

# IoT Based Project Home Automation

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# About the Internship:

- Emertxe information technology, Bangalore
- Duration 4 weeks
- Organized, Structured, and Standard
- Learning with implementation
- Student Support (Moodle LMS)
- Free Resources and Tools
- Project based learning
- Weekly Evaluation of student

# Topics to Learn

## Learning Part

- C/C++ Programming
- OOP's Concepts
- IoT Introduction
- Embedded System
- Workshop

## Project Part

- Peripherals
- Arduino programming
- Pcsimlab Simulation
- Blynk IoT App
- Home automation Project

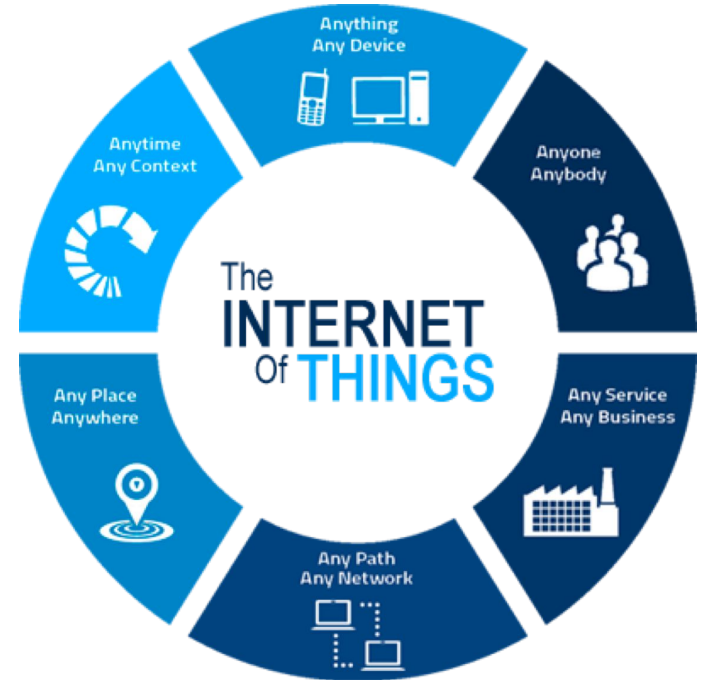
# What is IoT ?

IoT — The Internet of Things

Internet : Network

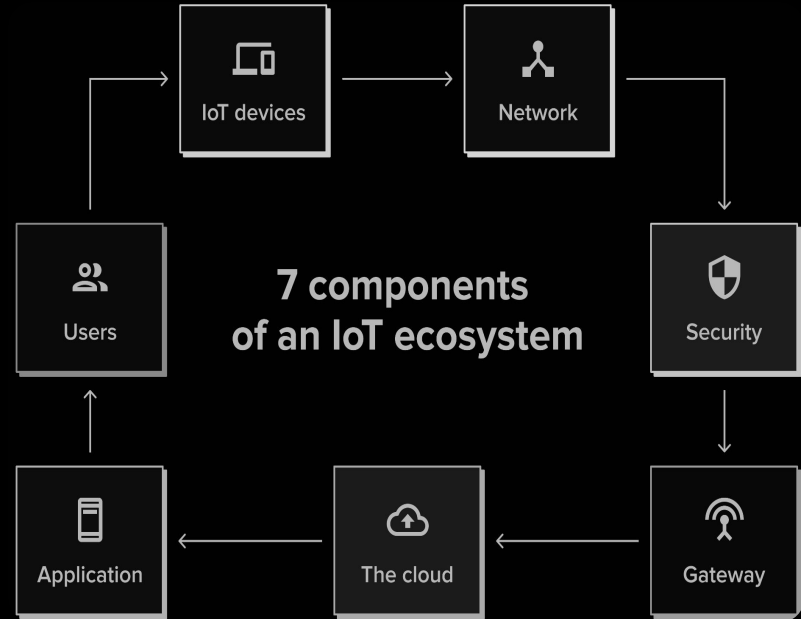
Things : Objects

- The Combination of objects with the help of network (Internet).
- IoT is the network of physical objects
- Collection of electronics, software, sensors, and network connectivity, which collect and exchange the data



