



IoT Product Development

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Agenda

- 
- Company Introduction
 - What is IoT
 - IoT Product development

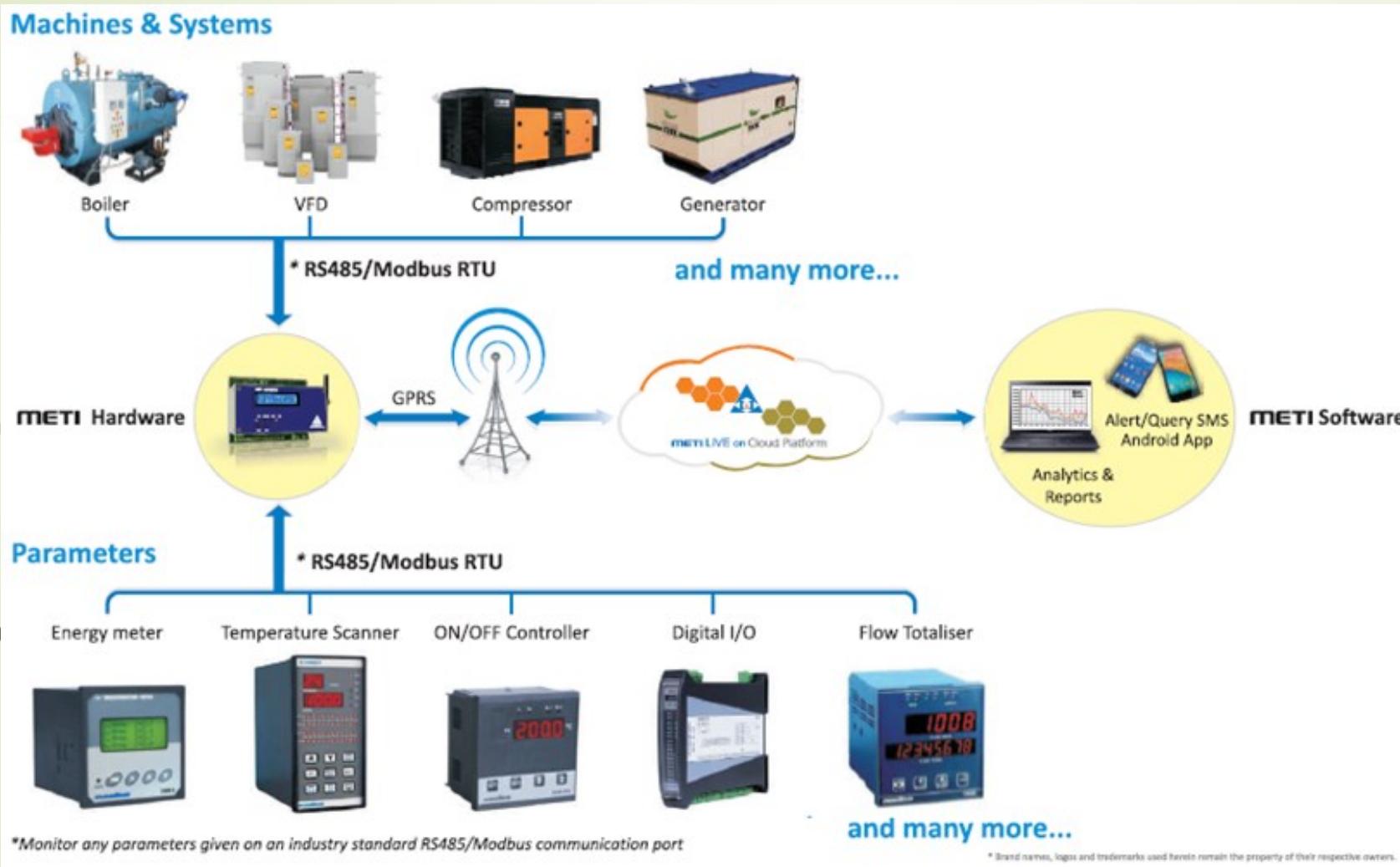
Company Introduction



About METI

- Incorporated in Dec 2014
- METI is an IoT company
- Specialized in Industrial monitoring (IIoT)
- Owns IPs for each component of IoT platform
 - IPs = Hardware + Webservice + Frontend web tool + Android App
- Provided more than 30 different monitoring solutions
- Offering services to more than 100 customers across India
- Monitoring 50000+ sensors and growing
- Professionally managed with ethical business practices

Monitor: What & How



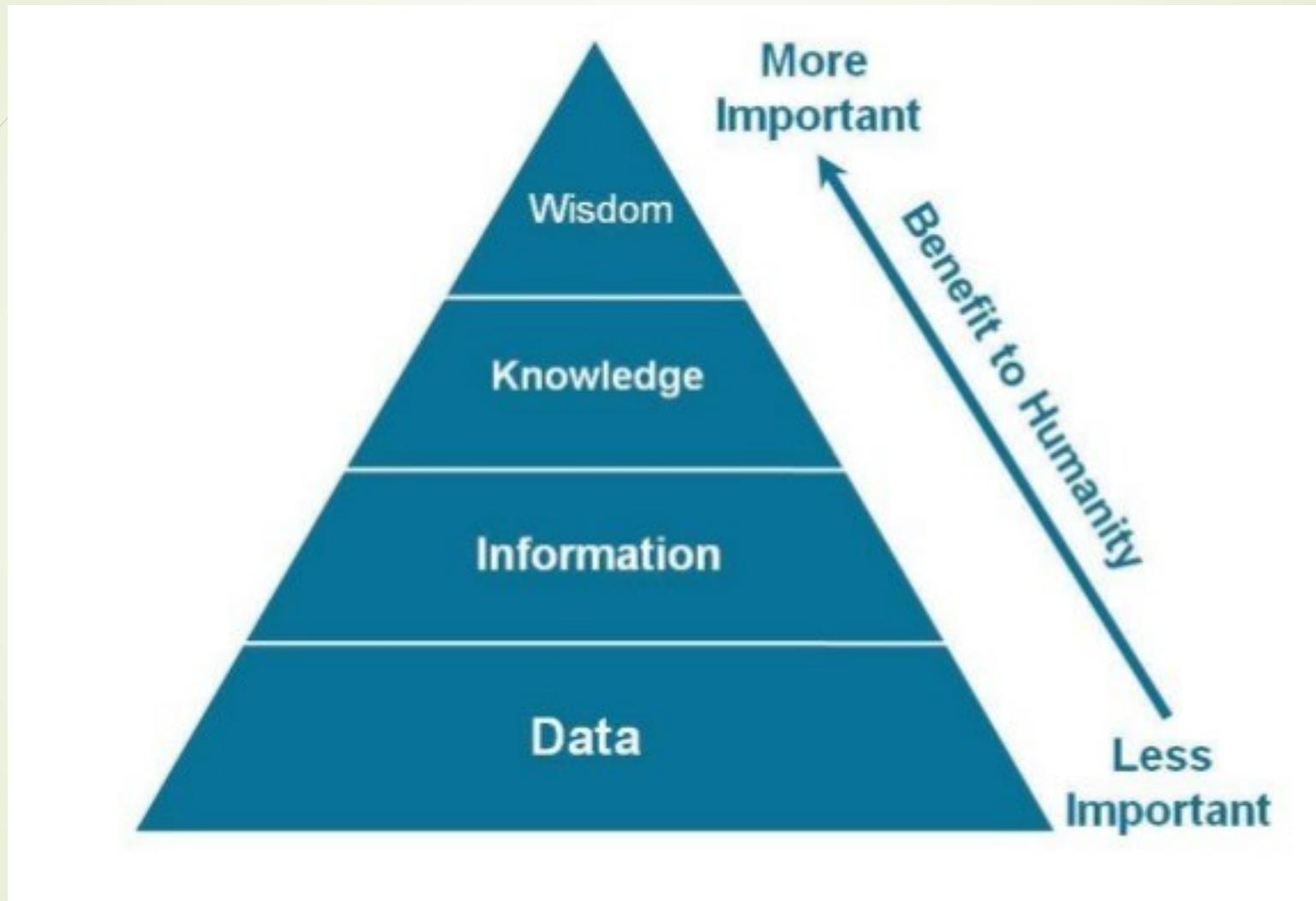
- Solar
- Street lights
- Transformers
- Water level
- Compressors
- Generators
- Cathodic protection
- Thermal mapping
- Energy
- Bio gas
- Freezers/Chillers
- and more...

