❑**Presentation On** :

"**Real time water quality monitoring system using lot and machine learning**"

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❑<u>INTRODUCTION</u> :

➢ As per increase in water pollution, there is need of controlling pollution in water is finished by monitoring Water quality.

➢ Our System consists of various sensors which will compute the standard values of water in real-time for effective action and is accurate and only less manpower required.

❑OBJECTIVE:

➢ To measure critical water quality parameters such as physical and chemical properties .

➢ System must be low cost , more efficient as well as processing , sending and viewing data on cloud through Wi-Fi to mobile.

➢ To collect data from various sensor nodes and send it to base station by wireless channel.

☐ REQUIREMENT ANALYSIS:

➤ Functional Requirement:

- ❖ 1. Arduino Mega 2560

- ❖ 2. pH Sensor

- ❖ 3. LDR Sensor

- ❖ 4. Turbidity Sensor

- ❖ 5. TDS Sensor

- ❖ 6. Rain Sensor

- ❖ 7. Esp8266 Wi-Fi module

- ❖ 8. Rechargeable Battery

Other components include tape, wires, floating devices, etc.

❑ Arduino Mega 2560:

- ➢ Microcontroller
- ➢ Open-source board
- ➢ Pin 3.3V & 5V – provides voltage
- ➢ Reset (RST) Pin- resets the microcontroller
- ➢ Vin Pin- external voltage provider (7V to 20V)
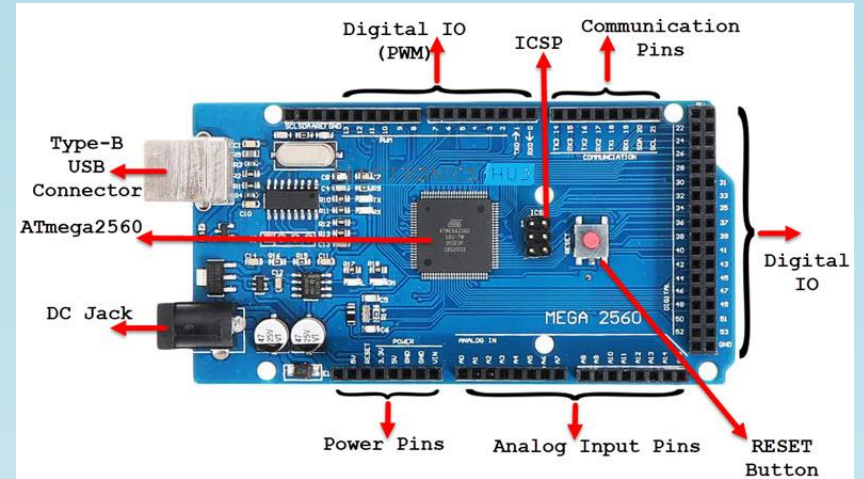
❑ pH Sensor:

- ➢ The pH meter measured the activity of the hydrogen ion of the liquid.
- ➢ The scale of pH is 0-14,
- ➢ pH 0-6 defined acidic
- ➢ 8-14 defined alkaline.
- ➢ pH 7 is a neutral solution.

☐LDR Sensor:

- ➤ Light Dependent resistor (LDR)
- ➤ electronic component which is sensitive to light
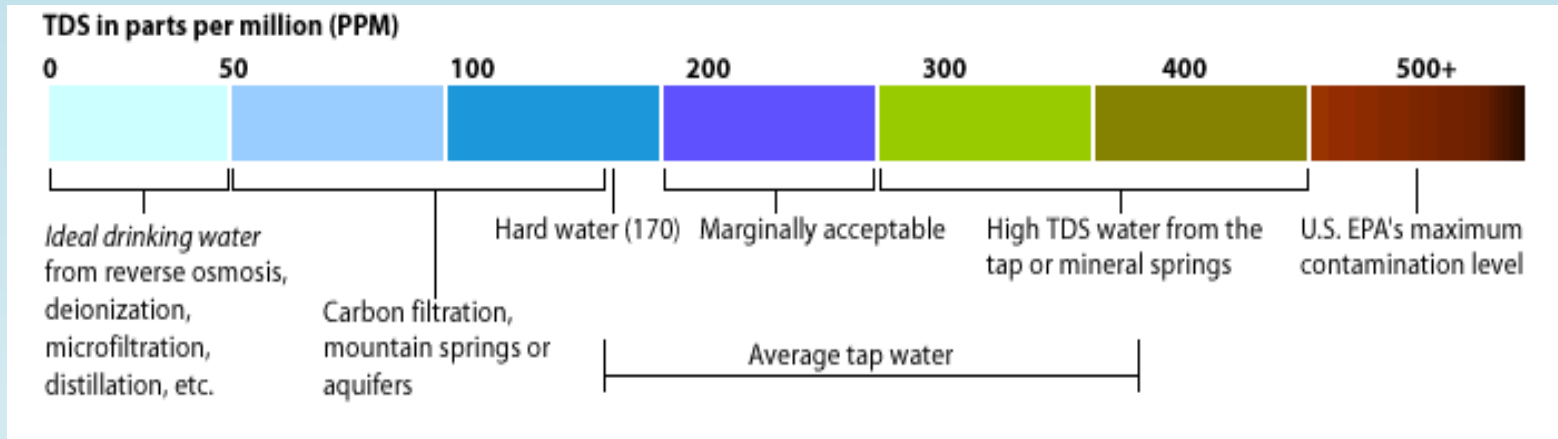- ➤ The resistance of LDR changes when light falls upon it

☐Turbidity Sensor:

- ➤ measures the level of turbidity of the water
- ➤ By transmitting and scattering the light it measures
- ➤ the suspended particle in water
- ➤ The increase of Total suspended solids (TSS) is defined
- ➤ to increase the turbidity level

TDS Sensor:

- It is an Arduino compatible kit for TDS meter that measured the cleanliness of the water
- It is used to measure hydroponic, domestic water and another purpose of testing water quality.


TDS in parts per million (PPM)

| 0 | 50 | 100 | 200 | 300 | 400 | 500+ |

Ideal drinking water from reverse osmosis, deionization, microfiltration, distillation, etc.

Carbon filtration, mountain springs or aquifers

Hard water (170)   Marginally acceptable

High TDS water from the tap or mineral springs

U.S. EPA's maximum contamination level

Average tap water

Rain Sensor:

- A rain sensor is made of a rain detector plate

  having a comparator that manages the intelligence.

Esp8266 Wi-Fi module:

➢ created by Espressif Frameworks in Shanghai, China

➢ low-cost Wi-Fi microchip
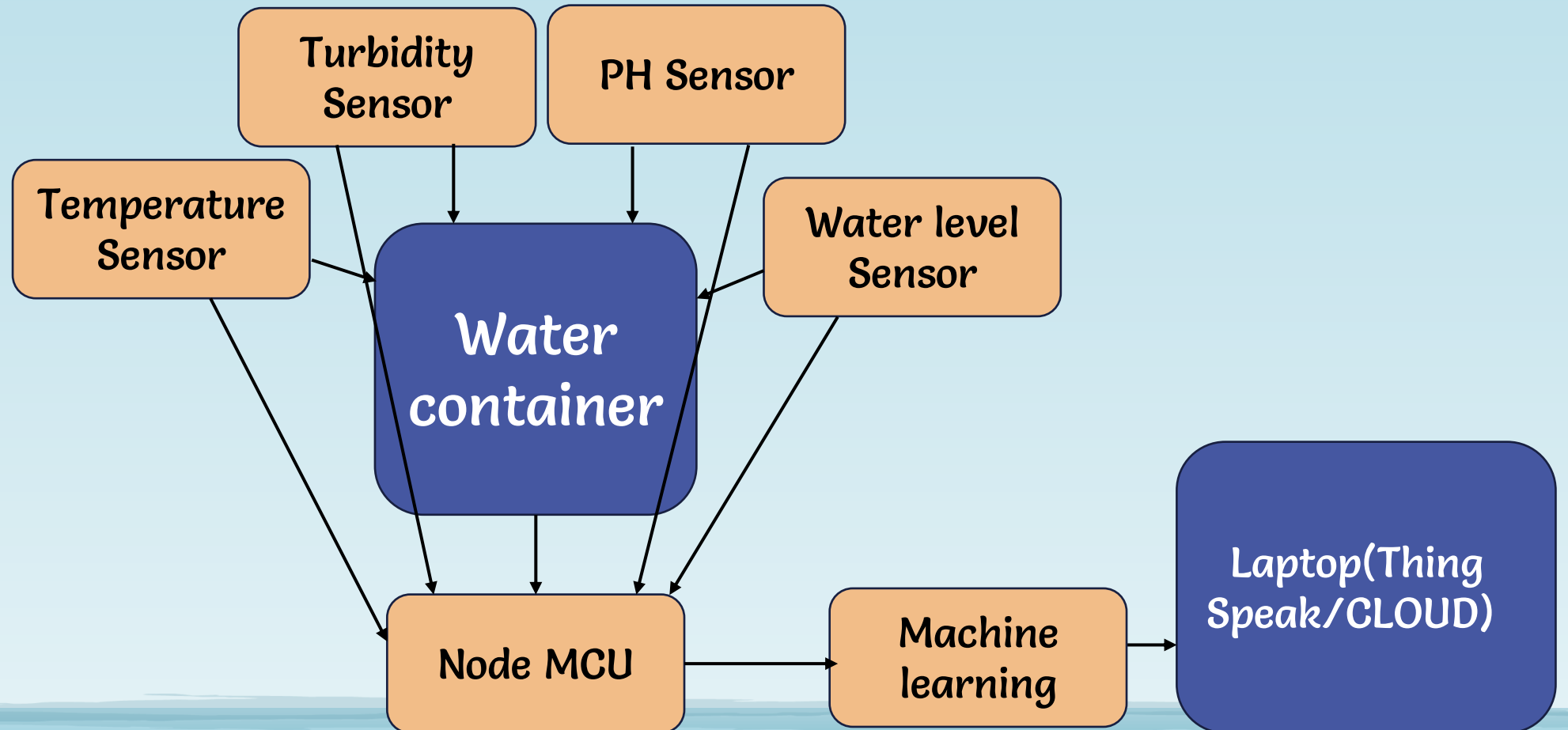
