Emertxe IoT Internship

IoT Based Project Home Automation

▶ By Gopisetti Gopi

▶ Study World College Of Engineering,Coimbatore

▶ B.E/CSE,Final Year

Table of contents :

- About the Internship
- Topics learned in this Internship
- What is IoT?
- What is embedded system?
- C/ C++(OOPs concepts)
- About the Project
- Implementation of the Project
- conclusion

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

Project Part

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

Learning Part

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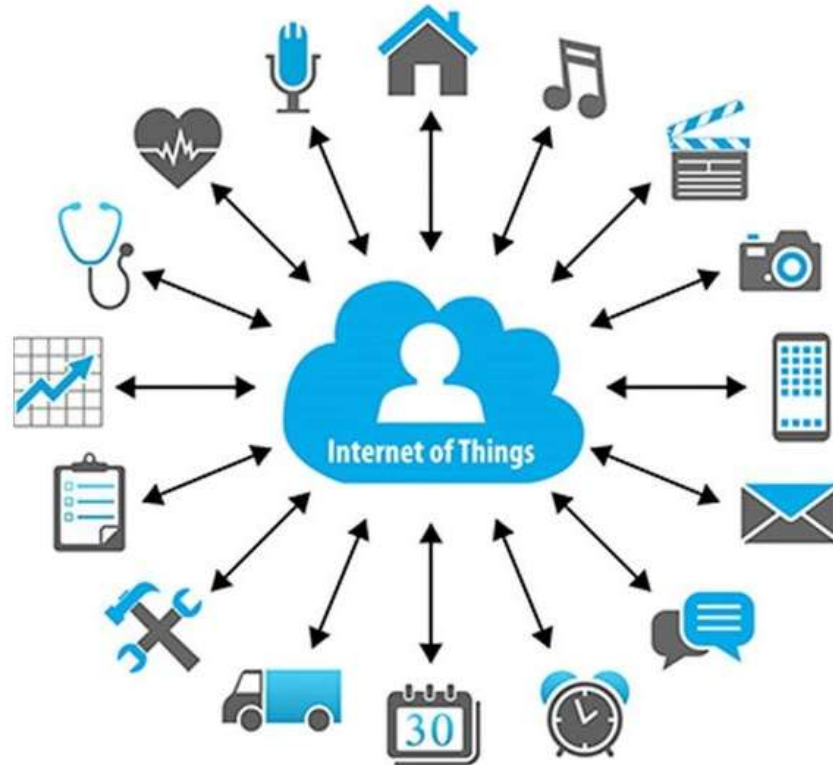- Embedded System
- Workshop

What is IoT ?

IoT — The Internet of Things

Internet : Network Things :

