



# **IoT Product Development**

**Yogesh M Iggalore**

# Agenda

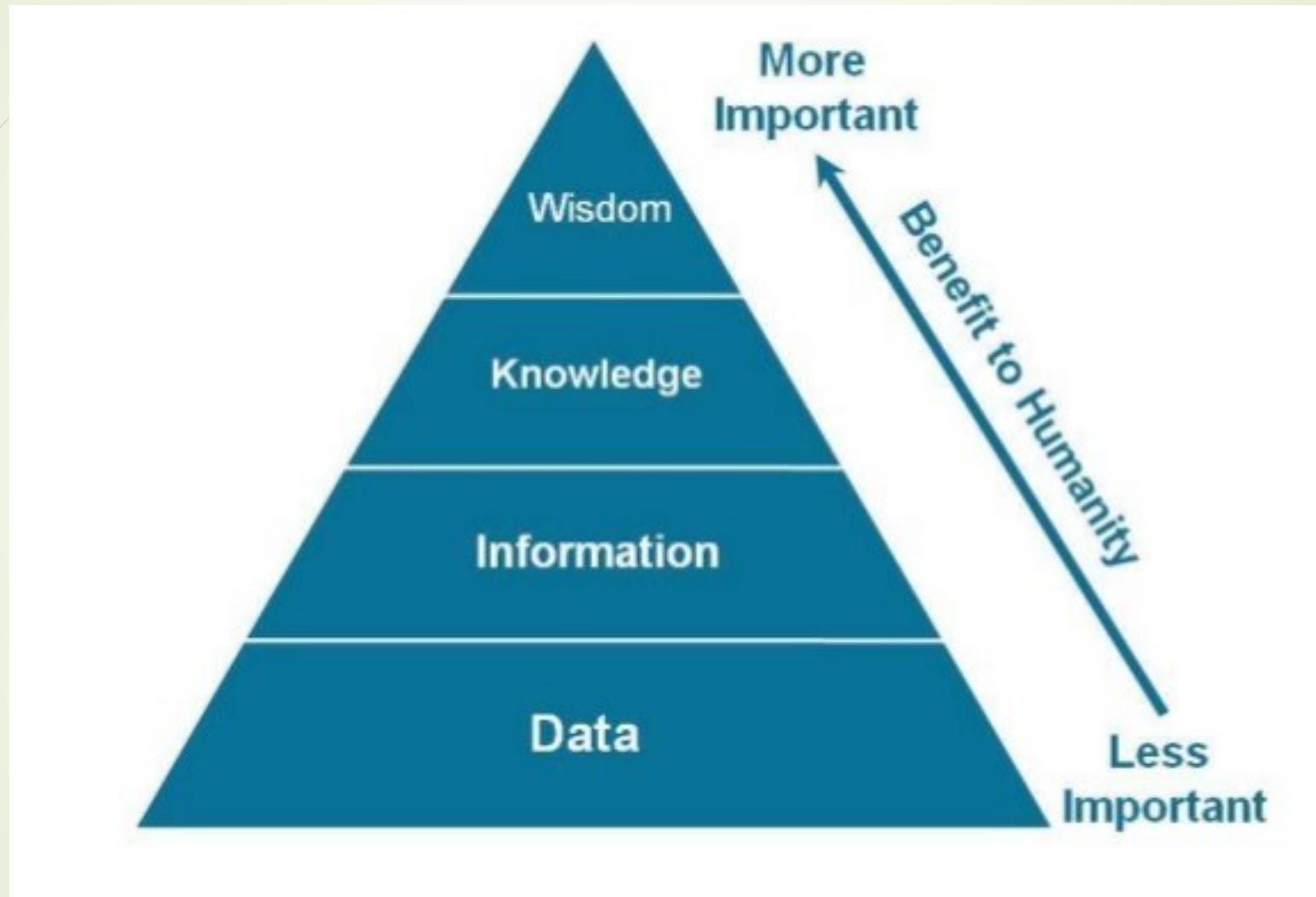
- 
- What is IoT
  - IoT Product development
  - Plan your Engineering life

# Internet of Things(IoT)

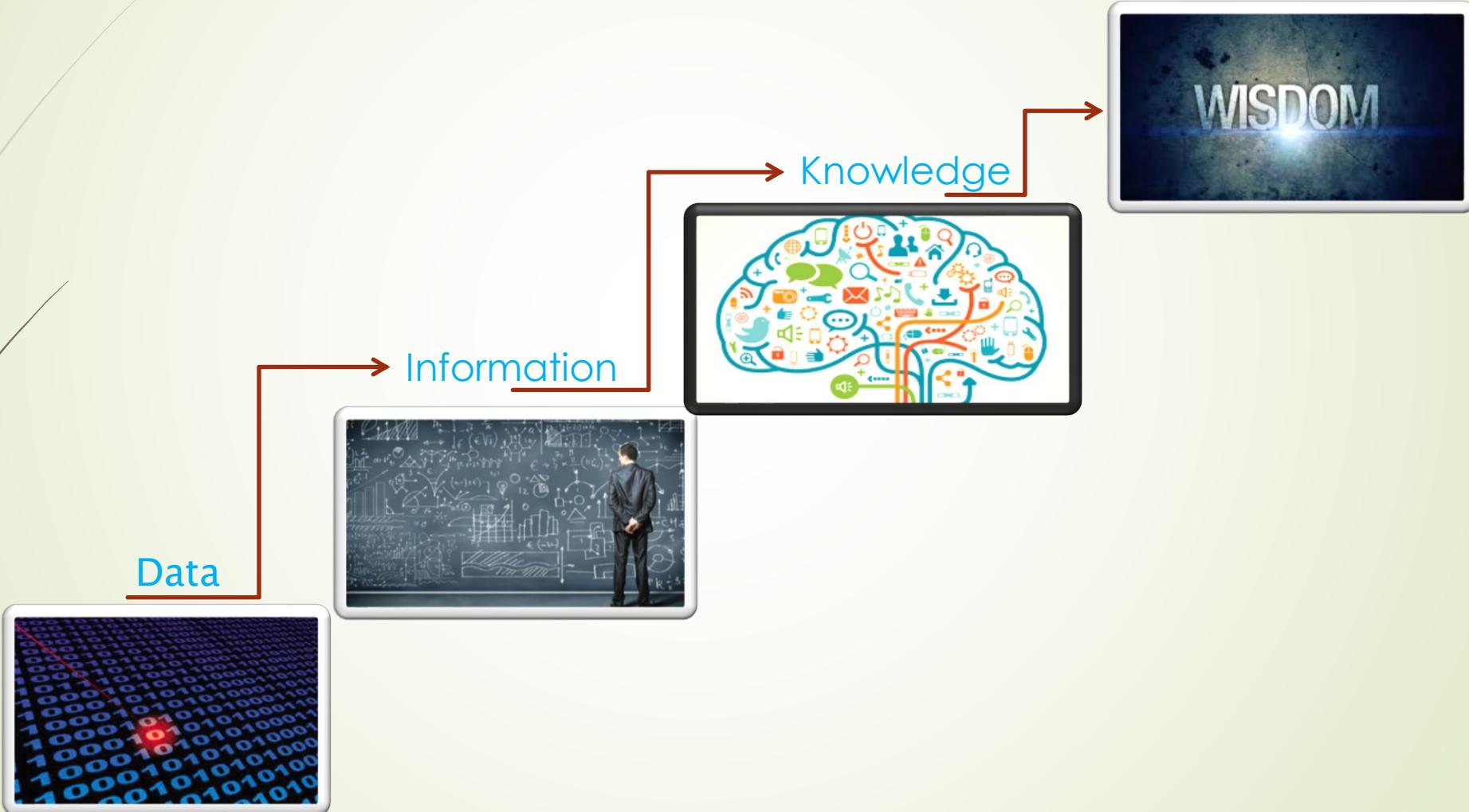
Definition:

The Internet of Things (IoT) is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.