➢ with a full TCP/IP stack and microcontroller capability
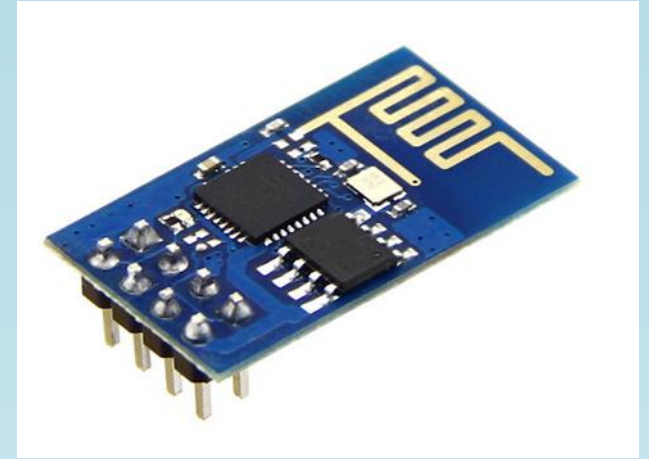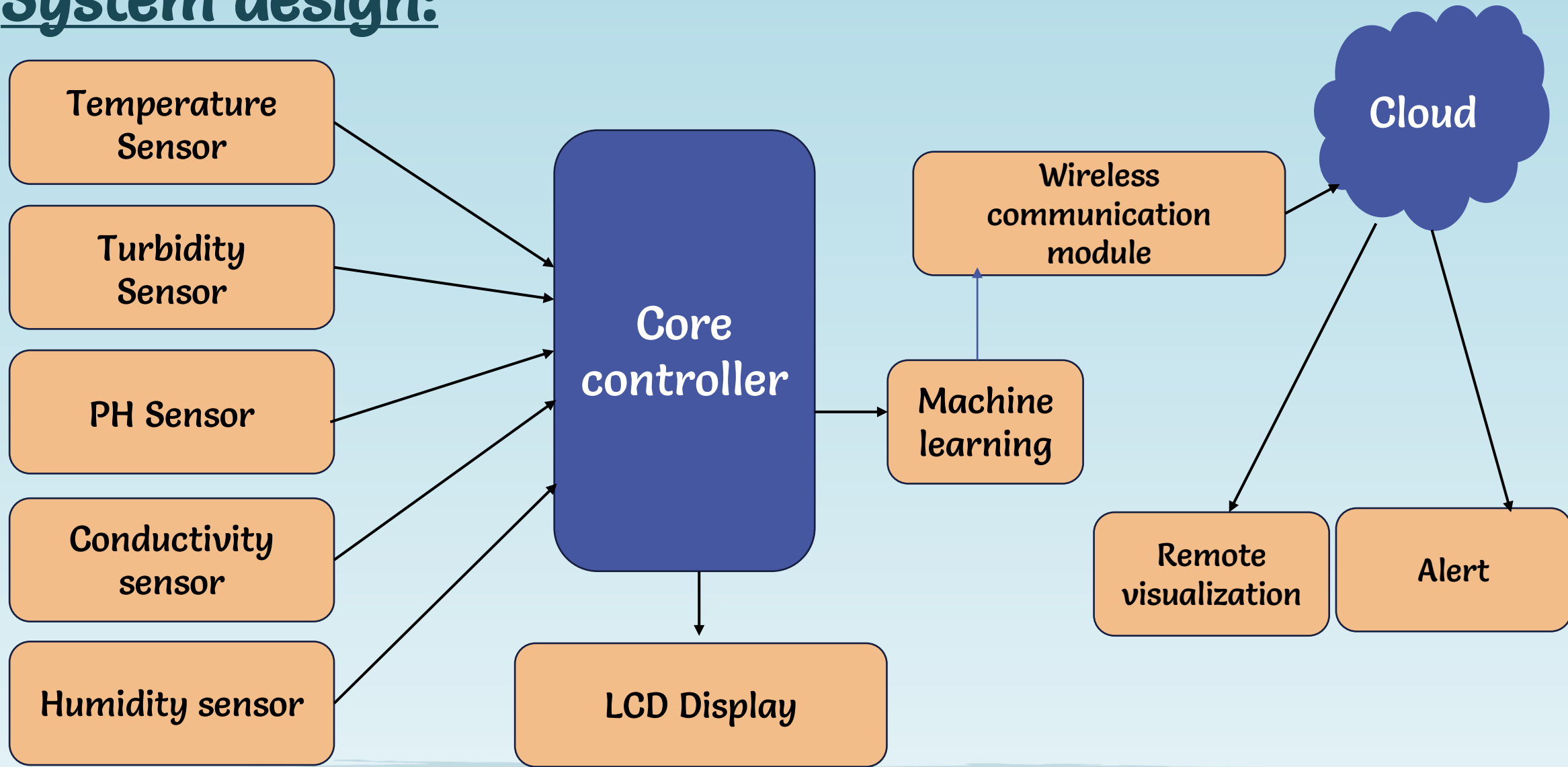