Internet of Things(IoT)

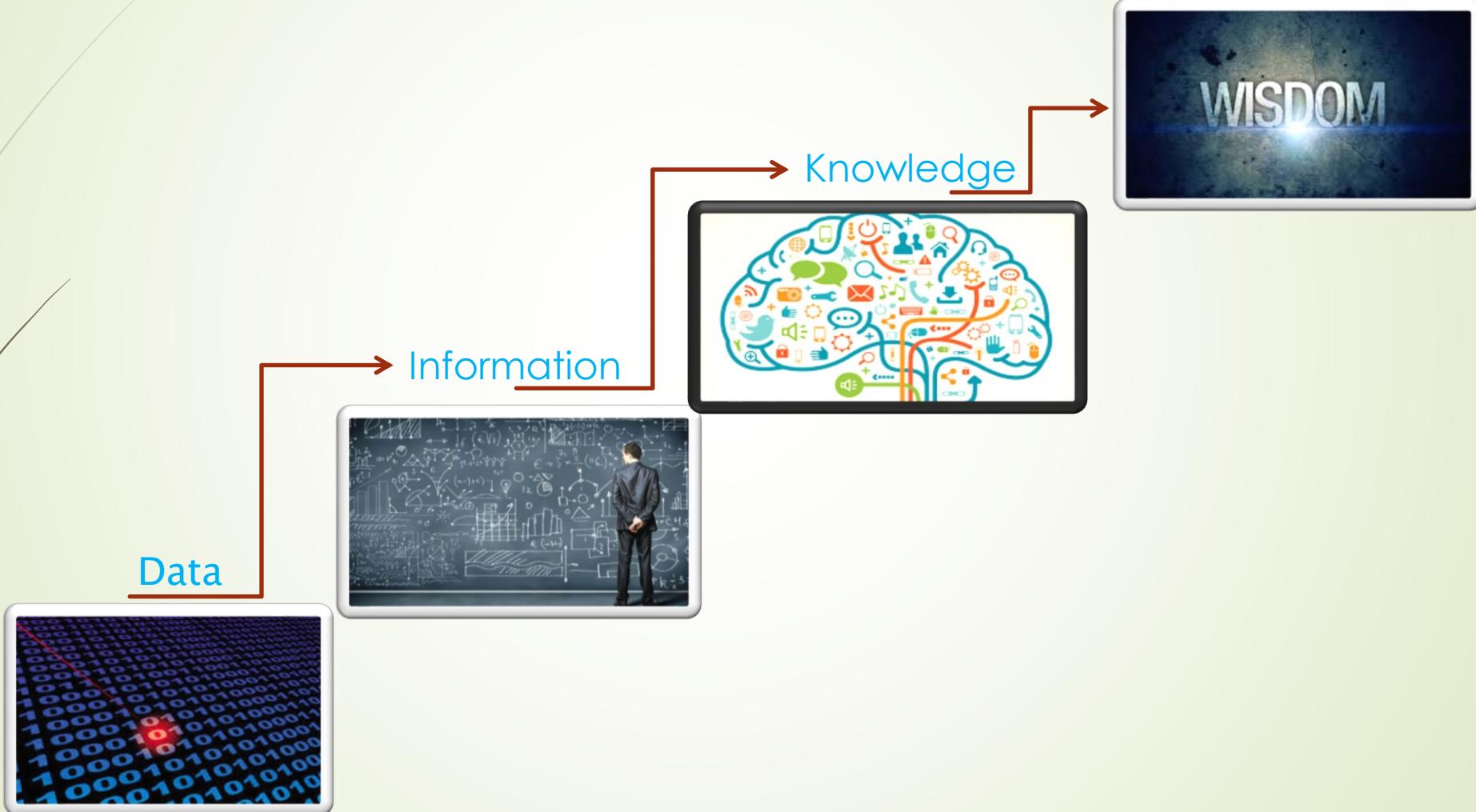
Definition:

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.

