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Higher School of Communication of Tunis

SCOPE STATEMENT
CLOUD OF THINGS PROJECT

SMART IRRIGATION MONITORING SYSTEM

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ANNÉE UNIVERSITAIRE: 2021/2022

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I. PROBLEM STATEMENT

Agriculture is one of the key economical sectors in Tunisia, in 2018, it generated 10.4% of the national GDP and provided 15% of employment. With the climate changes and the consecutive heatwaves that we are facing these years, the traditional irrigating techniques are becoming insufficient and the farmer should pay extra attention to its crop. Therefore a new approach should be implemented to avoid crop spoilage and water wastage.

II. PROPOSED SOLUTION

To properly manage the field irrigation we propose a solution based on sensors that measures the soil moisture and temperature, those measurements will help decide if the field needs to be watered.
A mobile application is also a part of the solution.
The application presents the following functionalities:
- Registration / authentication
- Locate the field on the map and precise the diffrent parcels
- Displays information retrieved via an agriculture api on the parcel's characteristics.
- Displays the sensors measurements statistics
- Displays a notification in case the moisture level goes beneath a certain threshold.
-Display the itinerary to a specific parcel

III. SCOPE DESCRIPTION

Our solution is designed for farmers who wish to remotely control and monitor the state of their piece of land.

Limits

-The irrigation part should be done manually.
-The application doesn't identify plant diseases

III. HARDWARE DESCRIPTION

Raspberry pi: Raspberry Pi 3

It is essentially a full computer, we can connect several peripherals, connect to the Internet and we can develop software using several Programming Languages like C++, Java, HTML, etc.

Temperature and Humidity Sensor

This sensor will help us measure the amount of water vapor present in the air and record the value of temperature in the land field. Therefor, we can use DHT22 sensor because It has a low cost, long transmission distance allowing it to transmit data through wires up to 20m away from the Raspberry Pi.

Soil Moisture Sensor

This sensor will measure the content of moisture in the soil. In order to appropriatly water the field and minimize the wastage of water.

IV. SOFTWARE TOOLS

Server side

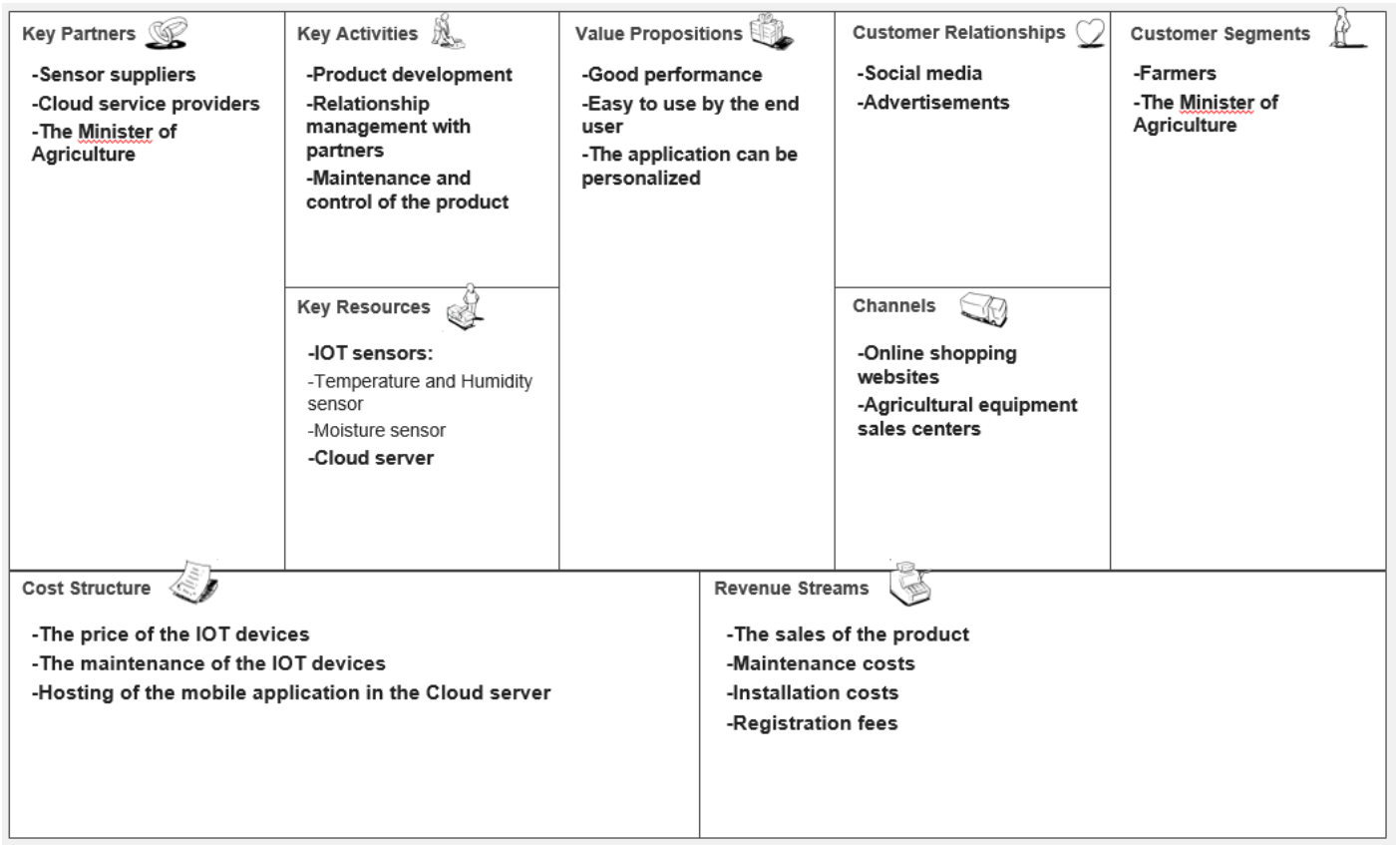
runtime environment: Node.JS
Performance: high speed due to non blocking process
Development process: fast and less complicated
Scalable
Database: MongoDB

Messaging protocol: MQTT
It is fast and easy to implement, ideal for exchanging data, suitable for wireless network and consume less energy.
MQTT Broker: Mosquitto
It reduces update rates to seconds, secure and the Publish/subscribe protocol collects more data with less bandwidth.

