QATra Irrigation System

Students: Maryam Al-Emadi, Noof Al-Sayed, Roqayya AlYousef, Fatima Al-Janahi

Mentor: Dr. Hazem Nounou

Course Instructor: Dr. Ali Ghrayeb

ECEN 403: Electrical Design Lab I

Texas A&M University at Qatar

Outline:

Problem Statement:

QATra is an advanced irrigation system that is able to reduce water consumption by checking the soil moisture and controlling the amount of water dispensed.

A mobile application, where the user can view the daily water content of the soil and gets notified when the plants are watered, is used in our system.

The user is informed in case of a fault in the system and can control the irrigation system using the application.
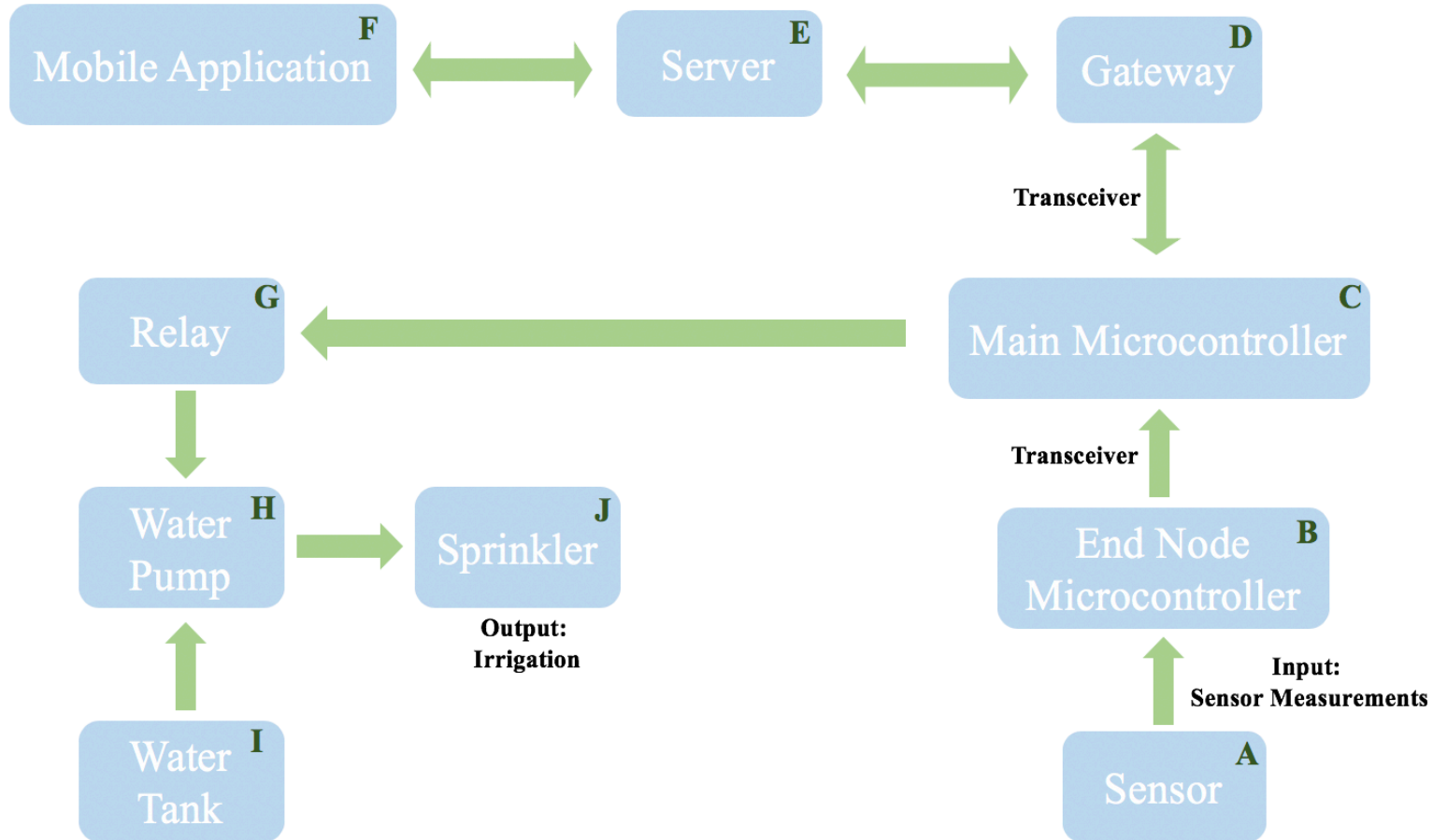
The project addresses environmental issues, cuts labor costs, encourages smart innovations and boosts cultivation.
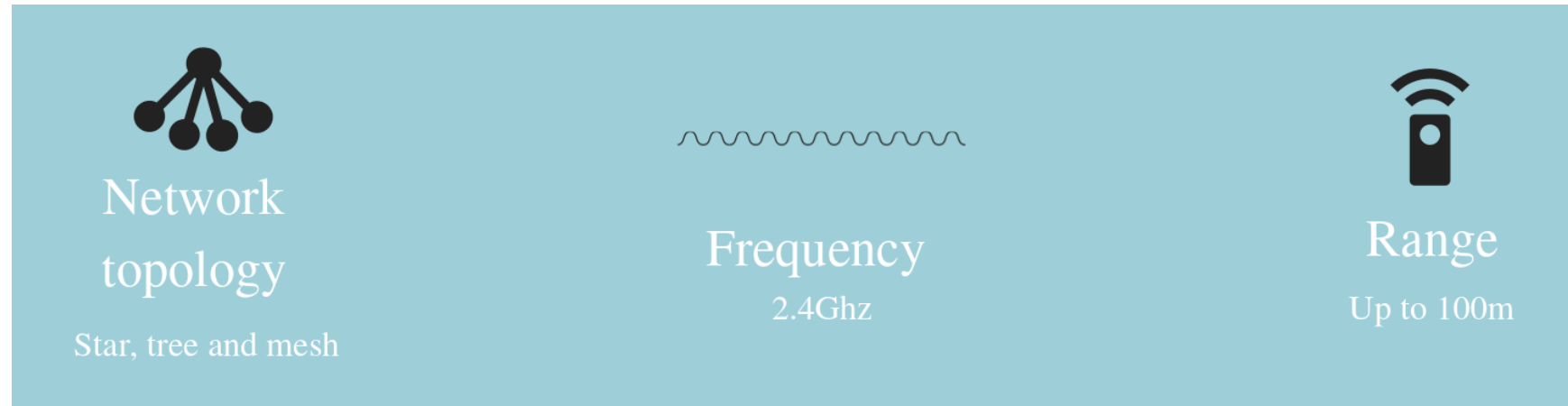
Proposed Solution
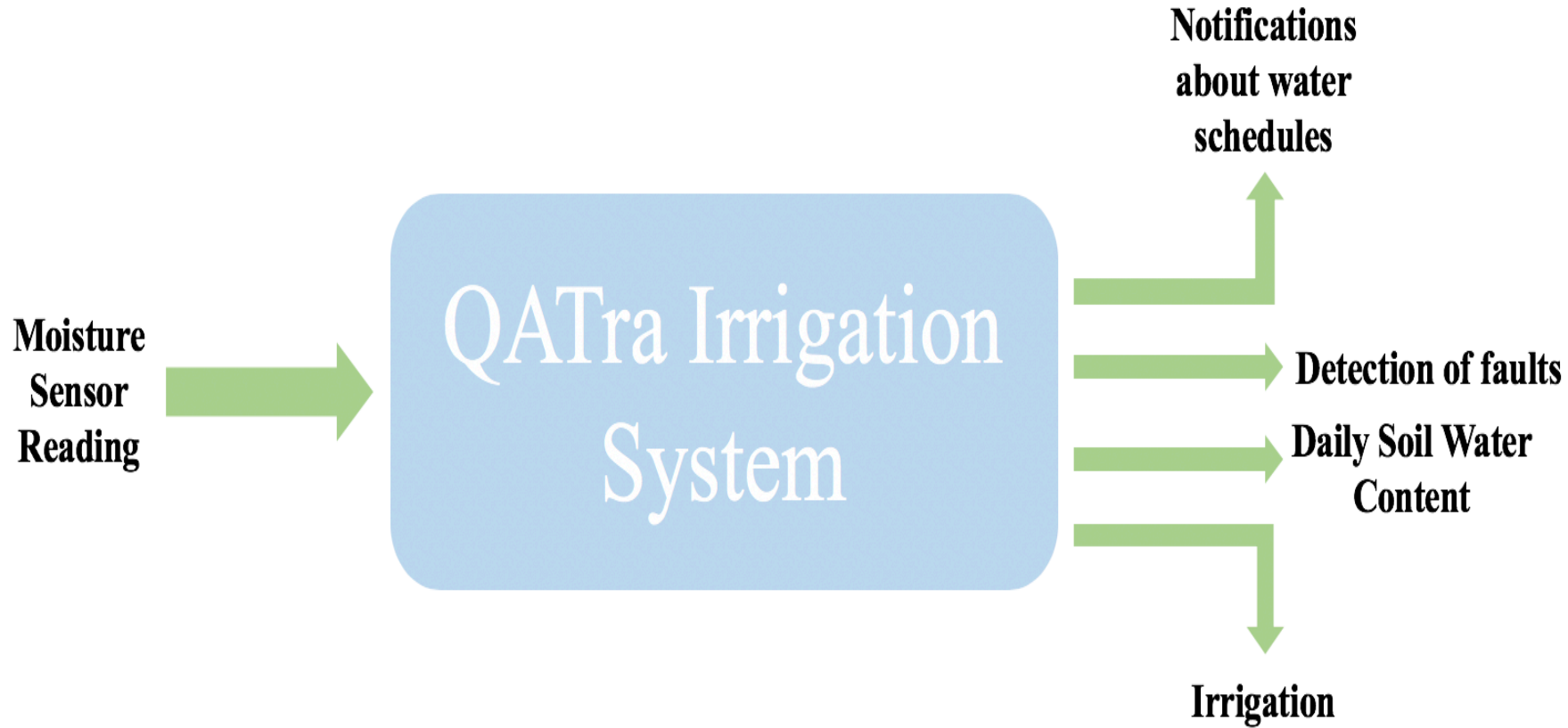
Proposed Solution (cont'd)