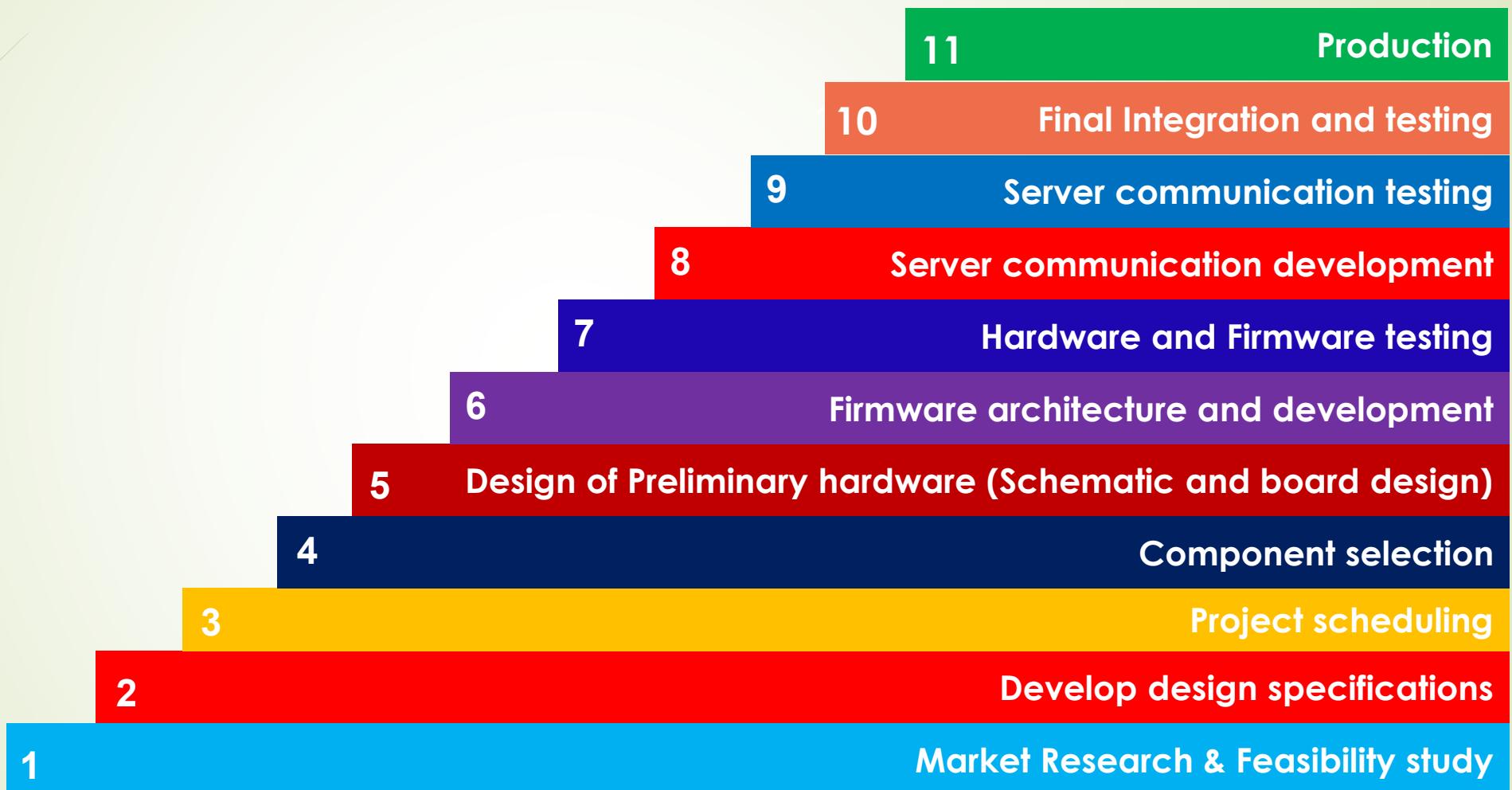
Goal of IoT



Turing Data into Wisdom



IoT Product Development Process



eNtroL



SwitchBinary

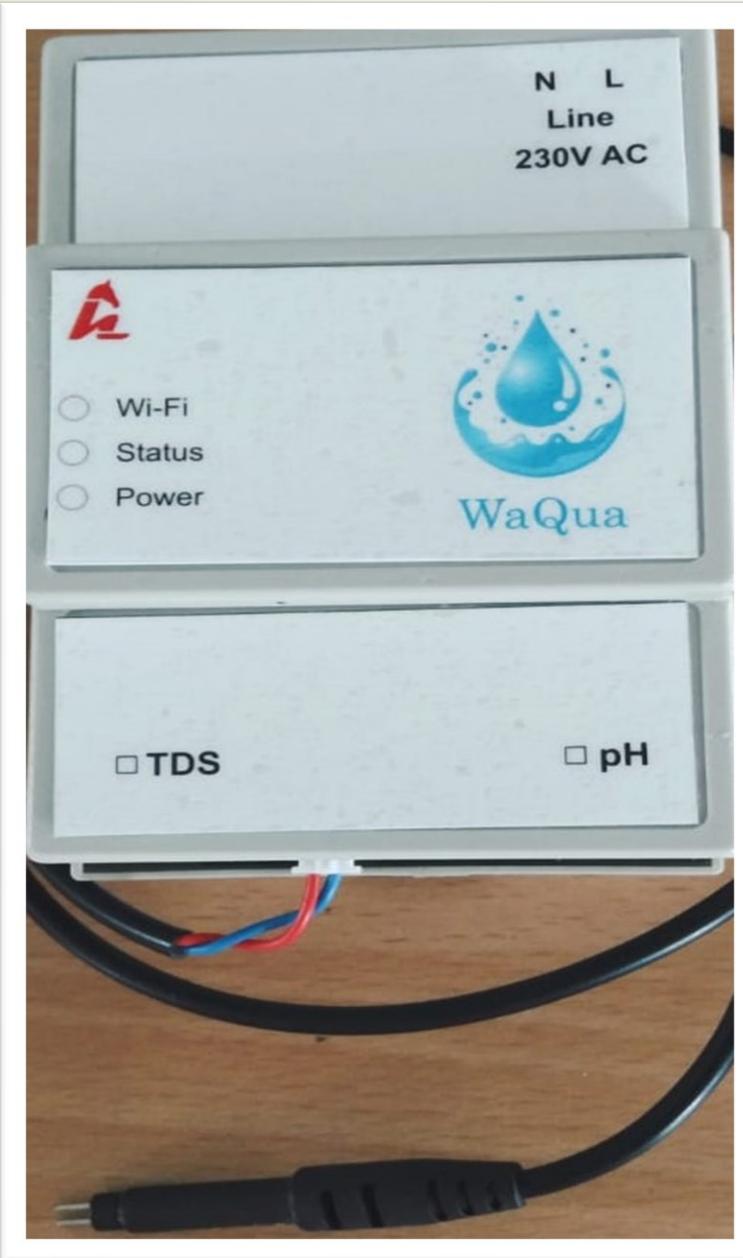


LightOn

Switch2Smart



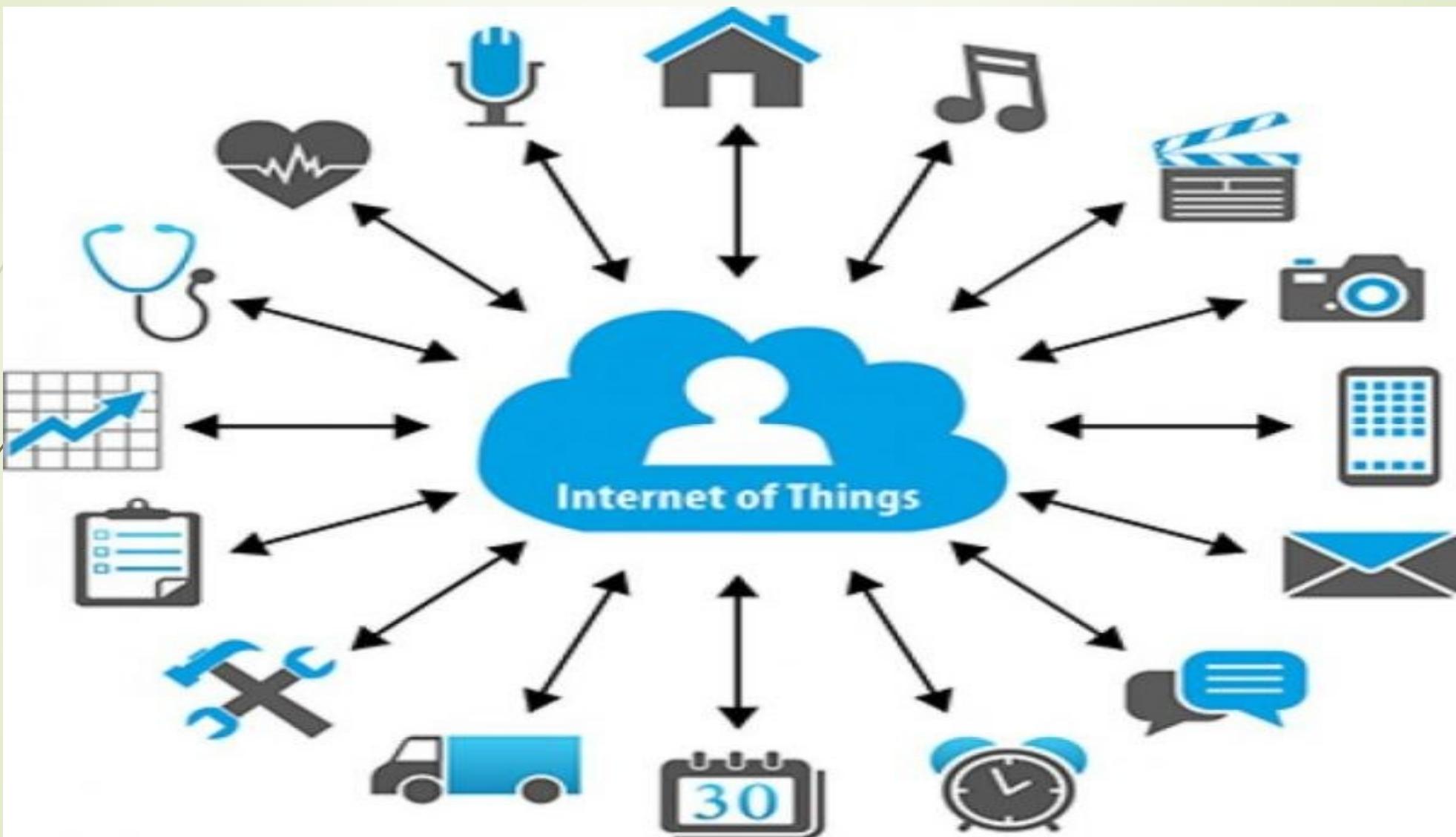