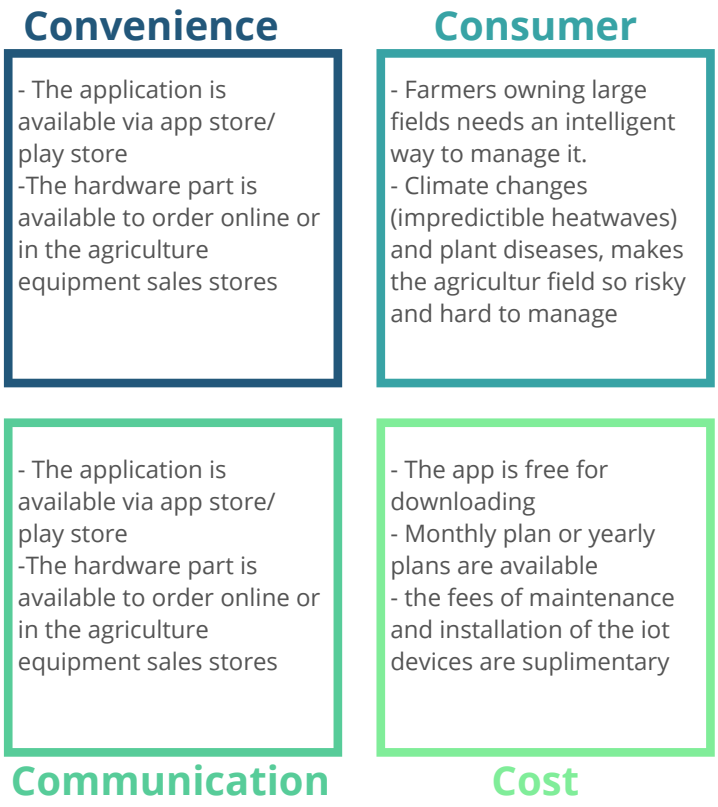
Client side

Ionic (React)
Apache Cordova : allows access to the native functionalities of the device.

VI. BUSINESS MODEL CANVAS



VII. BUISINESS MODEL



VII. DELIVRABLES

Scope Statement

This document outlines the entire project, including the project objectives, deliverables and goals to help measure success.

Design Document

This document contains different diagrams that demonstrate the different use cases of the project.

Technical documentation

The libraries and technologies used in the development of this solution as well as the references used.

Instruction manual

This document contains clear instructions for starting the solution for the IoT part as well as the mobile application.

VII. CONSTARINTS

Time constraint

7 weeks are not enough to produce a stable virsion of an application that properly fits the mentionned specifications.

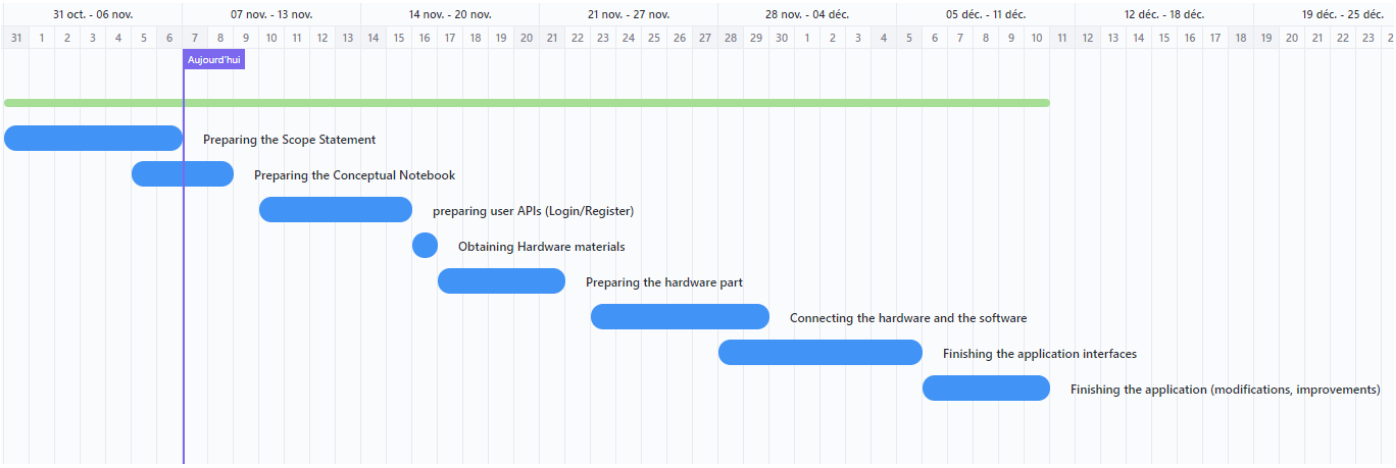
Technical constraint

The team working on this project is composed of two students who lack paractical experience in developpement and in IOT.

working methodology

Extreme Programming (XP): an agile software development framework that aims to produce higher quality software, and higher quality of life for the development team. XP is the most specific of the agile frameworks regarding appropriate engineering practices for software development

GANTT Diagram



IX.DEPLOIMENT DIAGRAM