Objects

The Internet of Things (IoT) is a network of physical objects that are embedded with sensors, software, and other technologies to connect and exchange data with other devices and systems over the 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
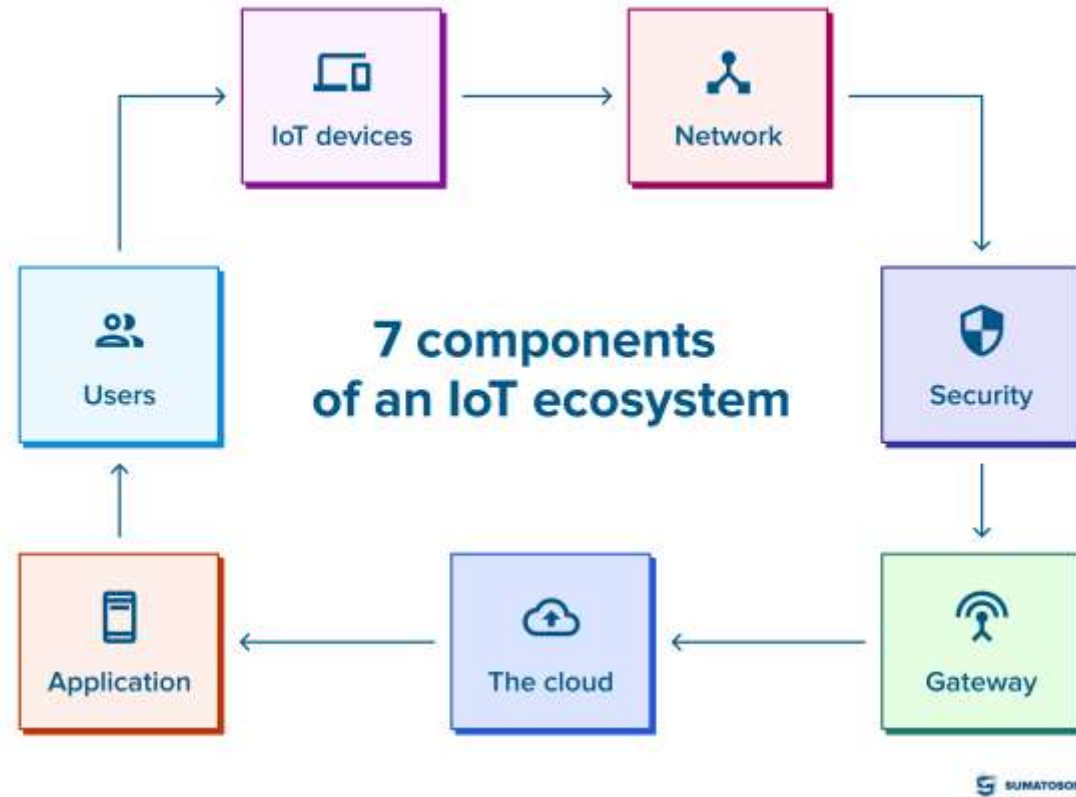
What is Embedded System?

- An embedded system is a small computer that's integrated into a larger device or machine to perform specific functions and control the device

- 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
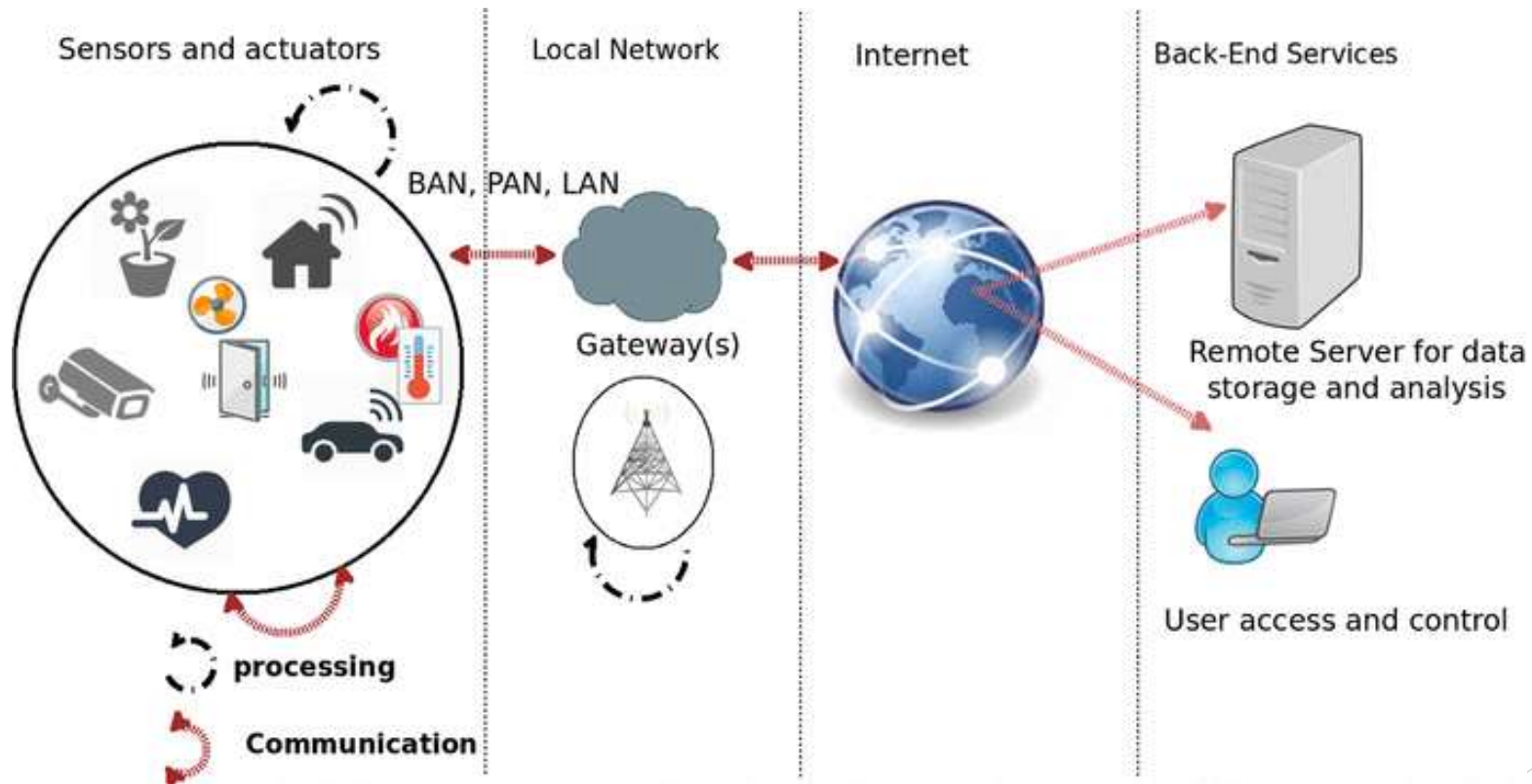
Types of Embedded system:

01 — Real Time embedded systems
- Self-driving vehicle controls
- Aircraft control systems
- Medical devices and patient monitoring systems

02 — Stand alone embedded systems
- Digital cameras
- Music players
- Washing machines

03 — Networked embedded systems
- Home security systems
- ATMs (Automated teller machines)
- Point of sale systems

04 — Mobile embedded systems
- Cell phones
- Laptops
- Smartwatches

Examples of embedded systems:

Industrial Robots
GPS Receivers
Digital Cameras
DVD Players

Embedded Systems

Wireless Routers
MP3 Players

Set top Boxes
Gaming Consoles
Photocopiers
Microwave Ovens

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

Main Components:
1. Arduino
2. PICSimLab
3. Blynk App
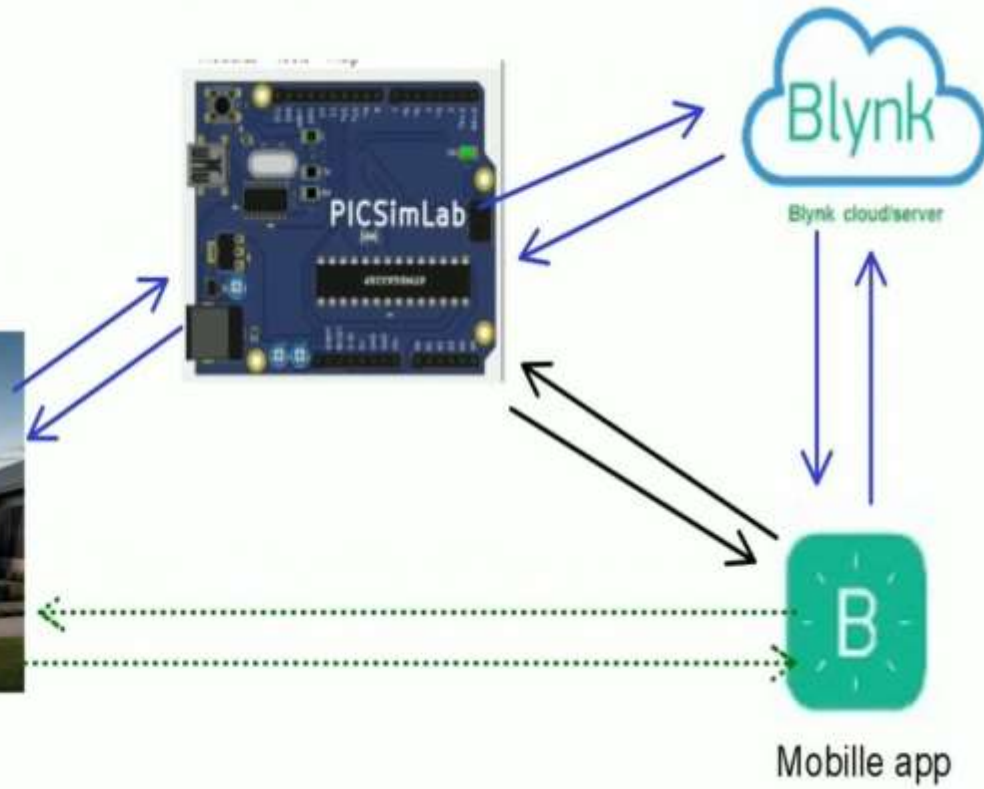
About the Project:

Peripherals:

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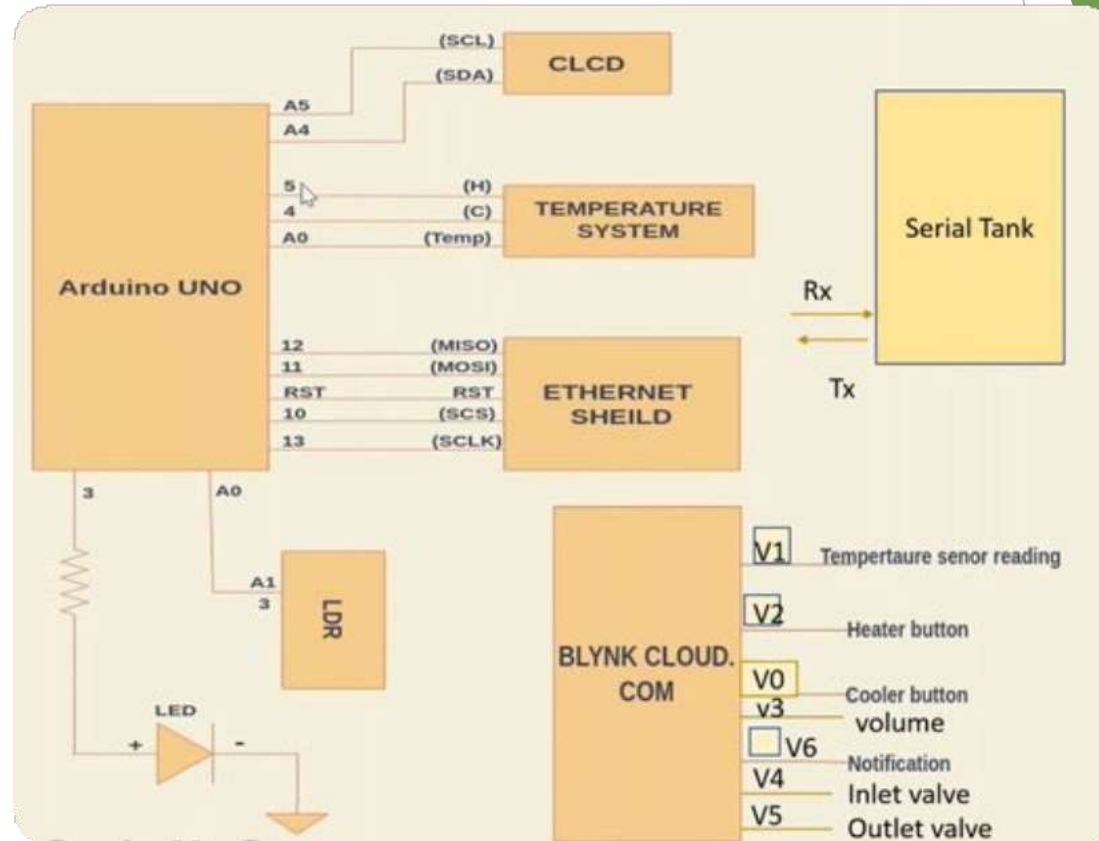
About the Project