WaQua TDS



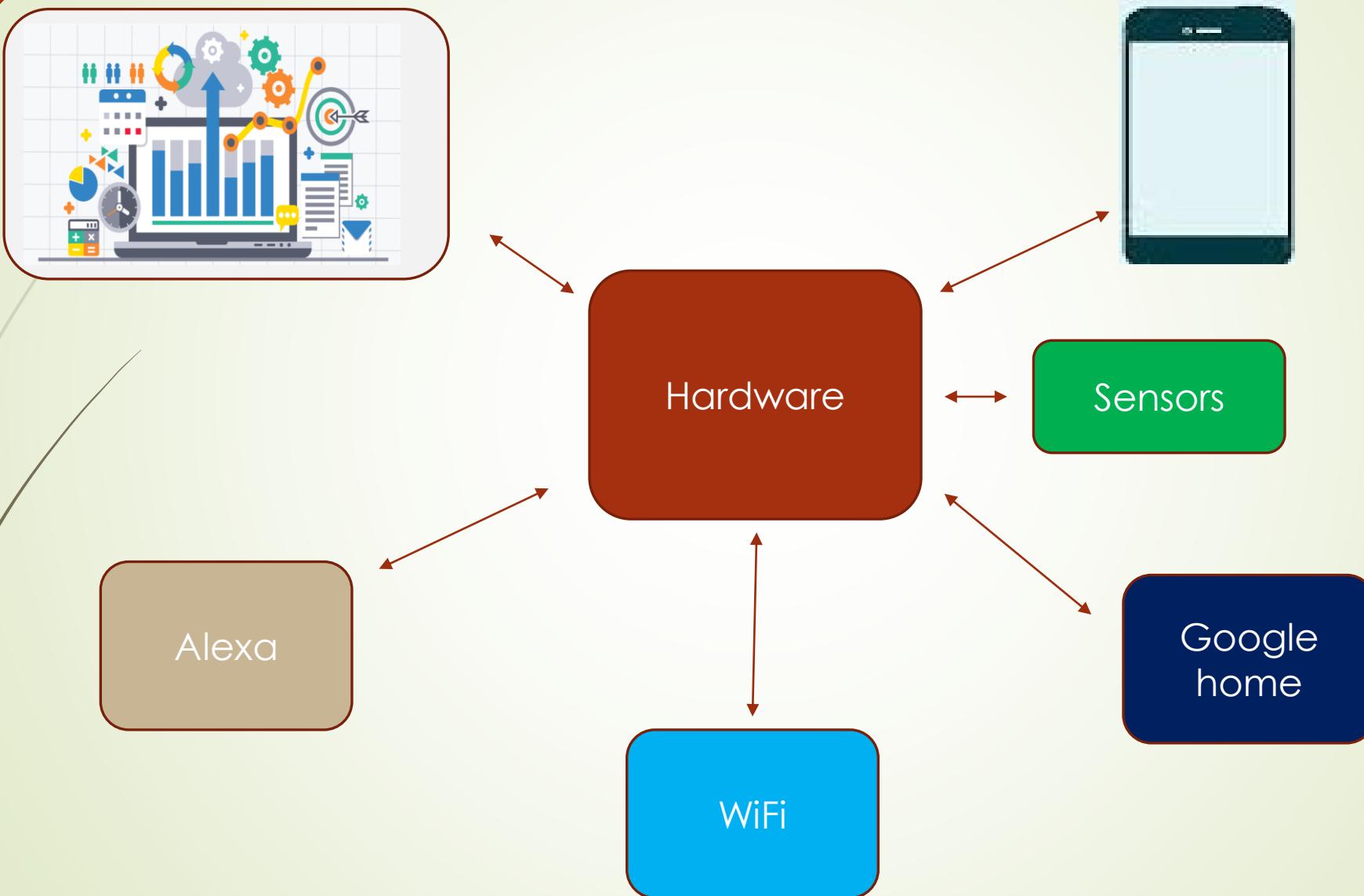
WaQua pH



1 Market Research & Feasibility study

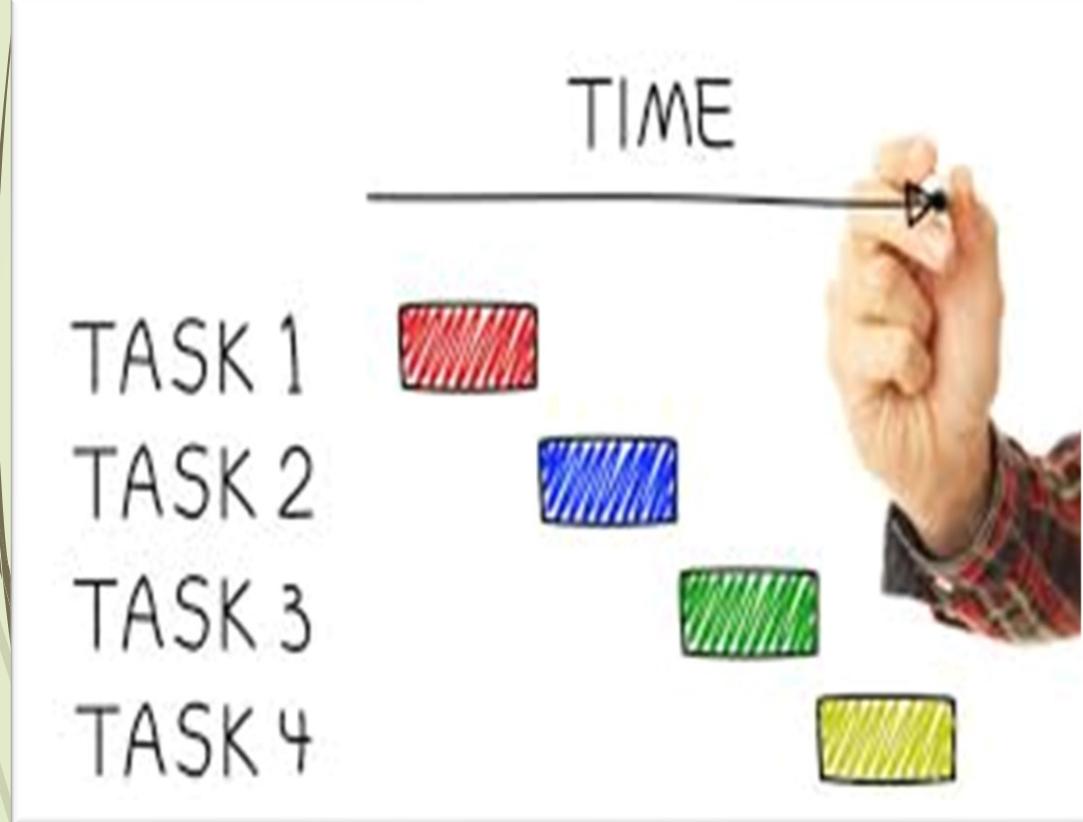


2 Develop design specifications



Project scheduling

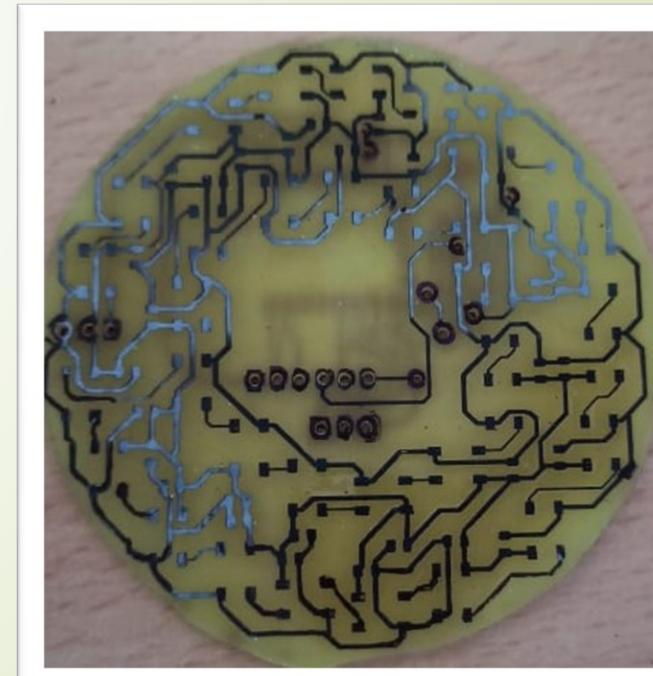