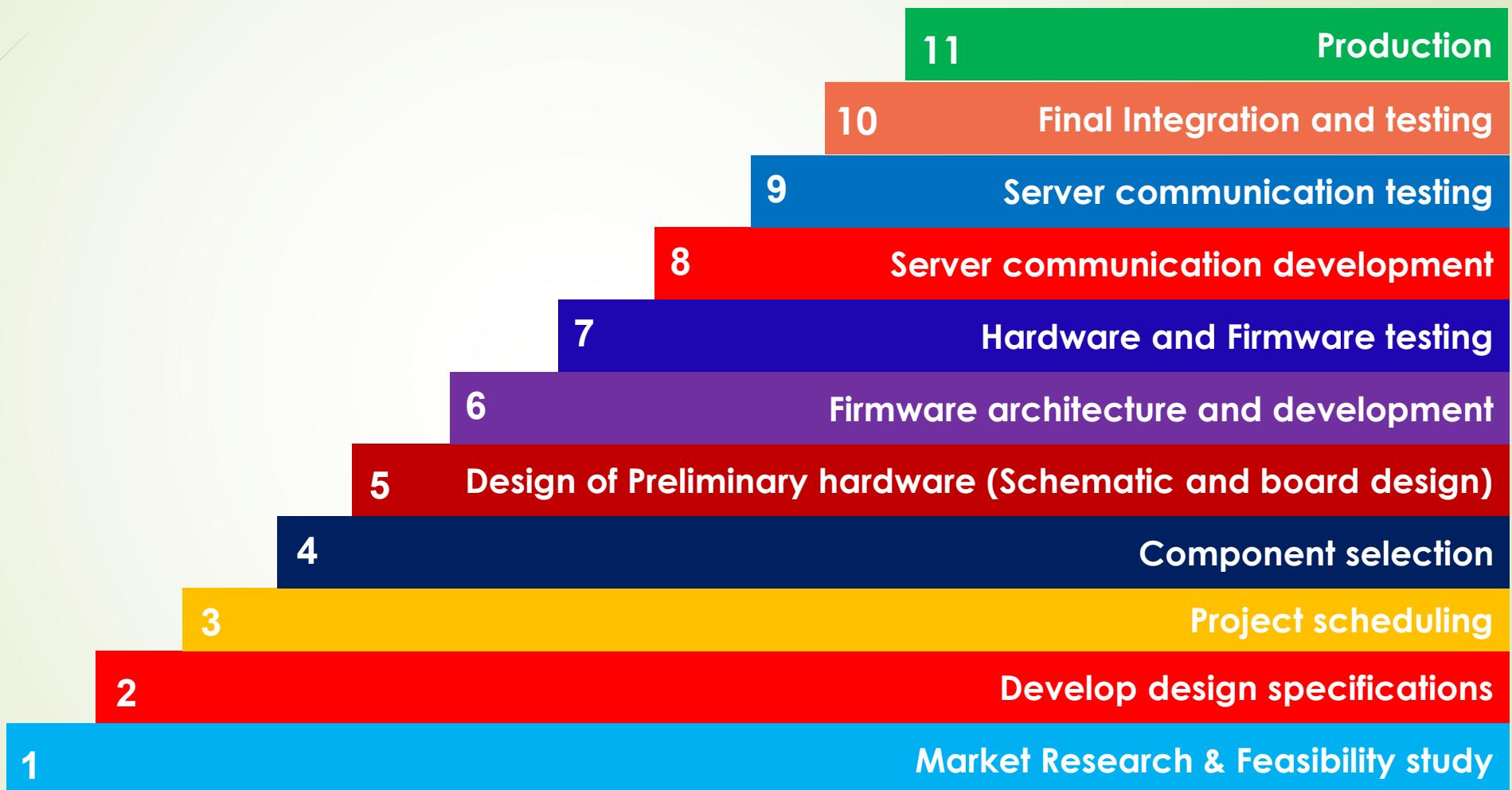
# Goal of IoT



# Turing Data into Wisdom



# IoT Product Development Process



# eNtroL



# SwitchBinary

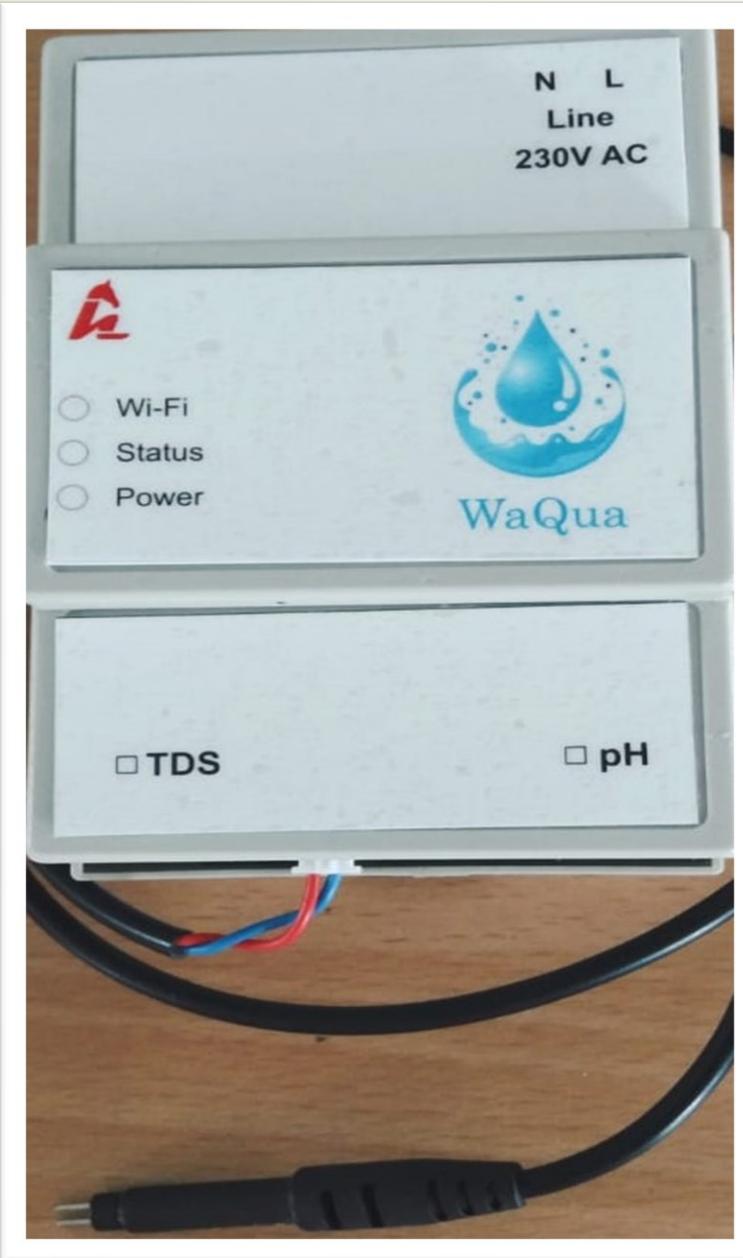


**LightOn**

# Switch2Smart



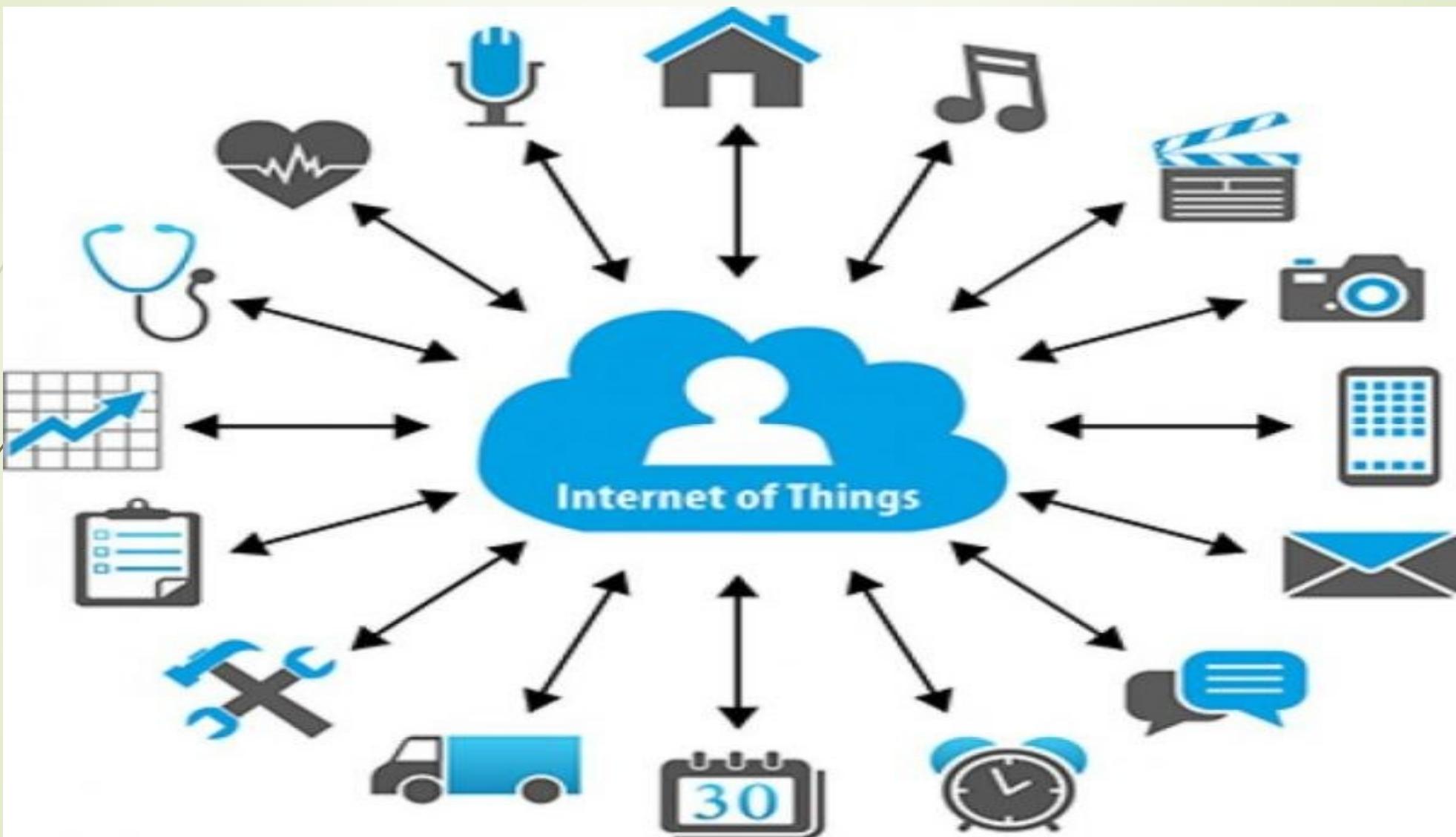