- 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.
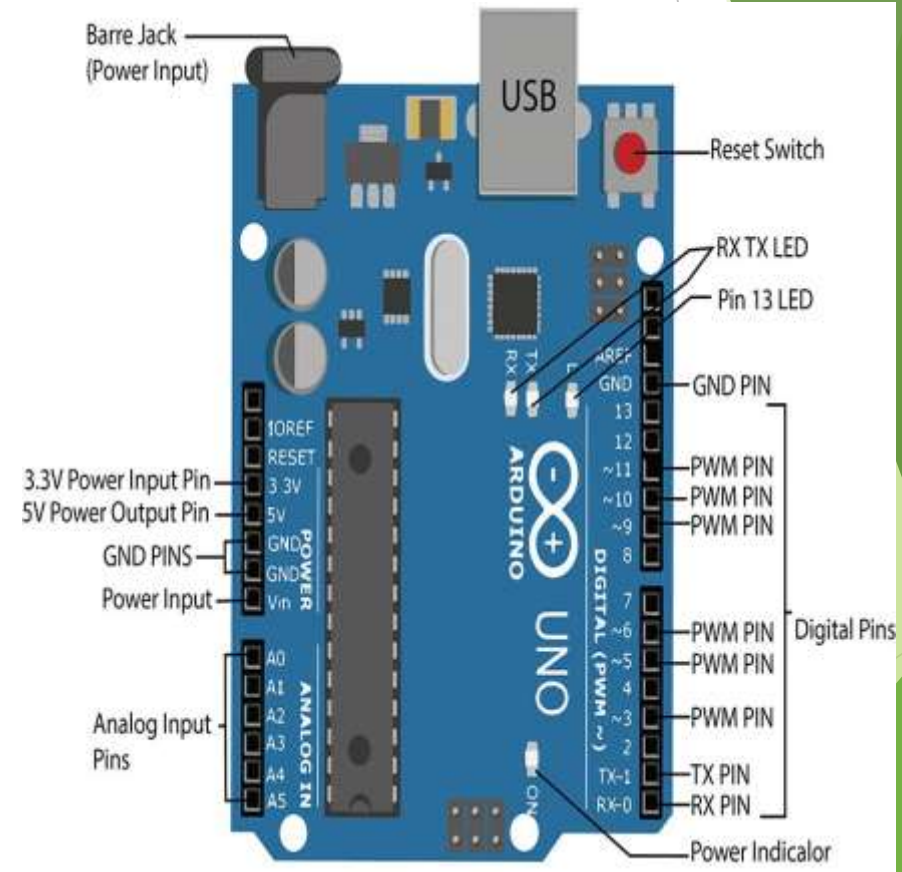
About the Project:

Ds (Light Emitting Diode
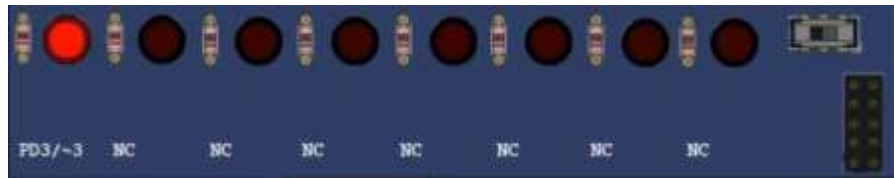
Temperature System