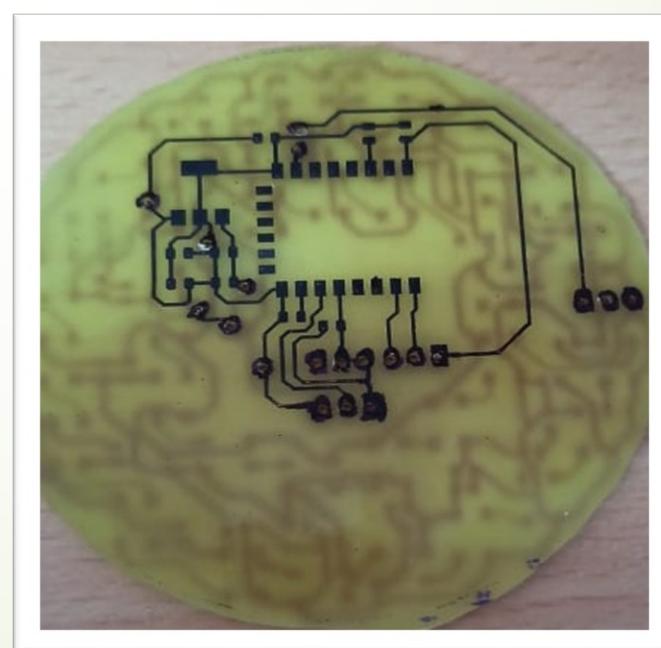
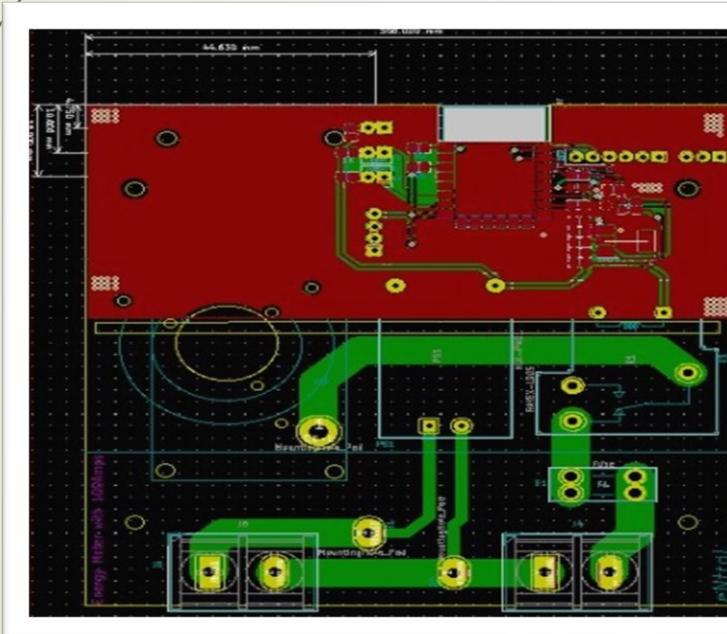
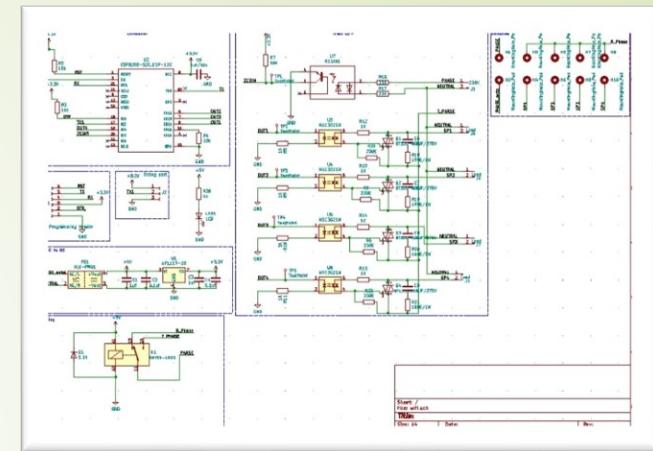
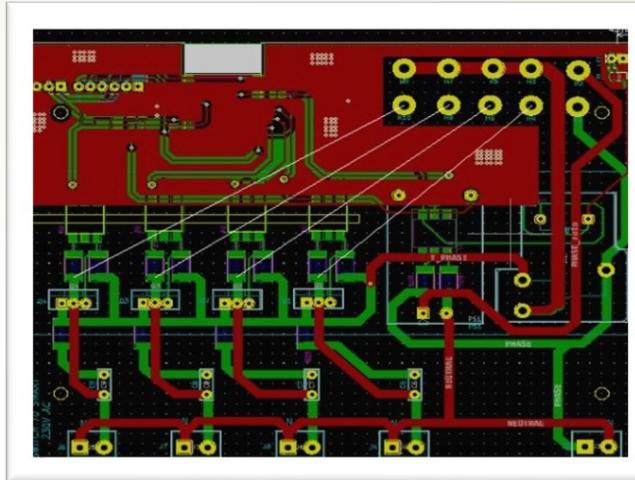
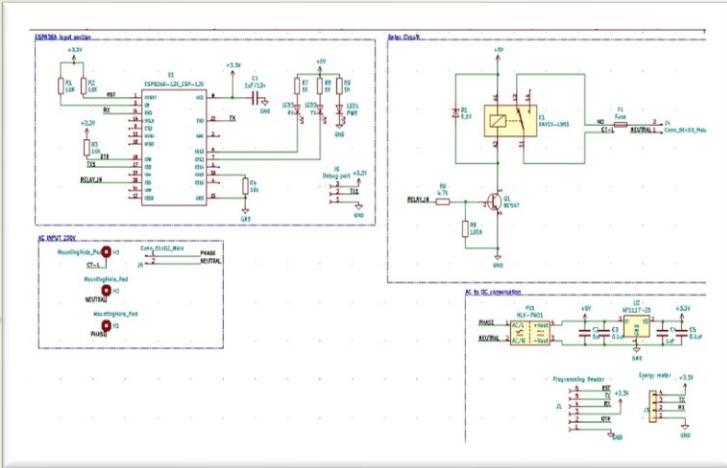
Component selection