# WaQua TDS



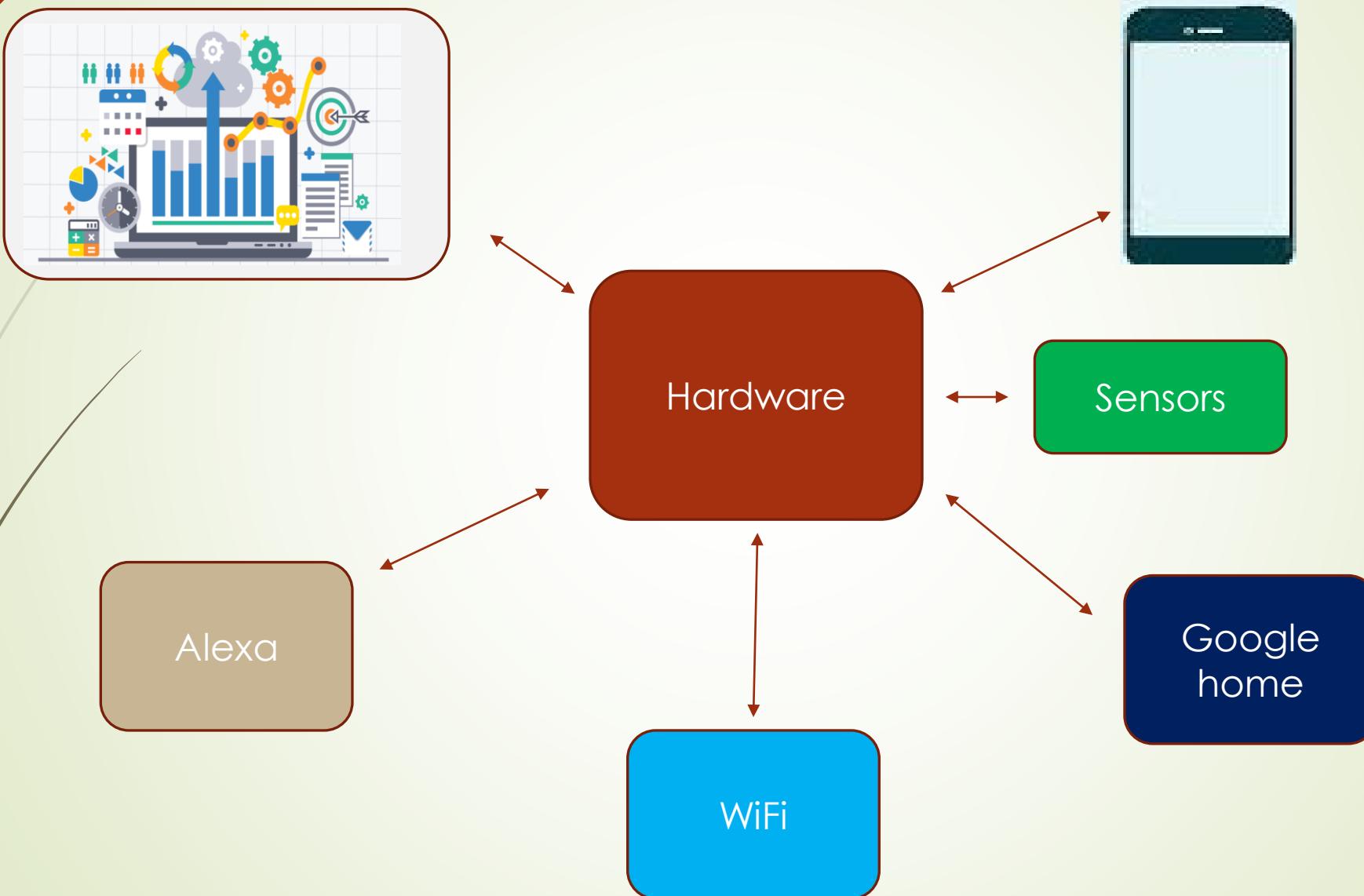
# WaQua pH



# 1 Market Research & Feasibility study

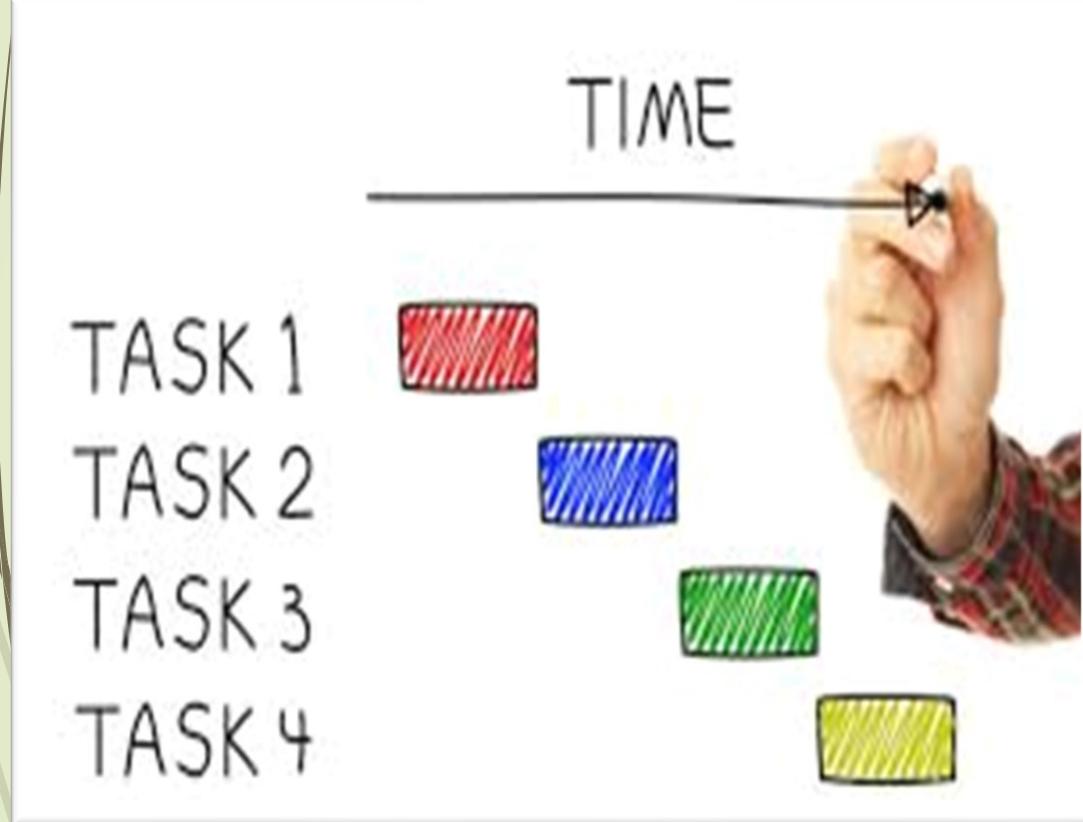


## 2 Develop design specifications



# Project scheduling

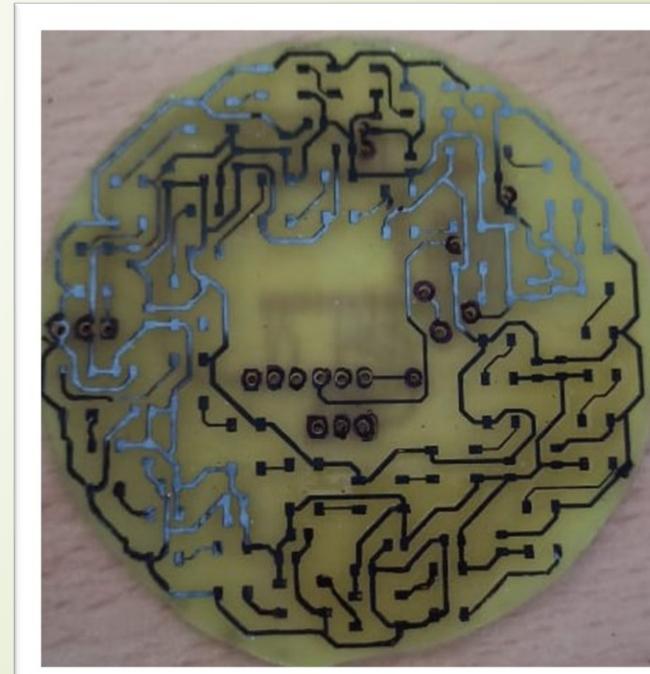