CLCD (16×2) Liquid Crystal
Display

Remote serial
Tank
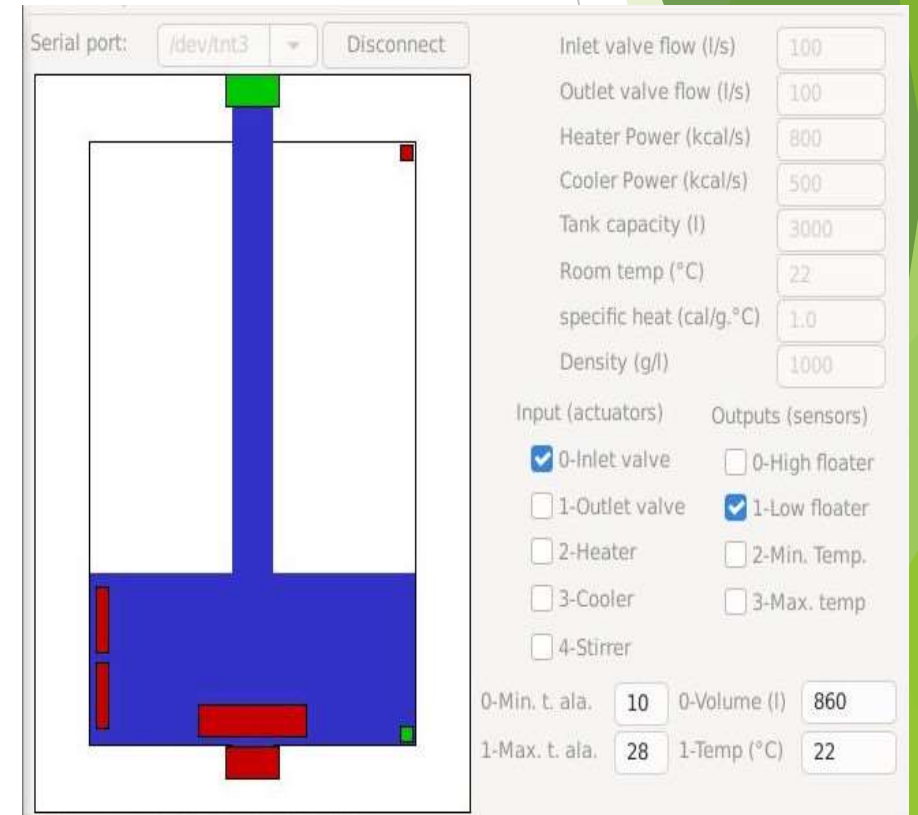
ETH W5500

- 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).

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
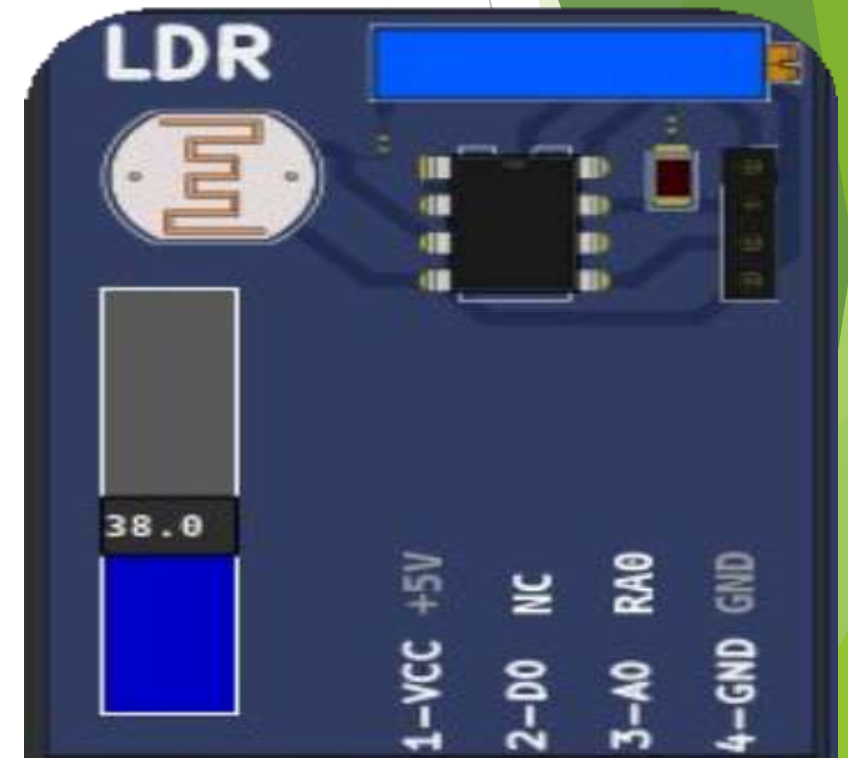
▶ PCF8574

- 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 (12C inter-IC).

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

Project Implementation:

Project Implementation:

Project Implementation:

- IoT applications use machine learning or artificial intelligence (AI) technology to analyze data received from IoT devices and make informed decisions.

- 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.

Conclusion:

The home automation project successfully demonstrated the integration of various IoT devices, allowing for efficient control and monitoring of household systems through a centralized platform. The project showcased the potential of smart home technologies to enhance convenience, energy efficiency, and security. Future work could explore the integration of AI for predictive maintenance and enhanced user personalization, as well as expanding the system to include additional devices and compatibility with emerging technologies.

- YoutubeLink

- Github

Thank You