Output:
Notifications, Fault Detection, Daily Soil Water Content

Mobile Application **F**
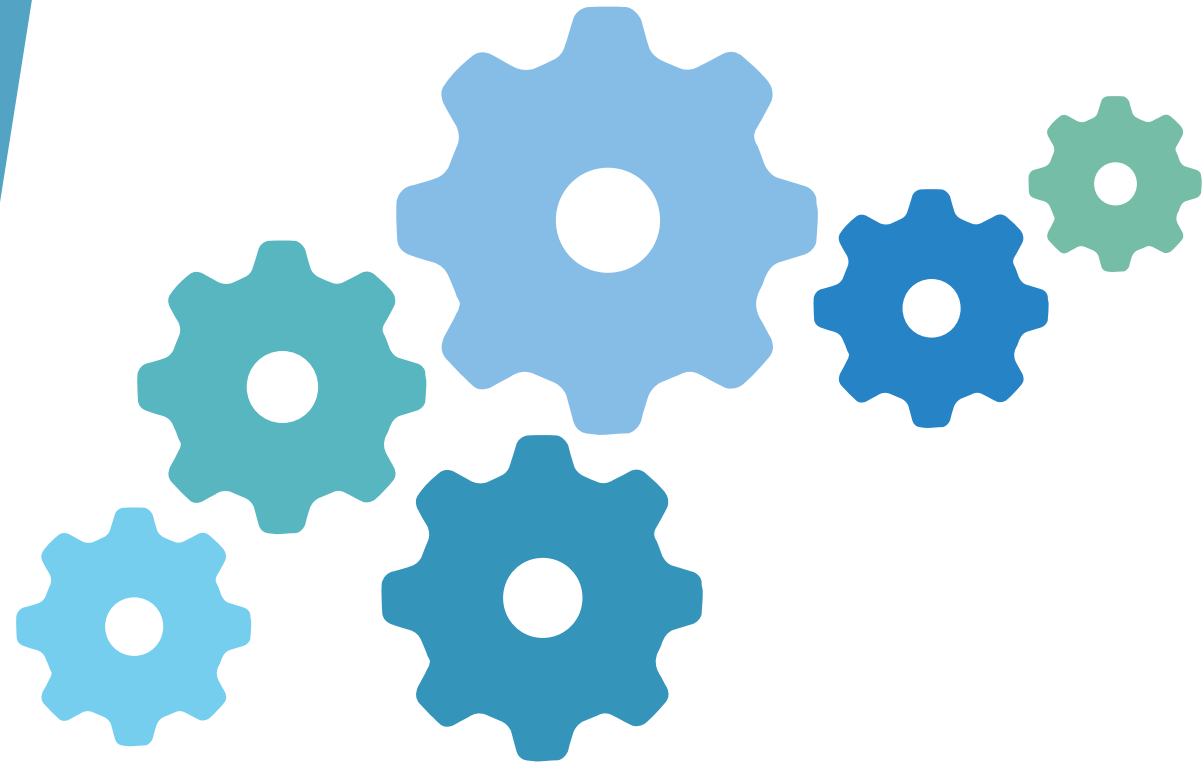
Server **E**

Gateway **D**

Transceiver

Relay **G**

Main Microcontroller **C**

Transceiver

Water Pump **H**

Sprinkler **J**

End Node Microcontroller **B**

Output:
Irrigation

Water Tank **I**

Input:
Sensor Measurements

Sensor **A**

3

Technical Standards

Zigbee: IEEE 802.15.4 [1]

Network topology

Star, tree and mesh

Frequency

2.4Ghz

Range

Up to 100m

How is this relevant to QATra?

Constraints

- Resources Constraint
- Technical Constraint
- Health and Safety Constraint
- Environmental Constraint
- Social Constraint
- Economical Constraint
- Political Constraint

Risks

Wi-Fi   Central Microcontroller

Performance Criteria:

ENVIRONMENTAL
(DIRECT)

PUBLIC HEALTH
(INDIRECT)

ECONOMIC
(INDIRECT)

SAFETY
(DIRECT)

SOCIAL, GLOBAL &
CULTURAL
(INDIRECT)

POLITICAL
(INDIRECT)
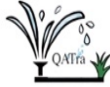
ETHICAL
(DIRECT)

WELFARE
(INDIRECT)

Existing Solutions

Product	Controllers				Systems	
	Rachio 3 [2]	Hydrawise Hunter HC [3]	Orbit B-hyve [4]	BlueSpray [5]	Conventional Irrigation System	QATra
Product Photo						
Cost	$228 - $232	$160 - $167	$50.50 - $62.19	$294.99 - $349.99	≈ $3000 - $4000	$541
Number of Zones	8 or 16	6 or 12	4 or 8	8, 16 or 24	Unlimited	Unlimited (additional cost will be added) *
Weather Intelligence	Yes	Yes	Yes	Yes	No	No
Fault Detection	No (leakage only if flow meter was added) **	No (leakage only if flow meter was added) **	No	No	No	Yes
User Interface	IOS, Android and web browser	IOS, Android and web browser	IOS, Android and web browser	web browser	None	IOS Application

*Our prototype will contain only 4 zones. However, due to star network topology unlimited number of zones can be added.
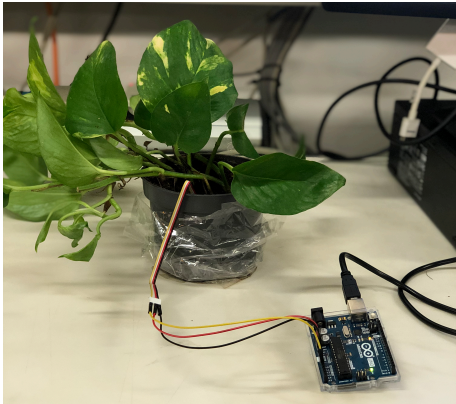**Those items are sold separately from the main product with additional cost.