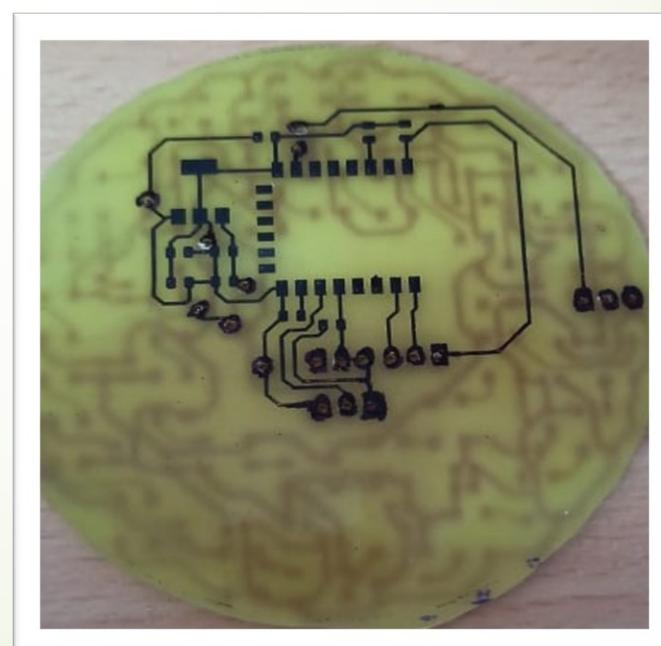
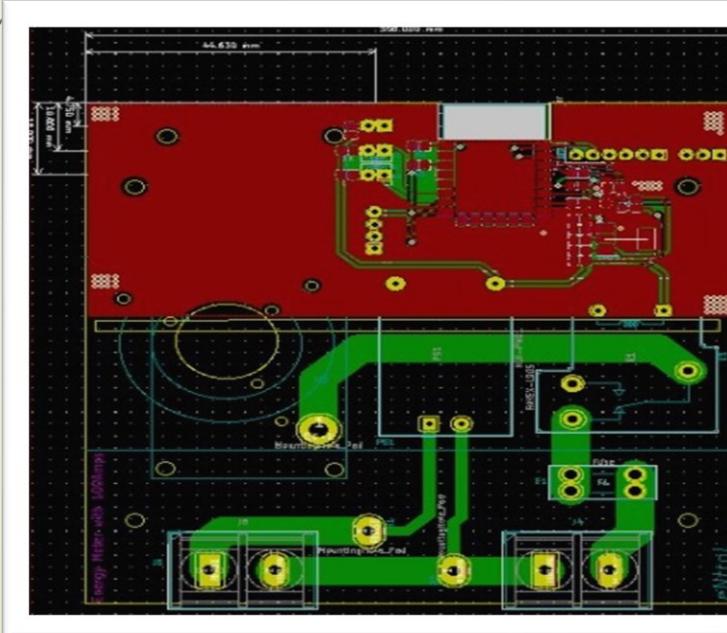
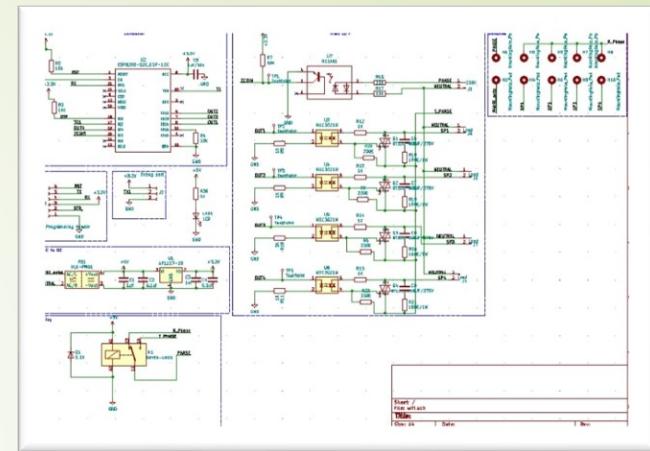
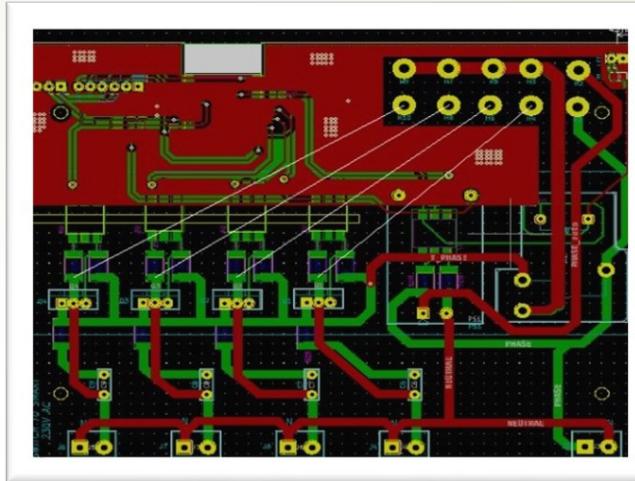
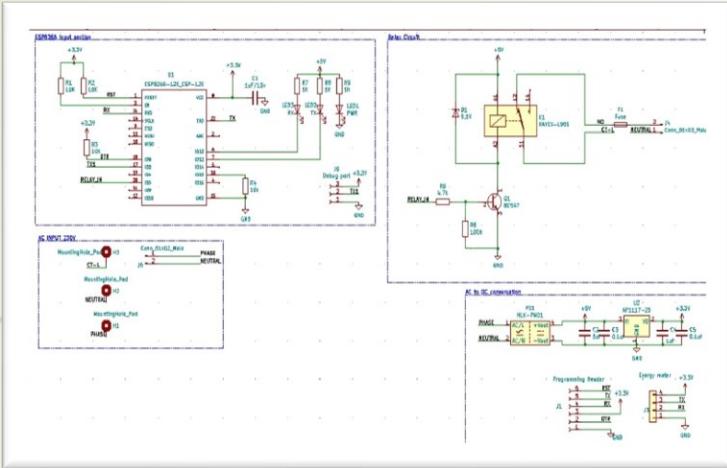
# Component selection