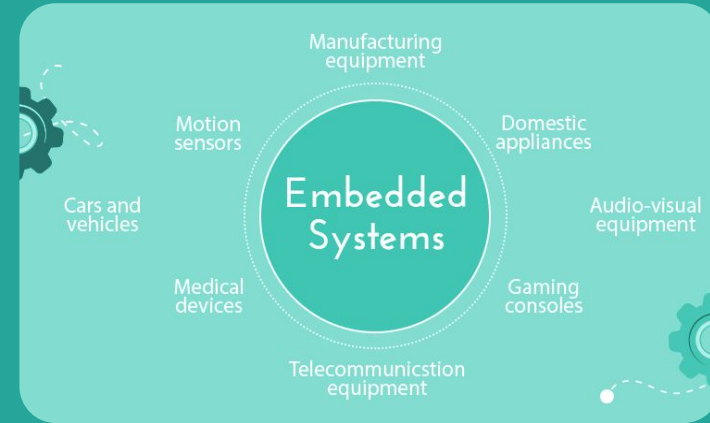
# Ecosystem of IoT:

- IoT devices
- Network
- Security
- Gateway
- The Cloud
- Application
- Users



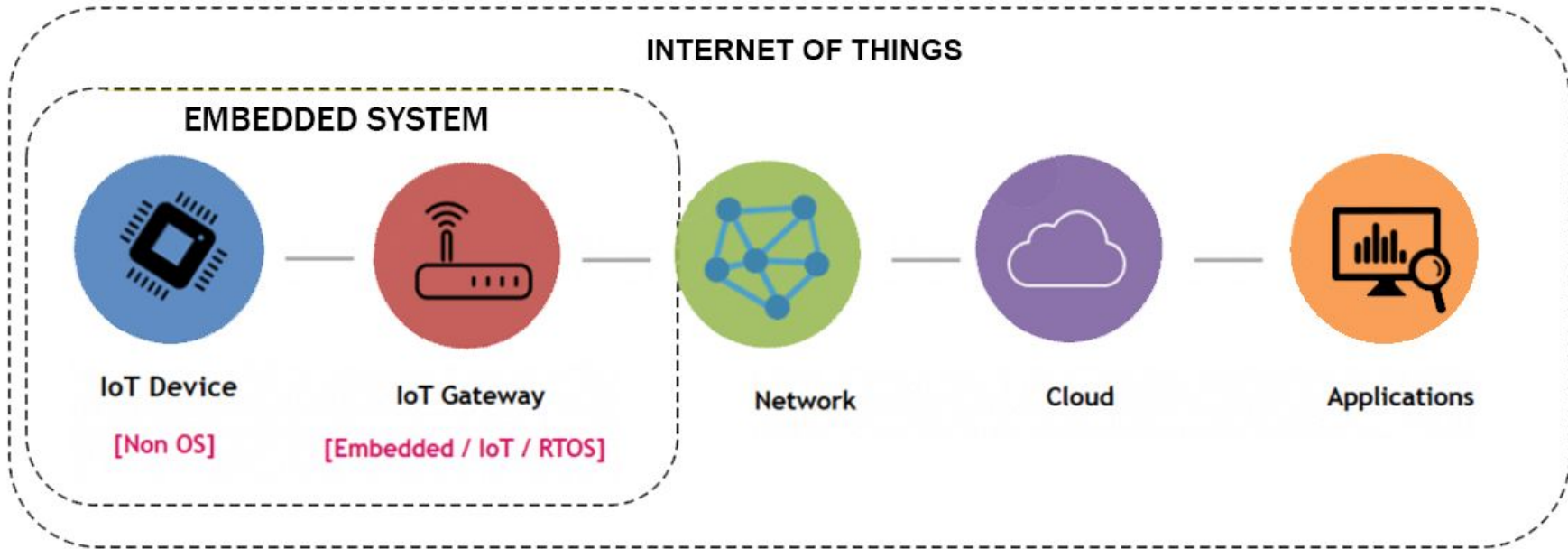
# What is Embedded System?