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

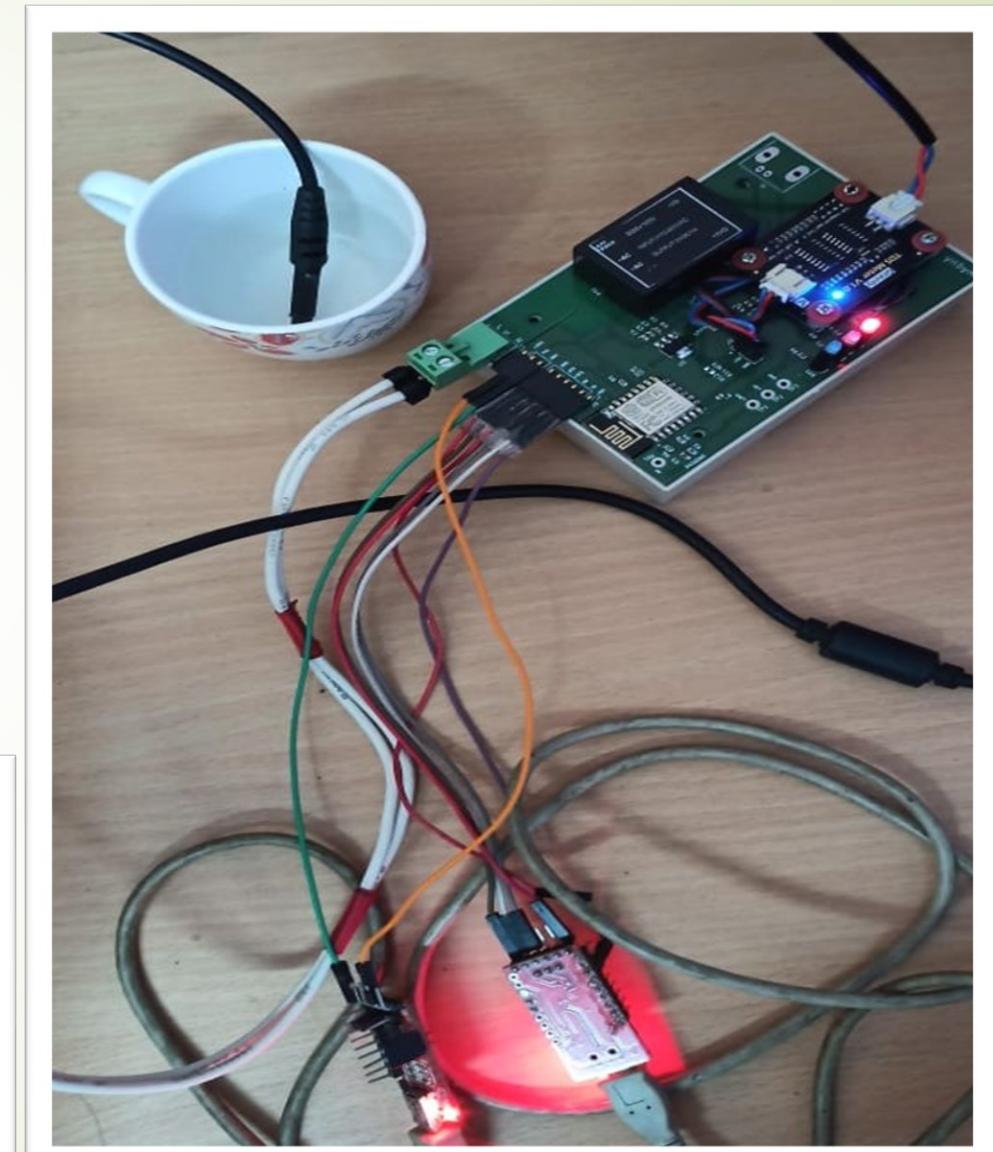
The screenshot shows the Visual Studio Code interface with the following details:

- 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.cpp` file, specifically the `onMqttConnect` function and the `Mqtt_Publish_All` helper function.
- 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.

```
908
909 void onMqttConnect(bool sessionPresent) {
910
911     Serial1.println("Connected to MQTT.");
912     Serial1.print("Session present: ");
913     Serial1.println(sessionPresent);
914
915     ui8MqttSendFlag = 1;
916     EApp.ui8MqttStatus = 1;
917
918     mqttClient.subscribe(MqFile.sMqttSubTDSTopic.c_str(),MqFile.ui8MqttQoS);
919     mqttClient.subscribe(MqFile.sMqttSubPhTopic.c_str(),MqFile.ui8MqttQoS);
920
921     Mqtt_Publish_All();
922     mqttClient.publish(MqFile.sMqttDeviceStatus.c_str(), MqFile.ui8MqttQoS, true,"online");
923 }
924
925 void Mqtt_Publish_All(void){
926
927     mqttClient.publish(MqFile.sMqttPubTDSTopic.c_str(),MqFile.ui8MqttQoS, true,String(ERead.ui16TDSValue).c_str());
928
929     mqttClient.publish(MqFile.sMqttPubPhTopic.c_str(),MqFile.ui8MqttQoS, true,String(ERead.fPHValue).c_str());
930     Serial1.println("Publish tds and ph values");
931 }
932 }
```

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

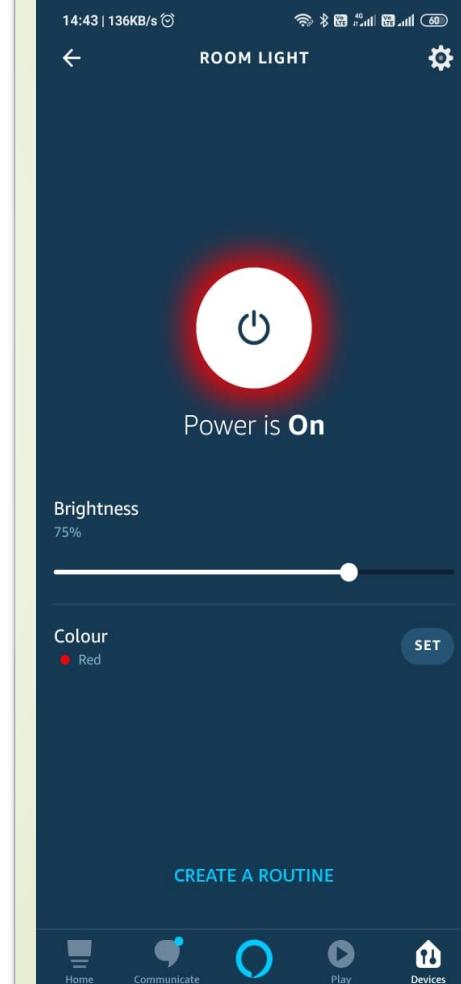
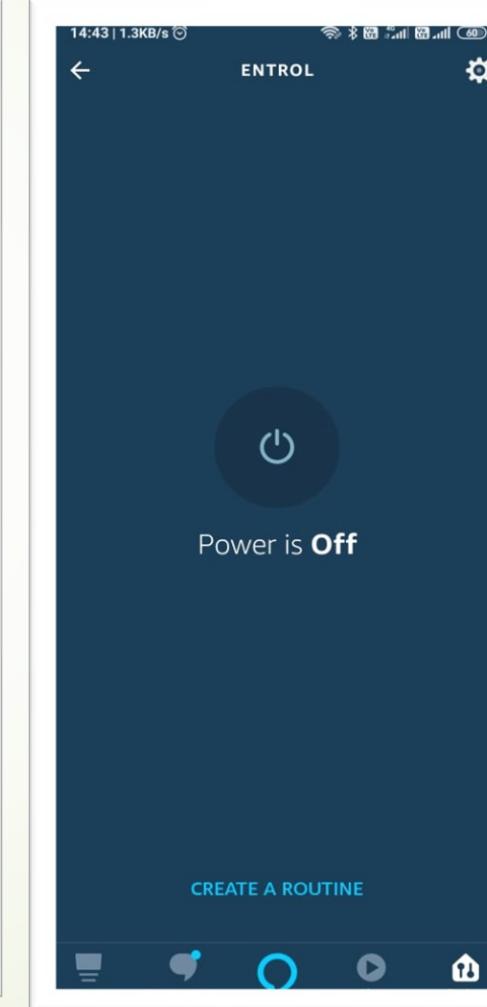
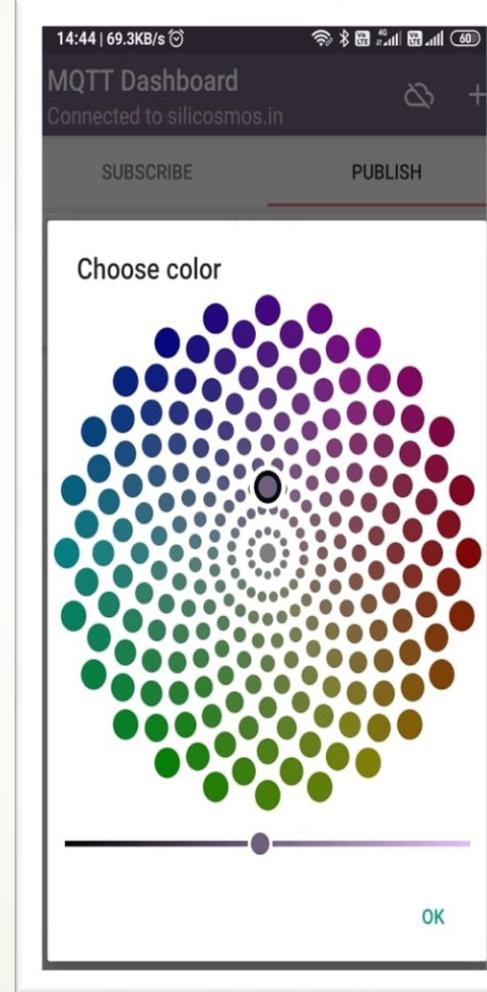
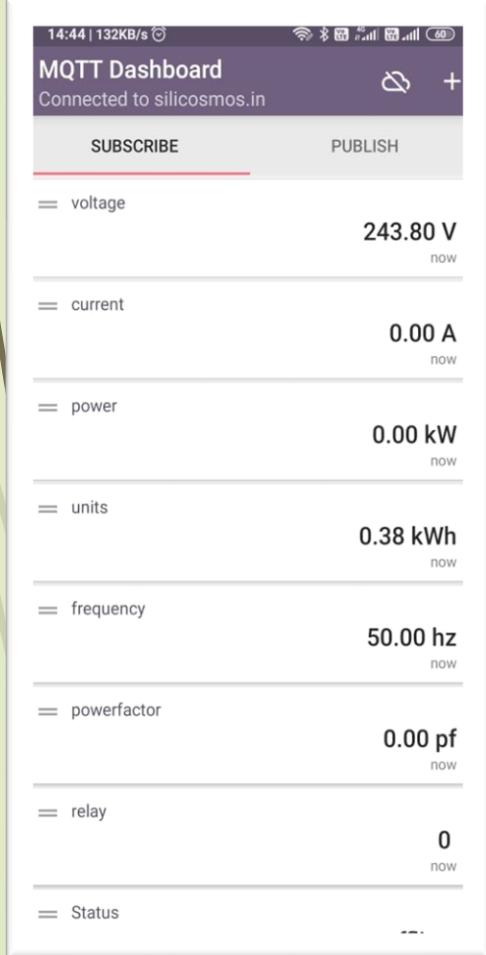
Gateway: Gateway