Compare Parts	Image	Digi-Key Part Number	Manufacturer Part Number	Manufacturer	Description	Quantity Available	Unit Price USD	Minimum Quantity	Packaging	Series	Part Status	Type	Protocol	Number of Drivers/Receivers	Duplex	Receiver Hysteresis	Data Rate
	▲ ▼	MAX485CSA+TTR-ND	MAX485CSA+T	Maxim Integrated	IC TRANSCEIVER HALF 1/1 8SOIC	2,500 - Immediate	\$1.63698	2,500	Tape & Reel (TR) <small>(?)</small> <small>Alternate Packaging</small>		Active	Transceiver	RS422, RS485	1/1	Half	50mV	2.5Mbps
	▲ ▼	MAX485CSA+TCT-ND	MAX485CSA+T	Maxim Integrated	IC TRANSCEIVER HALF 1/1 8SOIC	3,052 - Immediate	\$2.41000	1	Cut Tape (CT) <small>(?)</small> <small>Alternate Packaging</small>		Active	Transceiver	RS422, RS485	1/1	Half	50mV	2.5Mbps



# Design of Preliminary hardware (Schematic and board design)



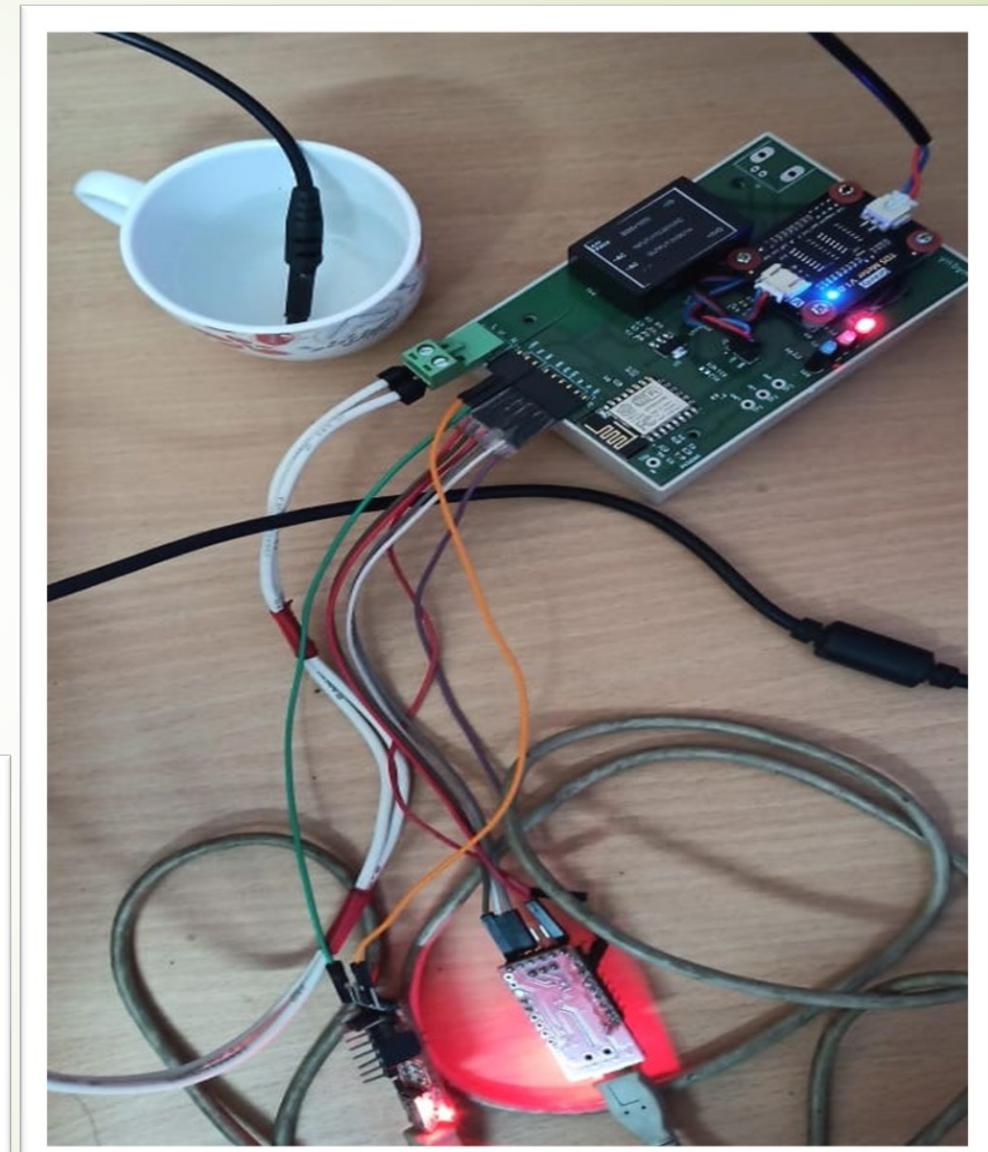
# Firmware architecture and development

The screenshot shows the Visual Studio Code interface with the following details:

- File Bar:** File, Edit, Selection, View, Go, Run, Terminal, Help.
- Title Bar:** main.cpp - Untitled (Workspace) - Visual Studio Code.
- Explorer:** Shows the project structure for "WaQuaV100 > src > main.cpp". The "src" folder contains files like WiFiSignal.css, wifiSignal.js, lib, Alexa, AnalogRead, ESPRead.cpp, ESPRead.h, Application, FileSystem, ESPFile.cpp, ESPFile.h, Memory, ESPMemory.cpp, ESPMemory.h, MqttFile, MqttFile.cpp, MqttFile.h, Timer, Utils, ESPUtils.cpp, ESPUtils.h, WifiControlV2, README, and main.cpp (which is currently selected).
- Code Editor:** Displays the C++ code for the main function, specifically handling MQTT connections and publishing messages. The code includes imports for Serial1, EApp, and mqttClient, and defines functions for onMqttConnect and Mqtt\_Publish\_All.
- Terminal:** Shows a PowerShell terminal window with the command "PS E:\ProStartIoT\Programs\WaQua\WaQuaV100>".
- Bottom Status Bar:** Provides information about the current file (Ln 927, Col 105), encoding (UTF-8), and system status (C++, Win32, battery level, network, etc.).
- Taskbar:** Shows the Windows taskbar with various pinned icons.

# Hardware and Firmware testing

```
New Project New Single File Project  
Time Event  
4:28:15.803410 DNS: 0.0.0.0  
4:28:15.803410 configarray: 0.0.0.0  
4:28:15.803410 192.168.1.23  
4:28:15.803410 Setting soft-AP configuration ... Ready  
4:28:15.803410 Setting soft-AP ... APName: W001BCDDC25C783B APPassword: test1234 Status: Ready  
4:28:15.803410 Soft-AP IP address = 192.168.4.1  
4:28:15.803410 Initialized scheduler  
4:28:15.803410 added TestTask  
4:28:15.803410 Enabled TestTask  
4:28:15.803410 added WifiControlTask  
4:28:15.803410 Enabled WifiControlTask  
4:28:15.803410 added MqttControlTask  
4:28:15.803410 Enabled MqttControlTask  
4:28:15.803410 Connecting to MQTT...  
4:28:16.147143 fAvgValues: 0.518000  
4:28:16.147143 fLastTDSADCValue: 0.518000  
4:28:16.147143 TDSValue: 197.009476  
4:28:16.147143 ui16ADCAdjust: 99  
4:28:16.490750 Connected to MQTT.  
4:28:16.490750 Session present: 0  
4:28:16.490750 Publish tds and ph values  
4:28:16.831210 Subscribe acknowledged.  
4:28:16.831210 packetId: 1  
4:28:16.831210 qos: 1  
4:28:16.832208 fAvgValues: 0.518000  
4:28:16.832208 fLastTDSADCValue: 0.518000  
4:28:16.832208 TDSValue: 197.009476  
4:28:16.832208 ui16ADCAdjust: 99  
4:28:16.271537 Subscribe acknowledged.  
4:28:17.271537 packetId: 2  
4:28:17.271537 qos: 1
```



# Server communication development

## SwitchBinary Dashboard

14:55:04 19-06-20

Relay On

WIFI MQTT ALEXA RESET

SetTime Enable TC Disable TC

MQTT Alexa

Sunday  Monday  
 Tuesday  Wednesday  
 Thursday  Friday  
 Saturday

Start time End time

Onetime Start Onetime End

Set

Set

SLNo	Active	Start Time	End Time
0	0	00:00:00	00:00:00
1	0	00:00:00	00:00:00
2	0	00:00:00	00:00:00
3	0	00:00:00	00:00:00
4	0	00:00:00	00:00:00
5	0	00:00:00	00:00:00
6	0	00:00:00	00:00:00
7	0	00:00:00	00:00:00

## MQTT Configuration

Server:

Port:

ClientID:

Username:

Password:

KeepAlive:

QOS:

VoltageTopic:

CurrentTopic:

PowerTopic:

UnitTopic:

FrequencyTopic:

PowerfactorTopic:

RelayTopic:

GetAllTopic:

## eNtroL Dashboard

Fri, 19 June 2020  
02 : 36 : 45 PM

WIFI MQTT ALEXA Thingspeak RESET

RX TX Relay Off MQTT Alexa

Units(kWh): **80386**

Voltage(V): **8423**

Current(A): **88888**

## Wi-Fi Configuration

ADD Wifi

Wifi:  One

Password:  ADD

HostName:

HostPassword:  HostSave

Add static IPs

IP Addr:  IPAddr

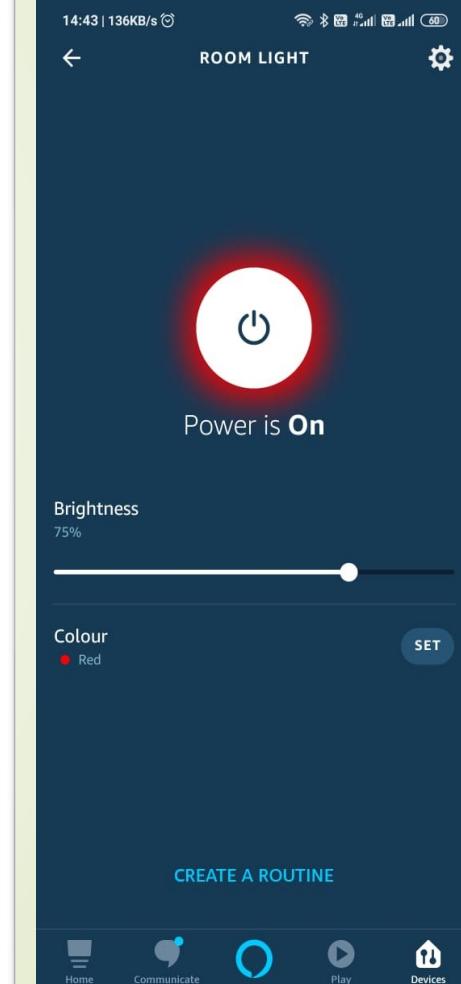
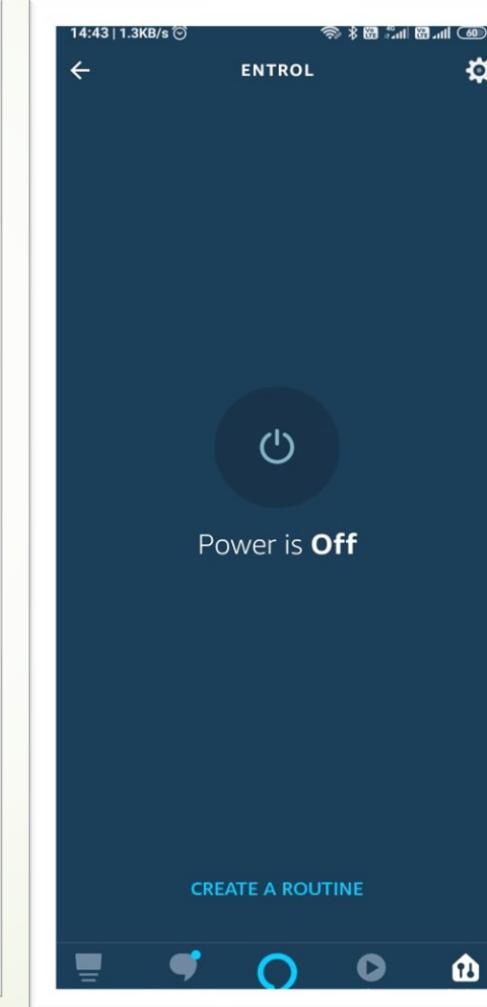
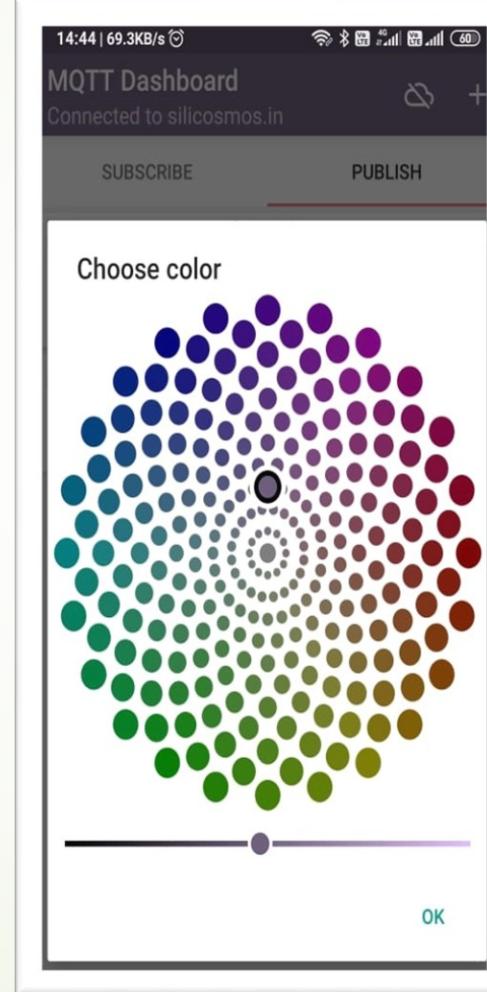
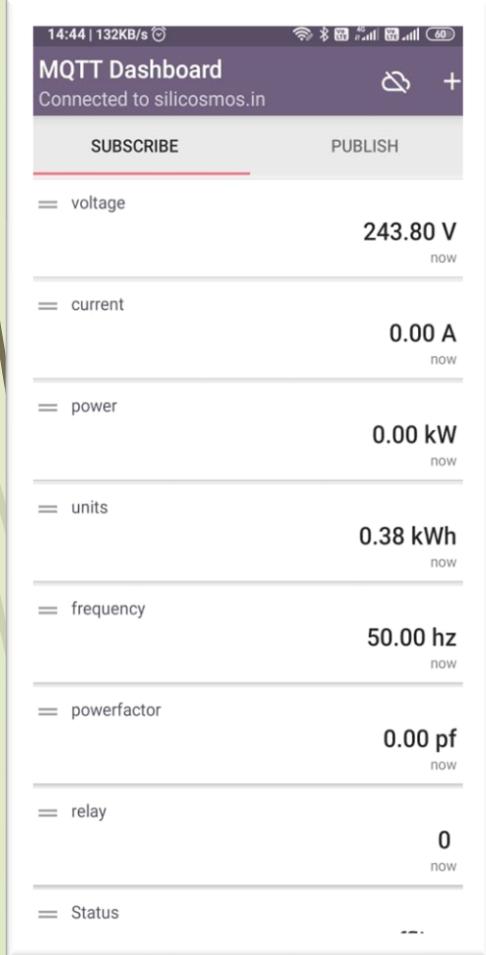
Gateway:  Gateway