- An embedded system is a combination of computer hardware and software designed for a specific function.
- An embedded system is a computer system which is the combination of a processor, memory, and input/output peripheral devices.



# An embedded system and IoT

- The difference between an embedded system and the IoT is an embedded system is a subset of IoT





# Types of Embedded system:

01	Real Time embedded systems	<ul style="list-style-type: none"><li>• Self-driving vehicle controls</li><li>• Aircraft control systems</li><li>• Medical devices and patient monitoring systems</li></ul>
02	Stand alone embedded systems	<ul style="list-style-type: none"><li>• Digital cameras</li><li>• Music players</li><li>• Washing machines</li></ul>
03	Networked embedded systems	<ul style="list-style-type: none"><li>• Home security systems</li><li>• ATMs (Automated teller machines)</li><li>• Point of sale systems</li></ul>
04	Mobile embedded systems	<ul style="list-style-type: none"><li>• Cell phones</li><li>• Laptops</li><li>• Smartwatches</li></ul>

# Examples of embedded systems:



# C/ C++ Programming

## Basics:

- Variables
- Keywords
- Datatypes
- Operators
- Conditionals
- Loops

## Intermediate:

- Arrays
- Pointers
- Functions
- Storage Classes
- Files
- Preprocessor

## Advanced:

- C++ Overview
- Class and Objects
- Abstraction
- Inheritance
- Encapsulation
- Polymorphism

# About the project: Home Automation

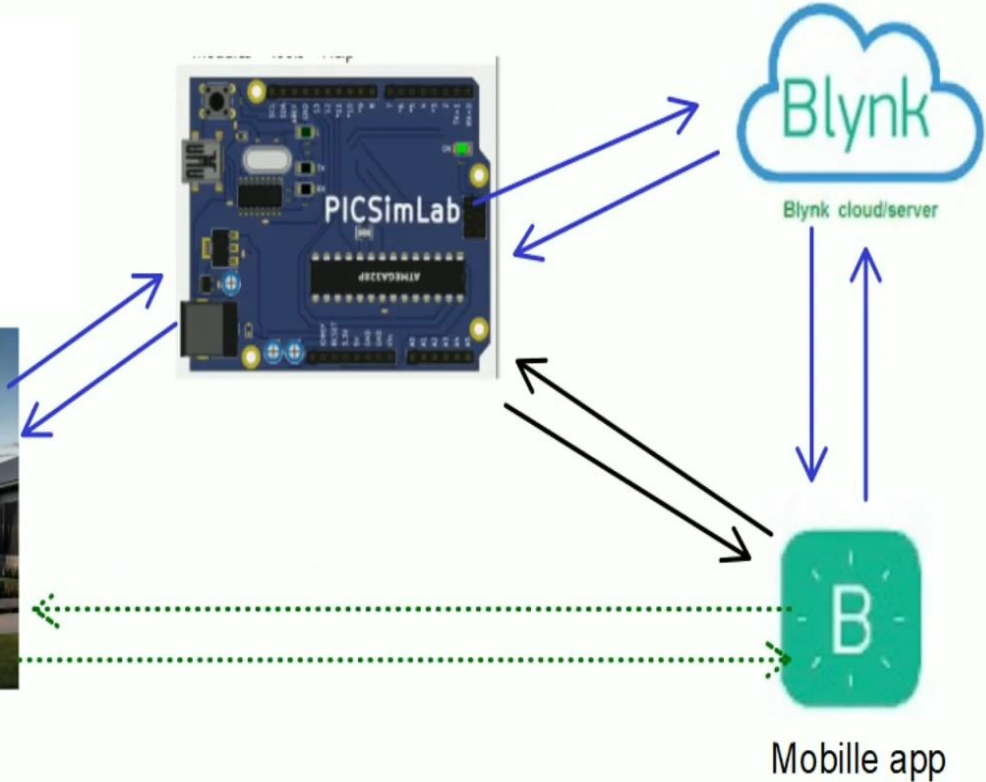
## Requirements:

- Garden Lights Control
- Temperature control
- Heater Control
- Threshold Temp. Control
- Water Tank control
- Inlet and outlet valves control
- Display water volume
- Displaying the progress and notified on the mobile (Blynk) app and CLCD with automatic actions

# About the Project:

## Main Components:

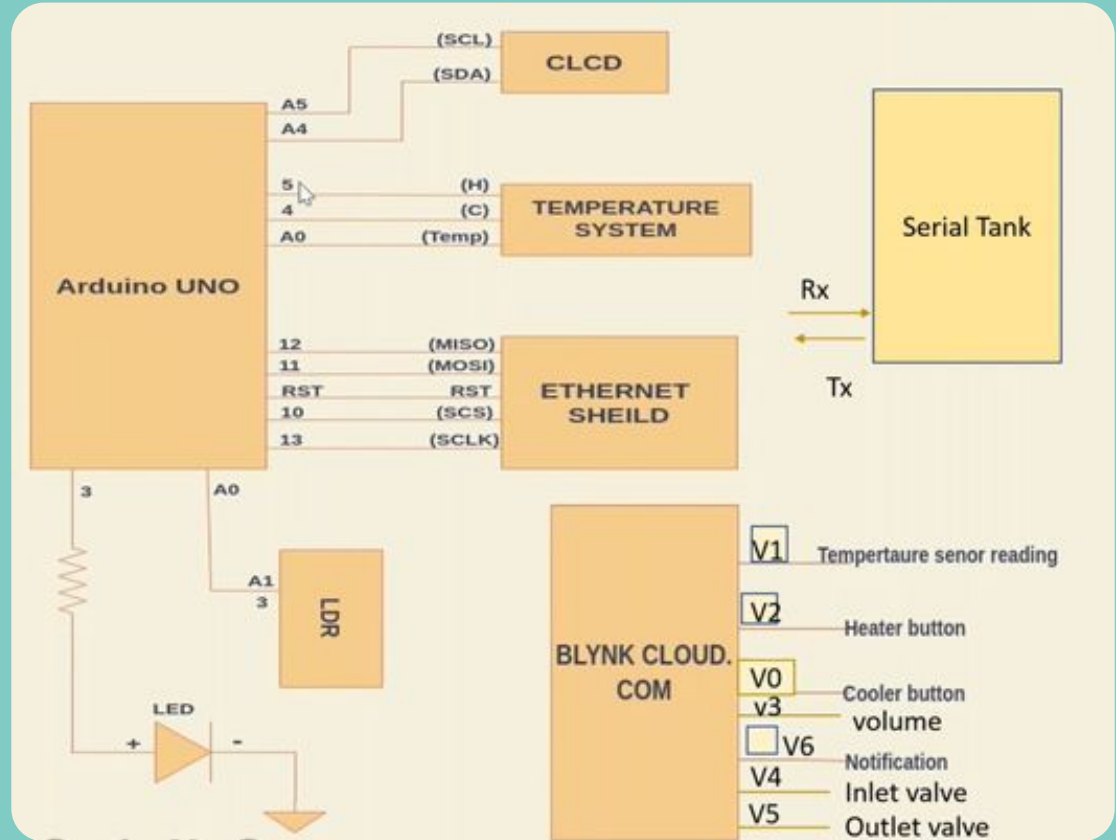