Subnet: Subnet

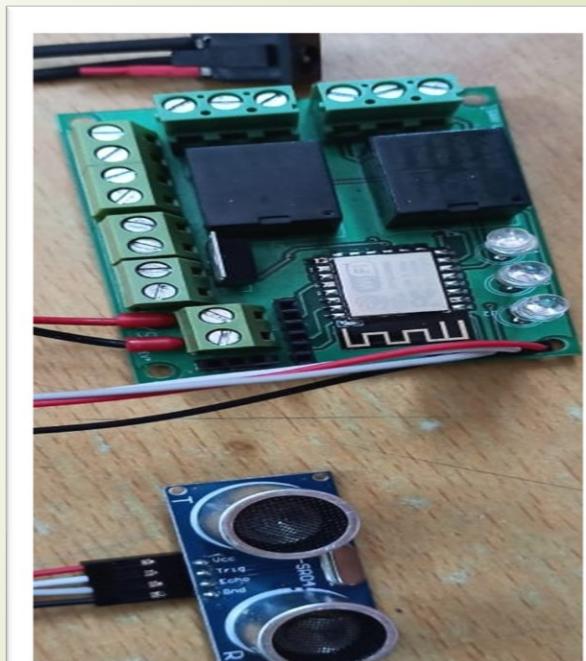
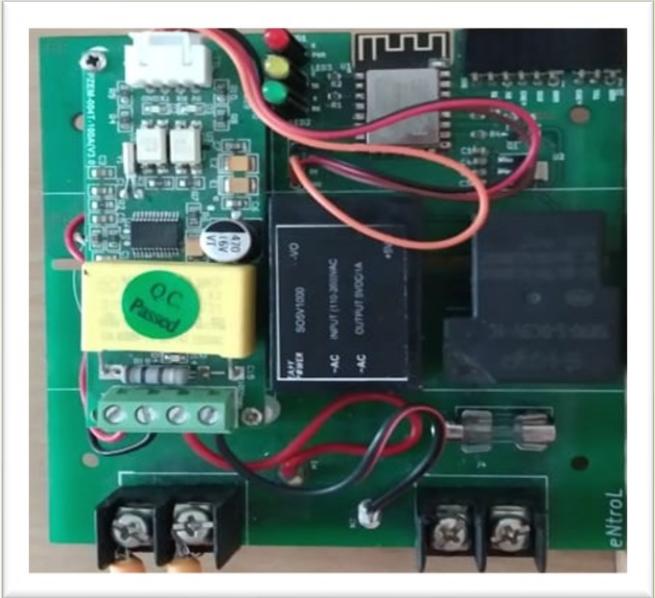
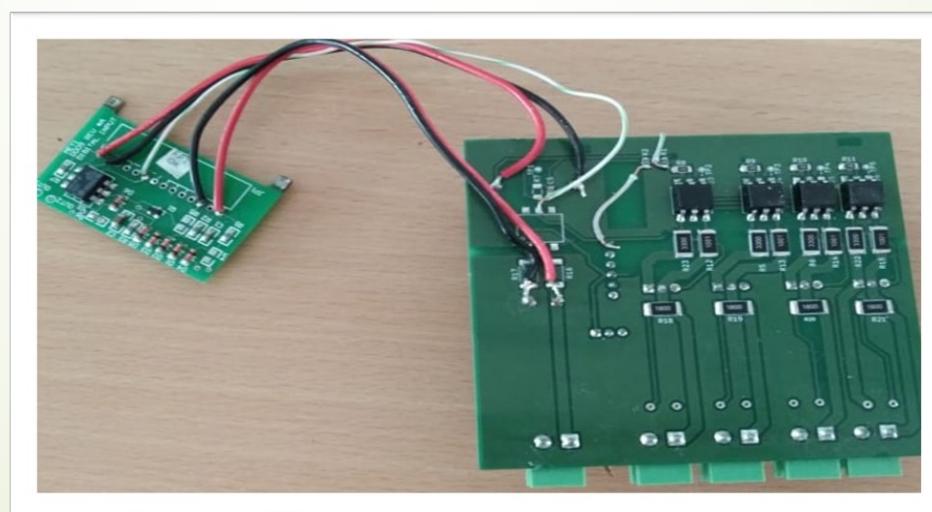
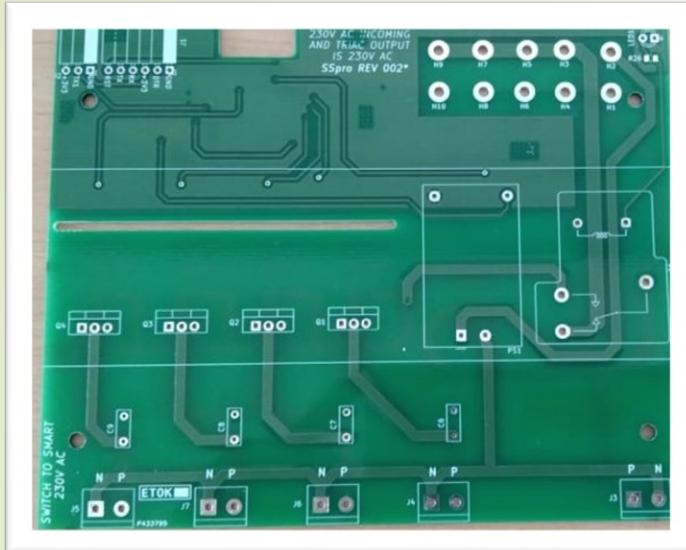
DNS IP: DNSIP

WifiConfig:

Final Integration and testing



Production





Silicon14 Inc

Thank You

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