Subnet:  Subnet

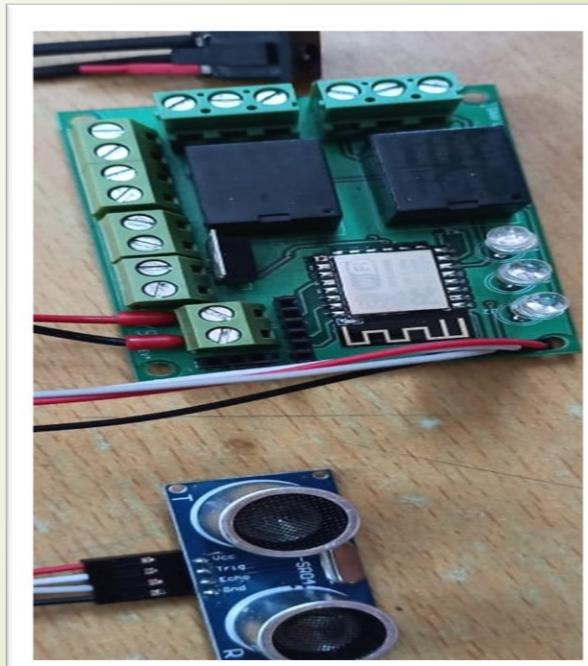
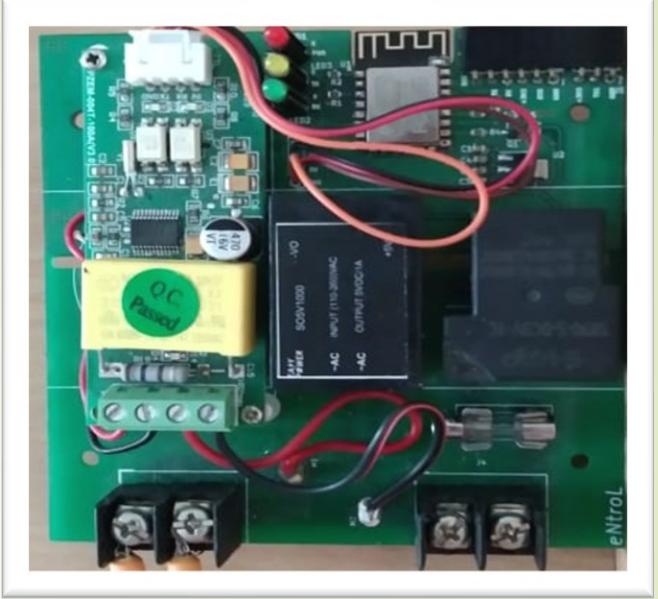
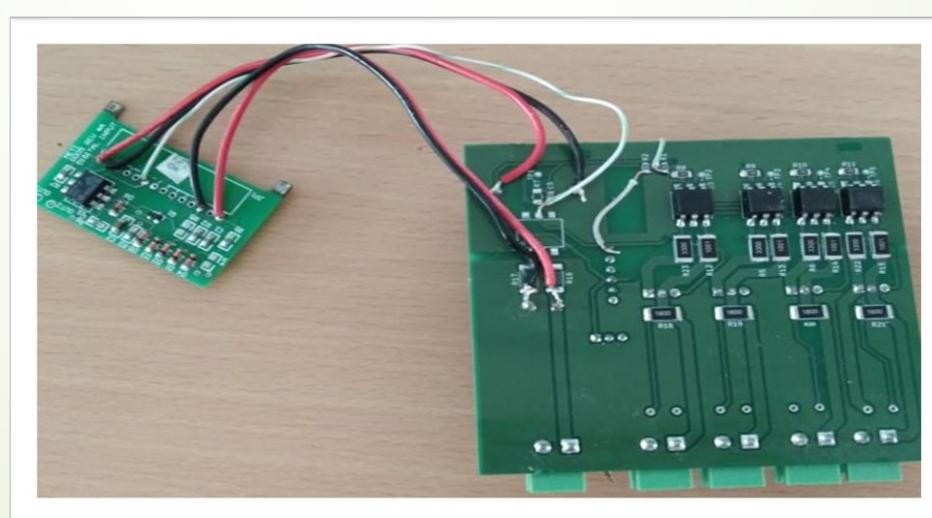
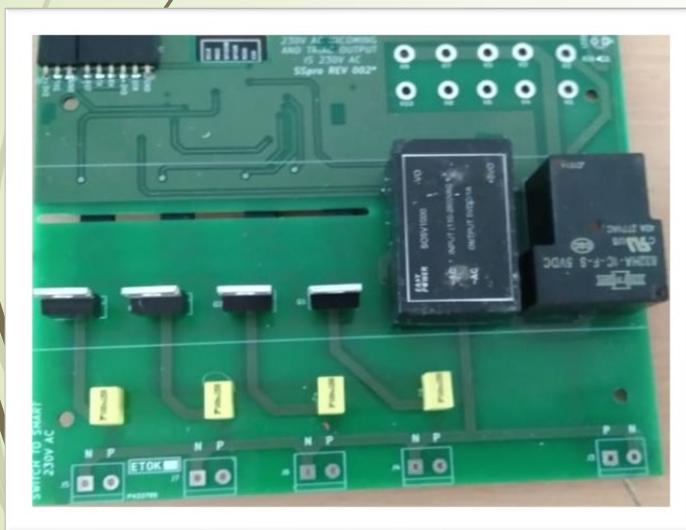
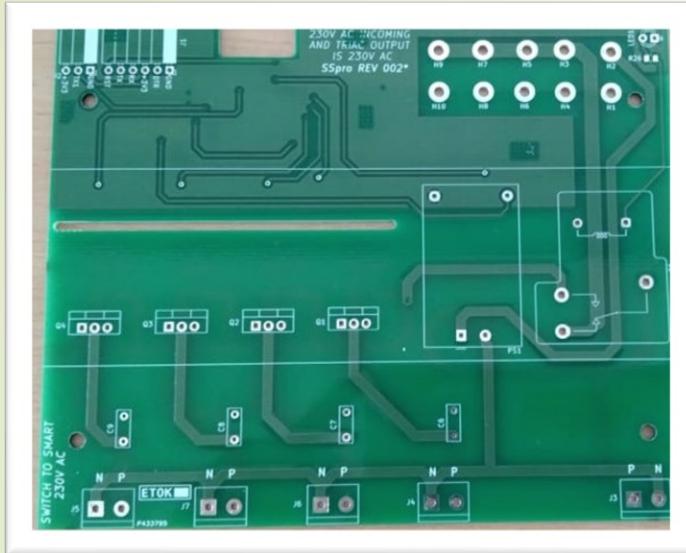
DNS IP:  DNSIP