- Arduino Uno
- PICSimLab
- Blynk App



# About the Project:

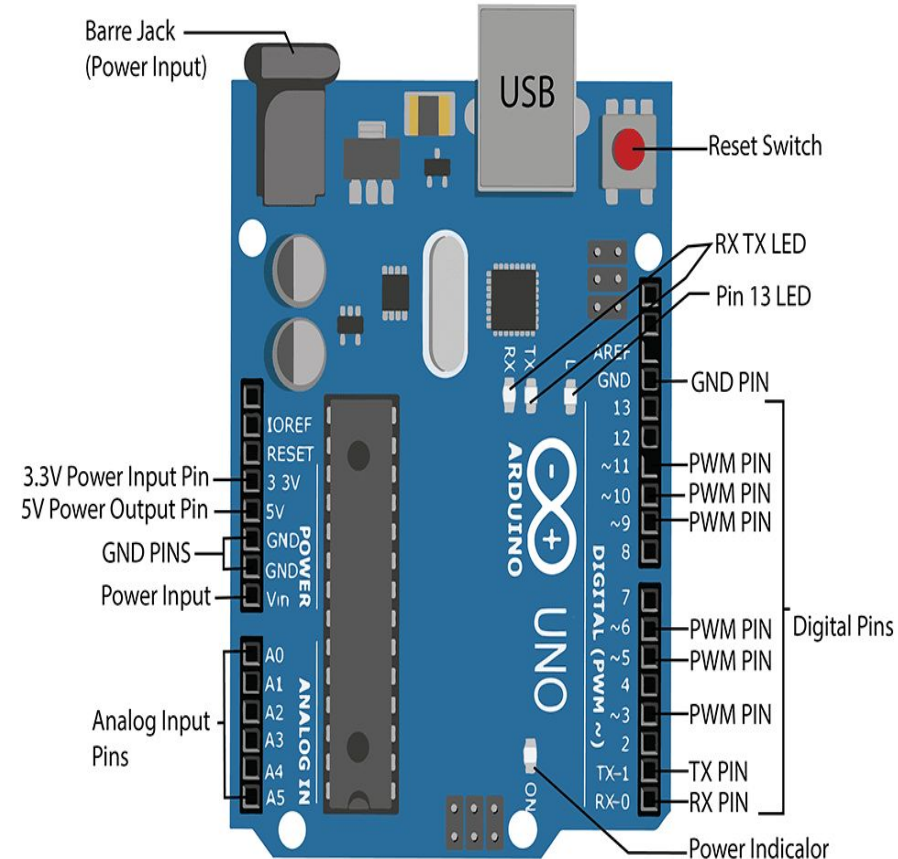
## Peripherals:

- LED's
- Temperature system
- CLCD
- LDR
- Serial tank (Serial communication)
- Ethernet shield



# About the Project:

- 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.



