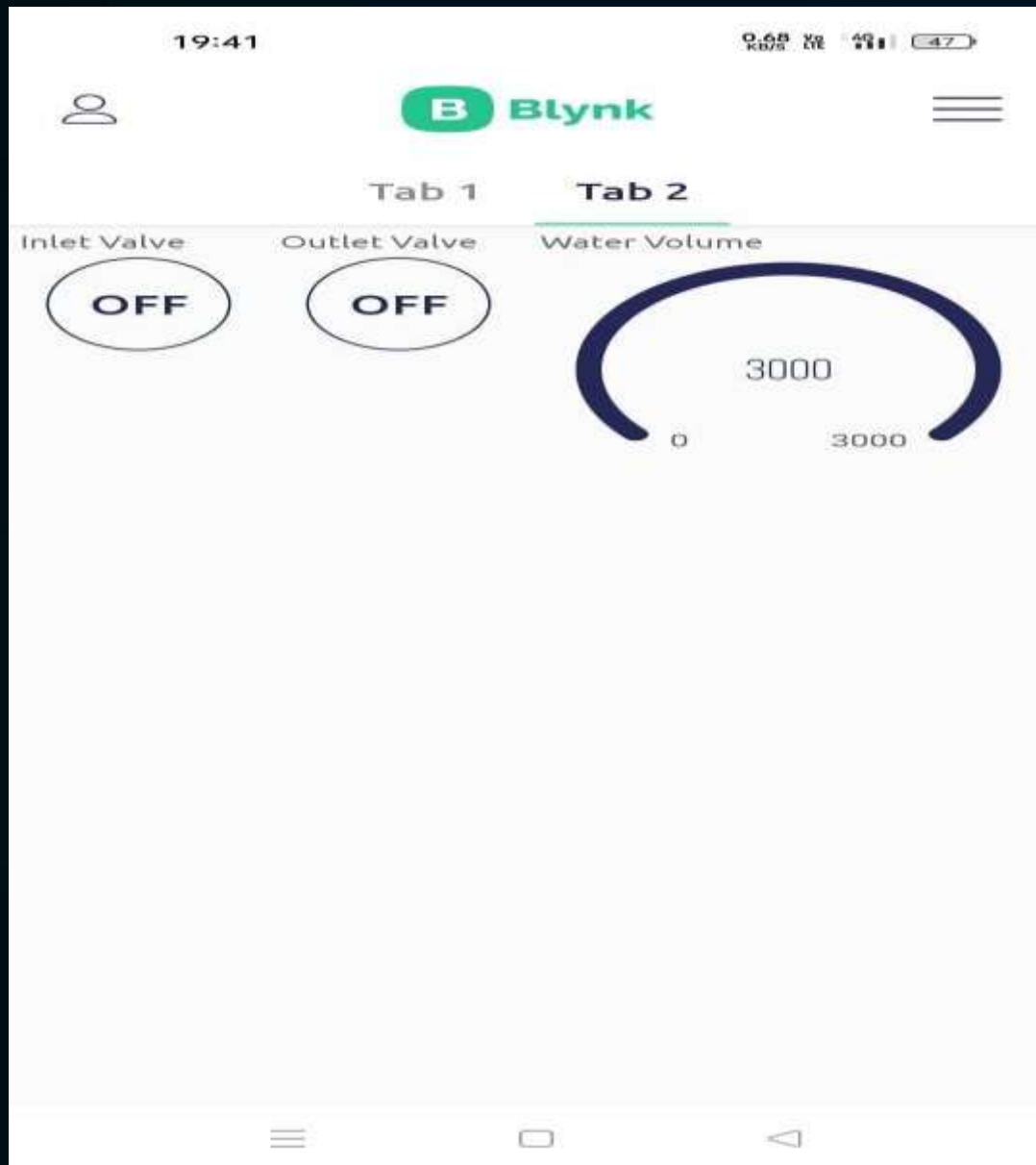


Heater will automatically turn OFF when temperature rises above 35



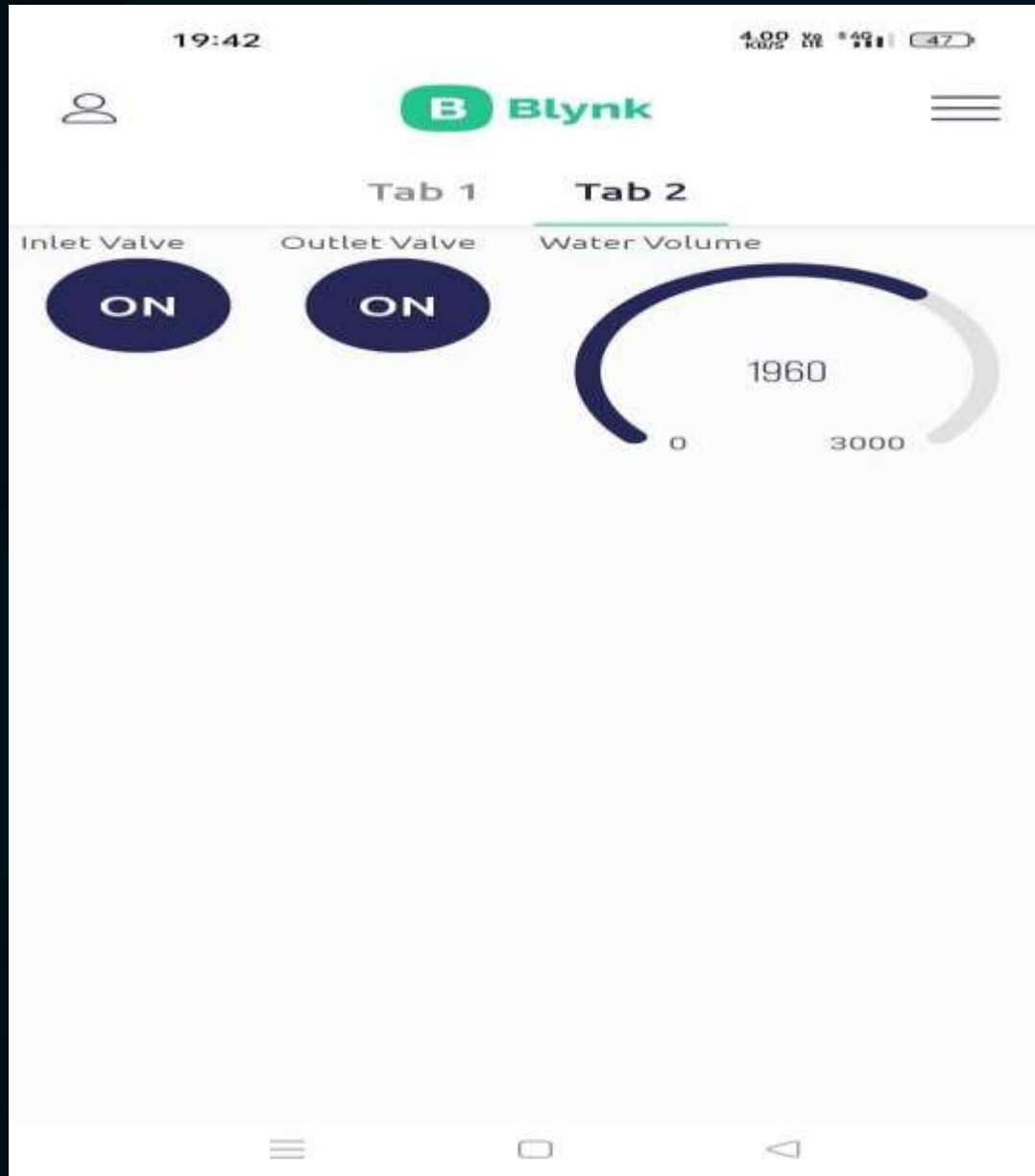
Notification of  
water level





Water tank is  
full - Inlet valve  
will  
automatically  
turn OFF





Water volume  
level

# CONCLUSION

- Using BLYNK IoT application and Picosimlab simulator, simulated home automation, where LED, temperature system, Serial tank resembles Light, Heater, Cooler and Water tank in real time.
- CLCD acts like a dashboard used for displaying the events, Widgets from Blynk IoT app like button widgets are used to control heater, cooler and inlet valve, outlet valve .
- Gauge widgets to display the temperature and volume of the water.

# THANK YOU

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