WifiConfig:

# Final Integration and testing



# Production





**Plan your Engineering life**

3345

1.5 Million

18%



## **Industry Expectations From Engineering Graduates**



**Technical Skills**

**Communication Skills**

**Interpersonal Skills**

**Commitment**

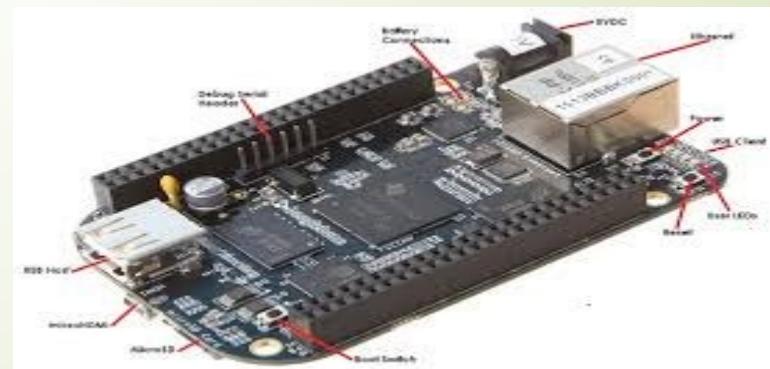
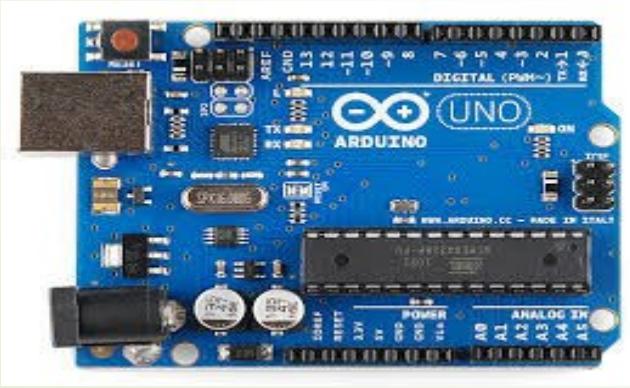
**Problem Solving**

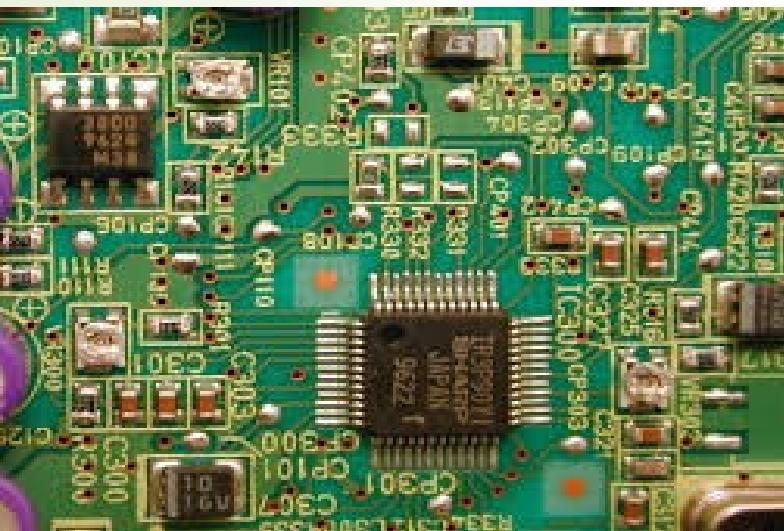
# Technical Skills

- Engineering subjects
- Massive Open Online Courses (MOOCs)
- Language C and Java/Python
- Embedded programing(Arduino)
- PCB Designing (Kicad, easyeda, falstad)
- Reading technical Magazine
- ElectroDroid



# Microcontrollers and Microprocessors





# Communication Skills

- Improve your English
- Build your resume everyday
- Read more and more



...  
in self-serve (which is the norm virtually everywhere else)? What is the best bottle of wine to order on a date? What do I have to do to become a Master Sommelier? Why do British and American chocolate taste different? Why are so many restaurants in New York City located in the same building? How do you fix a film flop at the office? What are good tips for carpooling? What are the best car-sharing services? Why do insects sleep? What's the best way to get around San Francisco? Why is it seemingly more difficult to find a good venue for a 100-150 person party in San Francisco? What are the biggest obstacles for people moving to the SF Bay Area? What is the most useful, shortest, and most generally applicable piece of wisdom you could today send a tweet to yourself back when you were graduating high school? What would you say? What are the best song covers in a completely different genre?

**Quora**

**Your best source for knowledge.**

# Interpersonal Skills



# Problem Solving



# Commitment





## Links to learn IoT

- [https://www.youtube.com/channel/UCu7\\_D0o48KbfhpEohoP7YSQ](https://www.youtube.com/channel/UCu7_D0o48KbfhpEohoP7YSQ)
- <https://www.youtube.com/channel/UC6mlxFTvXkWQVEHPsEdflzQ>
- <https://www.youtube.com/channel/UCu94OHbBYVUXLYPh4NBu10w>
- <https://www.youtube.com/channel/UCzml9bXoEM0itbcE96CB03w>
- <https://www.youtube.com/channel/UC7GMT3ohvYE AJFDenzj9EMQ>
- <https://www.jeremyblum.com/>
- <https://www.arduino.cc/>
- <https://kicad-pcb.org/>
- <https://platformio.org/>
- <https://www.espressif.com/>
- <https://randomnerdtutorials.com/>
- [https://www.youtube.com/channel/UCvsMfEolu\\_ZdBIgQVcY\\_AZA](https://www.youtube.com/channel/UCvsMfEolu_ZdBIgQVcY_AZA)



# Thank You

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