# About the Project:

## LEDs (Light Emitting Diode)



## Temperature System



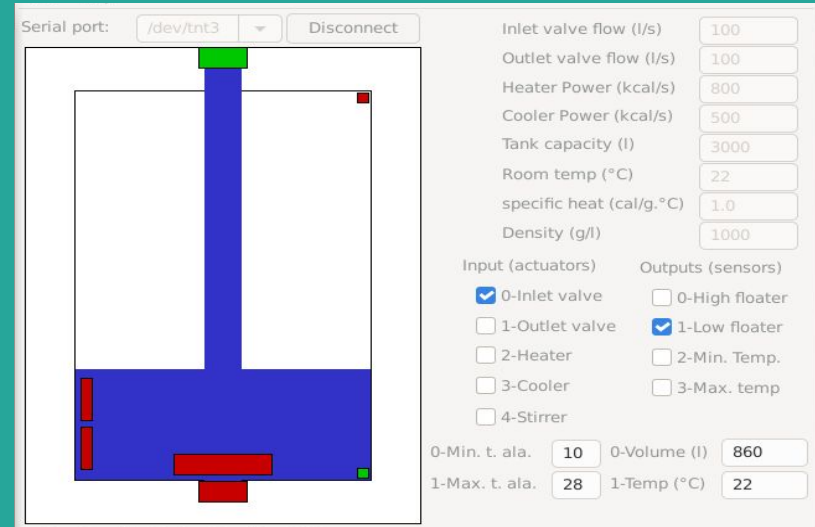


# About the Project:

## CLCD (16×2) Liquid Crystal Display



## Remote serial Tank



# About the Project:

## ETH W5500

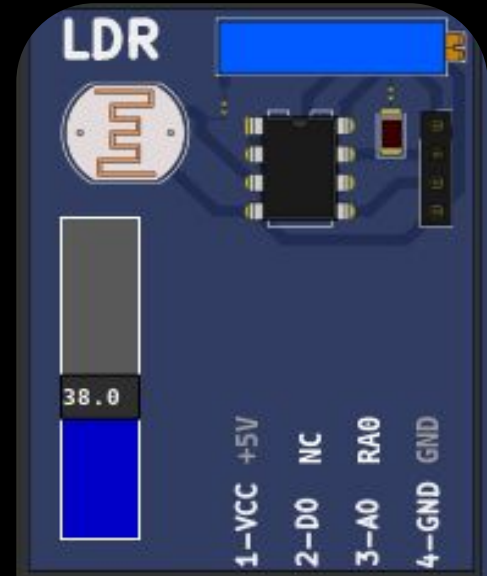
- The W5500 chip is a Hardwired TCP/IP embedded Ethernet controller that provides easier Internet connection to the embedded system.
- W5500 enables users to have the Internet connectivity in their applications just by using the single chip in which TCP/IP stack, 10/100 Ethernet MAC and PHY embedded.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