Rechargeable Battery:

➢ used a LithiumIon Battery
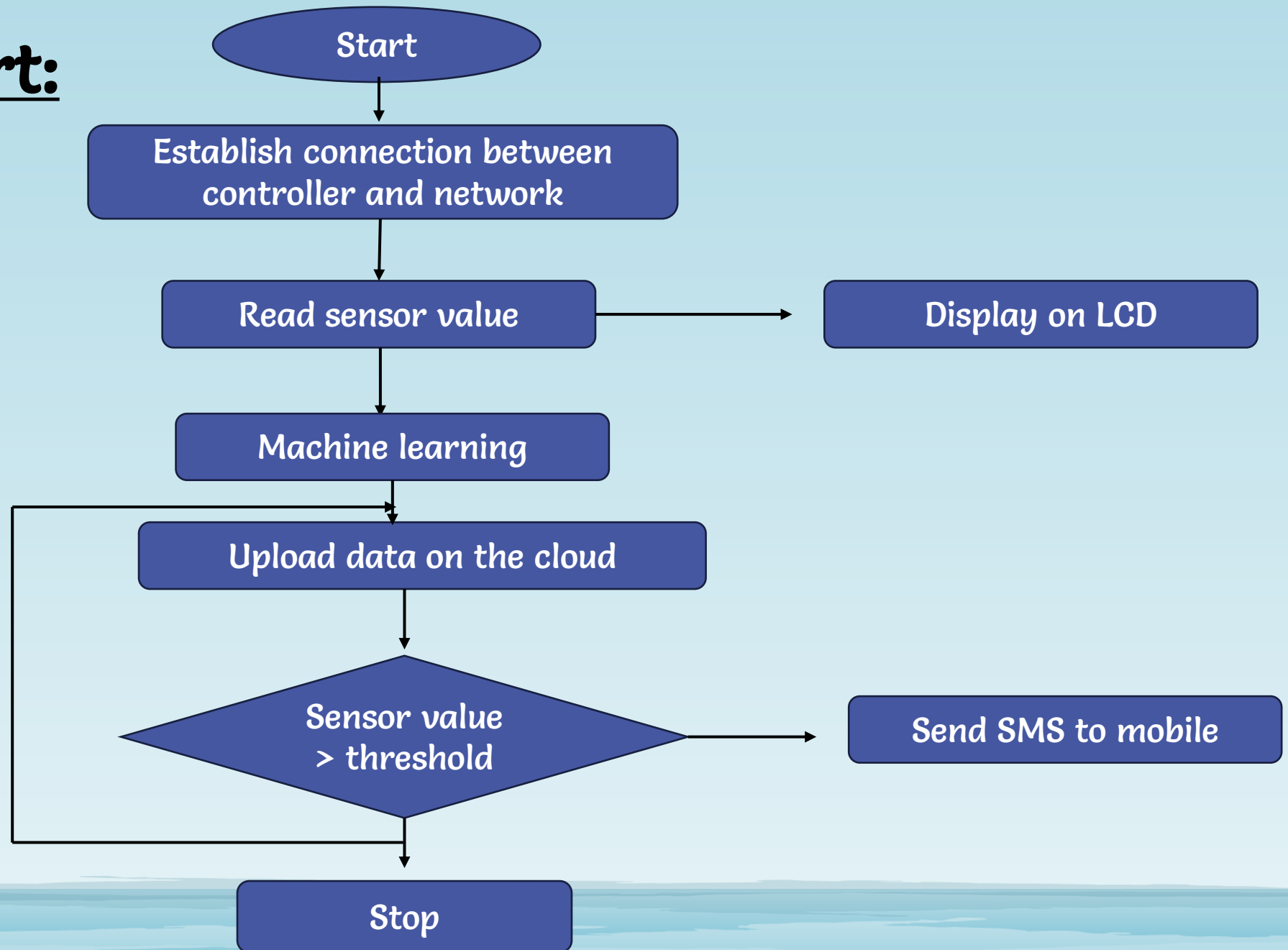
➢ called as 11.1V 1100mAh 3S 30C LiPo battery.
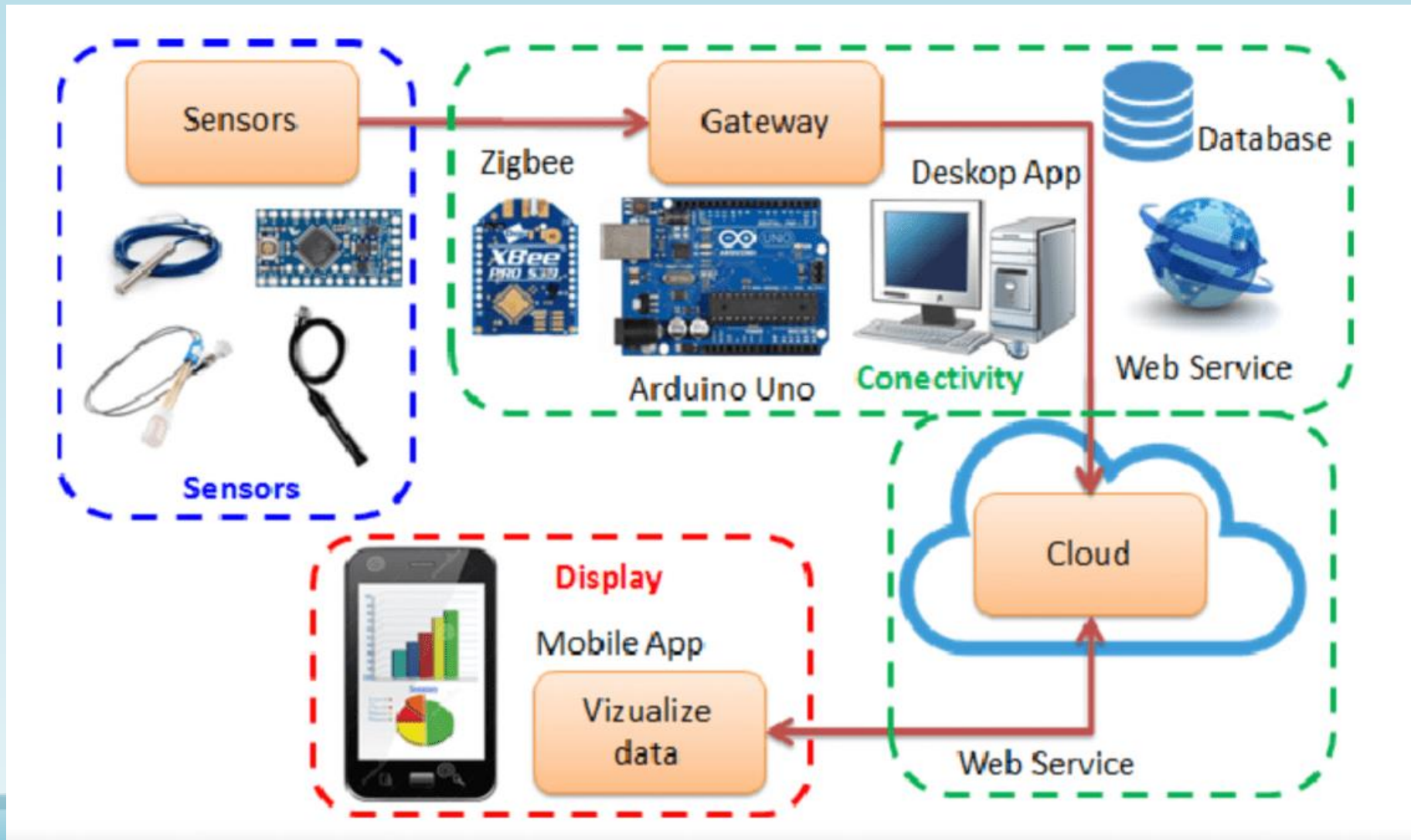
SYSTEM ARCHITECTURE:

System design:

❑ **Flow chart:**

❑Topology of the system:

❑ <u>Machine Learning:</u>

      Machine learning has become a very much popular medium for predicting the future of anything with the help of previous data. There are so many different algorithms which can be used for this purpose, such as ----------

1. Polynomial Regression
2. Cost function
3. Evaluation matrix
4. Probabilistic Analysis etc.

      For our project work, we have used two algorithms.

1. Polynomial Regression
2. Probabilistic Analysis

❑Selected Machine Learning Algorithm:

For our project, we have used two algorithms.

1. Polynomial Regression
2. Probabilistic Analysis

➢Reason:

They are much suitable for our dataset.

Our dataset does not have any specific classification. So, Polynomial Regression is more suitable for this type of data. Also in other future prediction of water has been conducted with this algorithm.

When any binary type data is given, Probabilistic Analysis is very suitable for calculation. Our Rain sensor gives 2 type of data 0 & 1. so, this type of sensor are very compatible with Probabilistic Analysis.

□Data handling using Machine learning:

Data preprocessing

1. Data collection
2. Data cleaning
3. Data transformation
4. Data reduction

Data processing

1. Data exploration
2. Box plot analysis
3. Normalization

Methodology

1. Correlation analysis and feature selection
2. Data split(cross validation)

   i. Regression model
   ii. Classification model

Evaluation

1. Regression
2. Classification evaluation