Progress made (Hardware)

Moisture sensor → Code → Results


```
Moisture_Sensor_Measuring
int SensorPin = A0;   // Connect the Moisture Sensor through Analog In Pin A0
int SensorValue = 0;  // Creating a Variable to Store the Sensor Value and Initialize it to Zero
double Dry = 300; // Minimum Soil Moisture Level Threshold

void setup() {
    Serial.begin(9600);  // Determining the Baud Rate for the Serial Communication
}

void loop() {
  SensorValue = analogRead(SensorPin); // Reading the Value from the Moisture Sensor and Save it in SensorValue
  delay(1000);
  // Prinitng the Value of Soil Moisture Level on the Screen (Using Putty)
  Serial.print("Soil Moistue Level = ");
  Serial.println(SensorValue);
  Serial.print("\n");

  if(SensorValue < Dry) // Notify the User if the Soil Moisture Value Falls Under Minimum Threshold
  {
    Serial.print("The plant needs to be watered! ");
  }

}
```
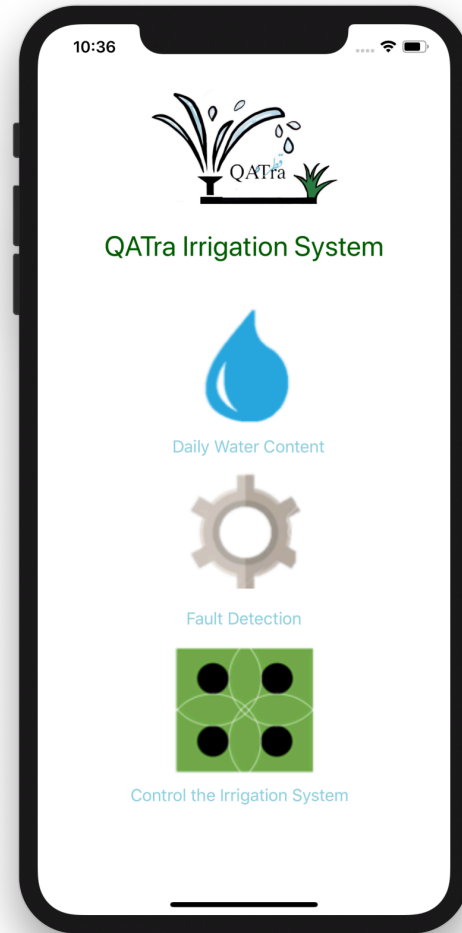


```
Soil Moistue Level = 681
Soil Moistue Level = 583
Soil Moistue Level = 470
Soil Moistue Level = 191
The plant needs to be watered! Soil Moistue Level = 185
The plant needs to be watered! Soil Moistue Level = 183
The plant needs to be watered! Soil Moistue Level = 179
The plant needs to be watered! Soil Moistue Level = 172
The plant needs to be watered! Soil Moistue Level = 163
The plant needs to be watered! Soil Moistue Level = 158
The plant needs to be watered! Soil Moistue Level = 151
```
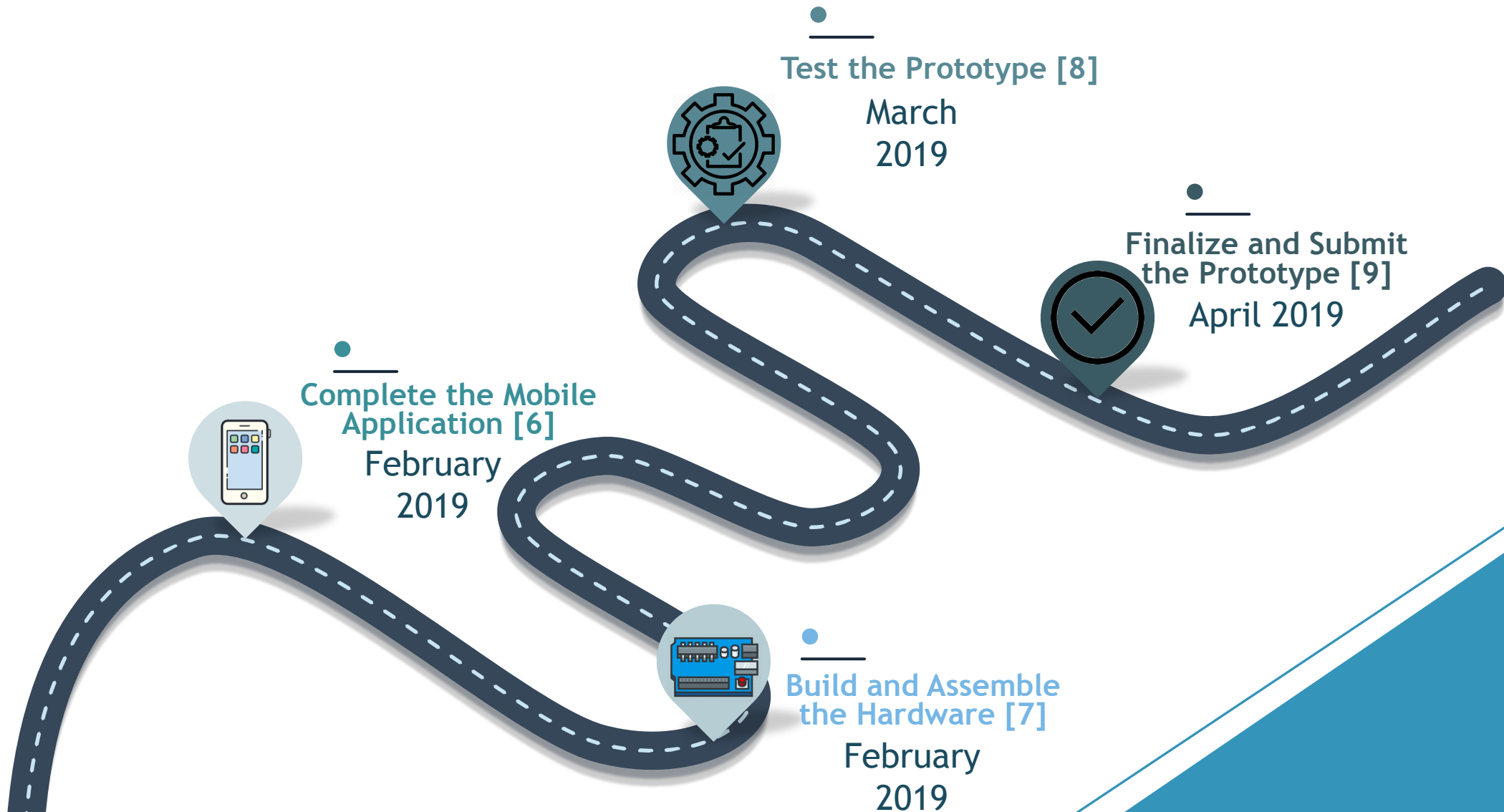
Progress made (Software)

IOS Mobile Application

Timeline and Future Plans

Test the Prototype [8]
March 2019

Finalize and Submit the Prototype [9]
April 2019

Complete the Mobile Application [6]
February 2019

Build and Assemble the Hardware [7]
February 2019

Conclusion:

Benchmarking

Initial
proposal

Functional
Modeling

Market/Customer
needs
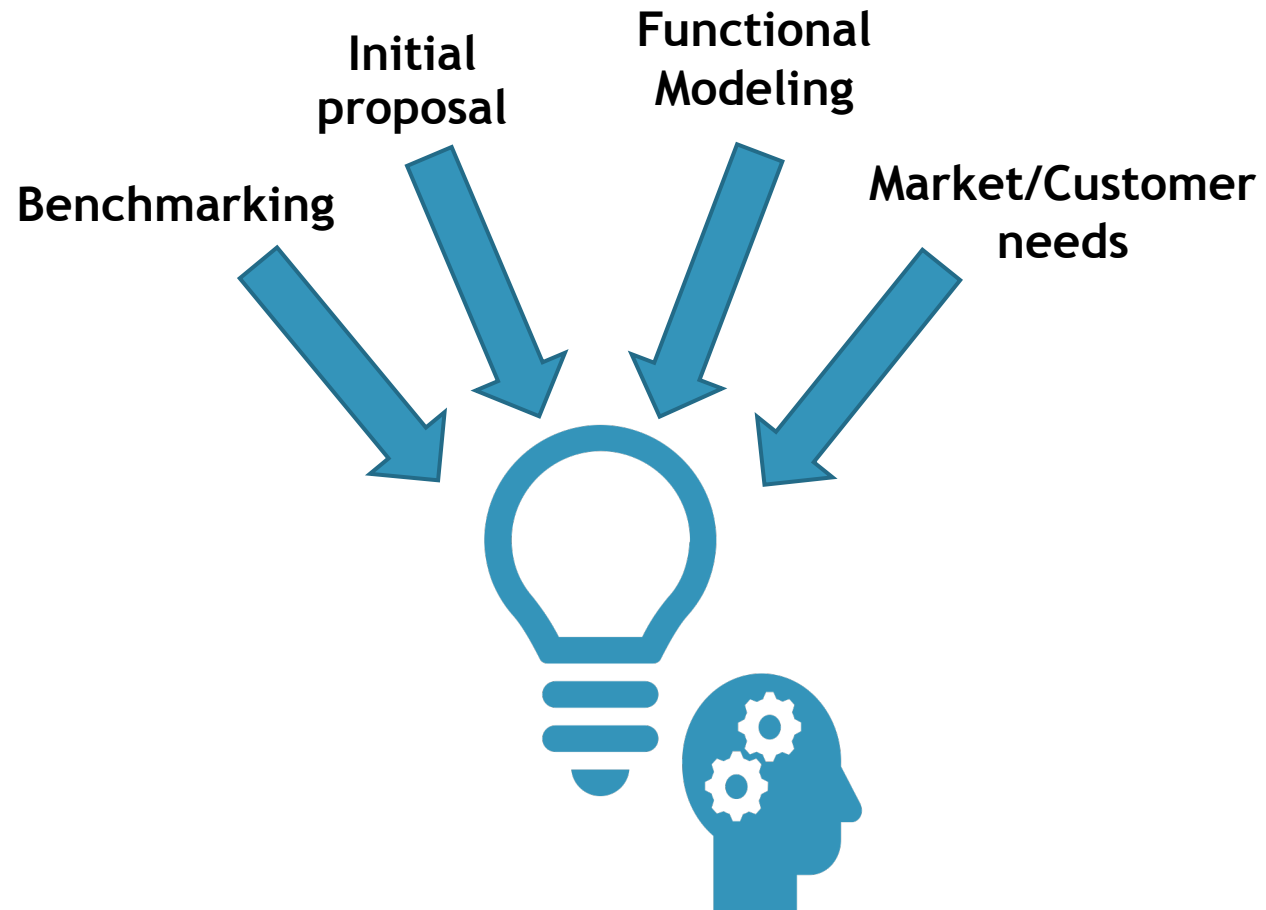
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- [4] "HC," Hunter Industries, 06-Nov-2019. [Online]. Available: https://www.hunterindustries.com/irrigation-product/controllers/hc. [Accessed: 11-Nov-2019].

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