# About the Project:

## LDR (Light dependent resistor) 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.



Light  $\propto$   $1 / \text{Resistance}$

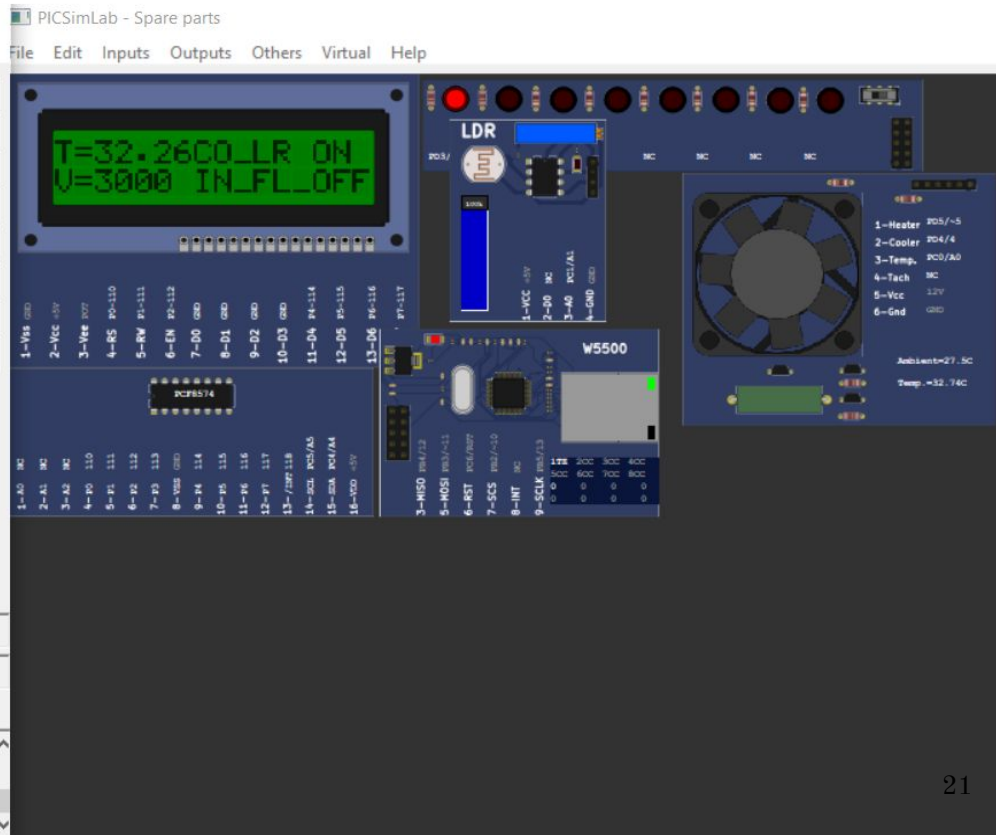
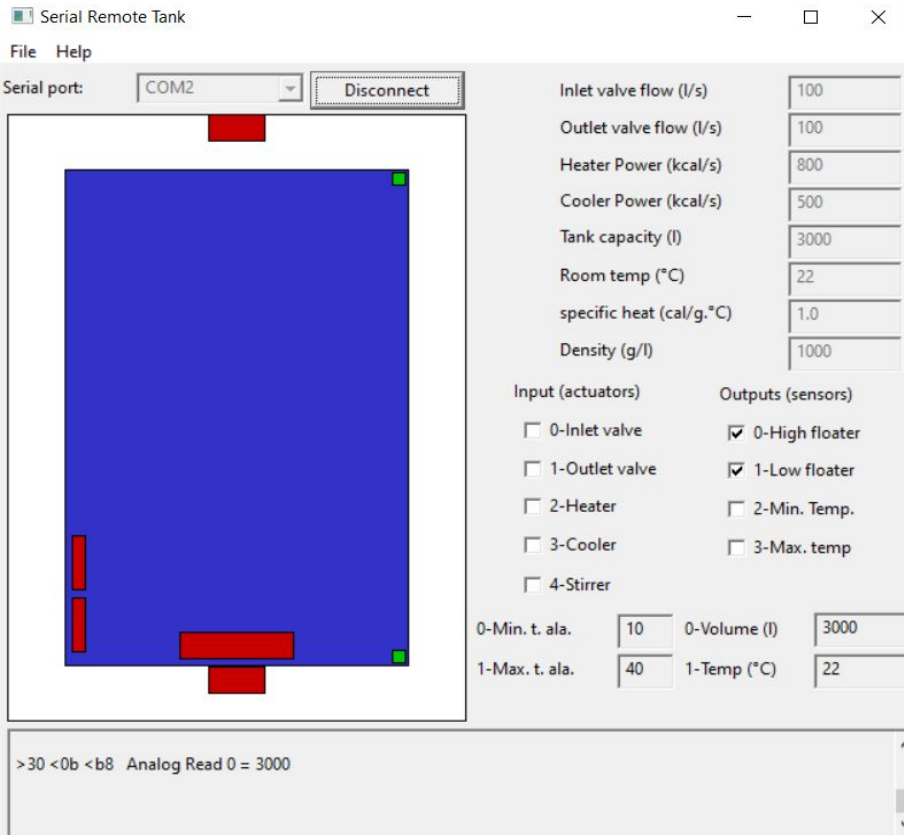
# About the Project:

## PCF8574

- 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 inter-IC).
- The device consists of an 8-bit quasi-bidirectional port and an I2C-bus interface.



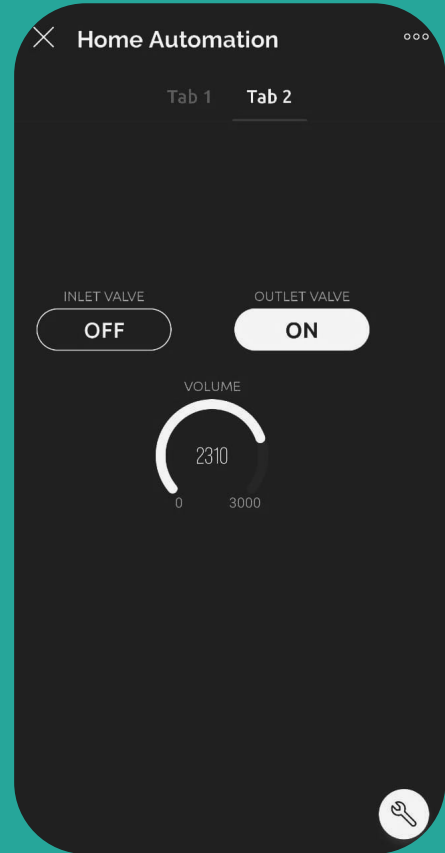
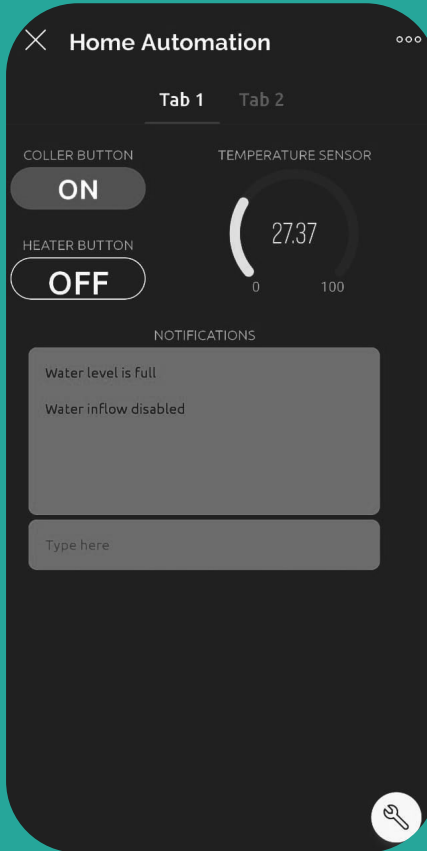
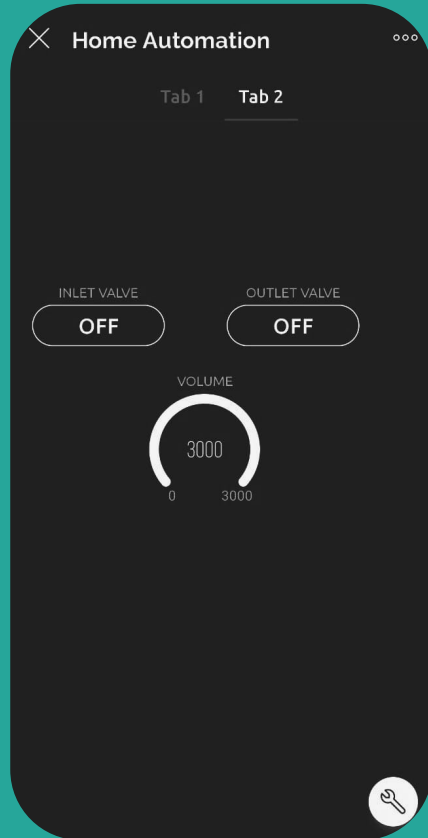
## Project Implementation:



The image displays a complex PCB layout in Proteus, designed for a temperature monitoring application. Key components include:

- Microcontroller:** W5500, located centrally.
- Display:** A large LCD at the top left shows real-time data: "T=27.37C" and "V=1970 IN\_FL\_ON".
- Sensors:** An LDR sensor and a temperature sensor are connected to the microcontroller.
- Actuator:** A cooling fan is shown on the right side of the board.
- Power Management:** A battery symbol is present at the bottom right.
- Pin Headers:** Multiple headers are labeled with pin numbers and functions:
  - Header 1: 1-Vcc, 2-Vcc, 3-Vee, 4-RS, 5-RW, 6-EN, 7-D0, 8-D1, 9-D2, 10-D3, 11-D4, 12-D5, 13-D6, 14-D7.
  - Header 2: 1-A0, 2-A1, 3-A2, 4-P0, 5-P1, 6-P2, 7-P3, 8-VSS, 9-P4, 10-P5, 11-P6, 12-P7, 13-/MSP, 14-SCL, 15-SDA, 16-VDD.
  - Header 3: 3-MISO, 5-MOSI, 6-RST, 7-SCS, 8-INT, 9-SCLK.
- Status Indicators:** A row of LEDs at the top right indicates system status.

# Project Implementation:







## Conclusion

- Using blynk IoT application and Picsimlab 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!**

YouTube-link

LinkedIn contact