

# SCOPE STATEMENT CLOUD OF THINGS PROJECT

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## SMART IRRIGATION MONITORING SYSTEM



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## TABLE OF CONTENTS

I. Problem statement .....	2
II. Proposed solution .....	2
III. Hardware description.....	2
IV. Software tools.....	3
V. Prototype.....	4

# 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 different 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. 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. Therefore, 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 appropriately 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

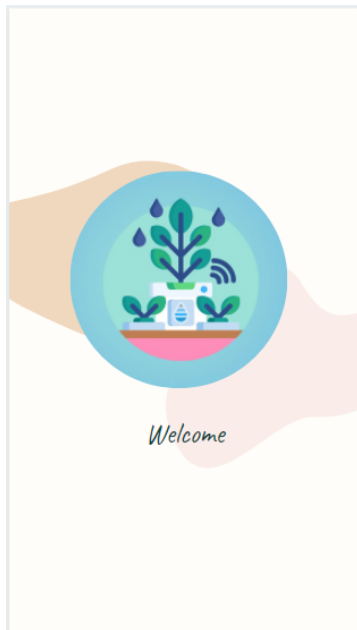
It reduces update rates to seconds, secure and the Publish/subscribe protocol collects more data with less bandwidth.

## Client side

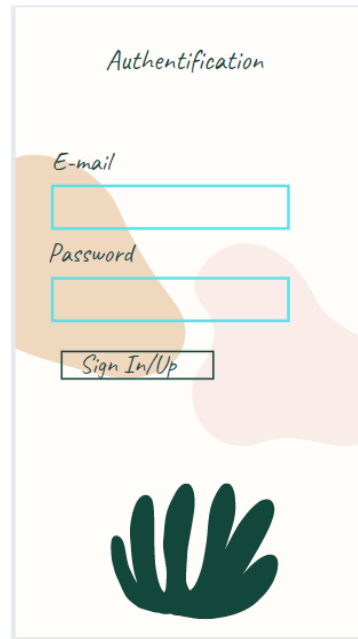
**Ionic (angular)**

**Apache Cordova:** allows access to the native functionalities of the device.

# V. PROTOTYPE



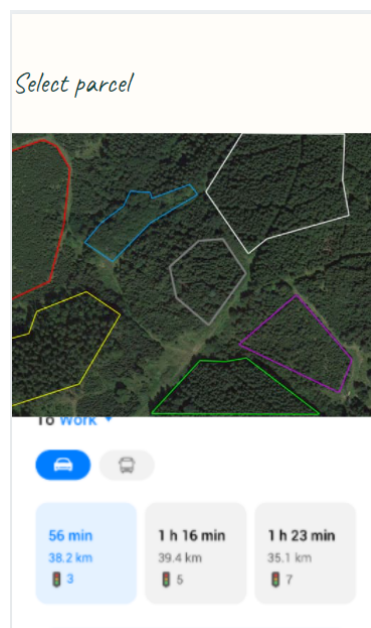
Page 1



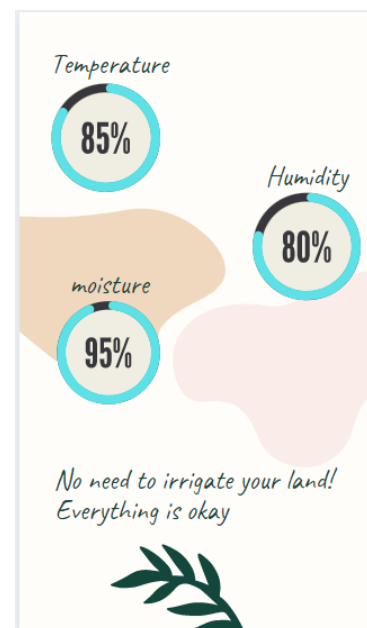
Page 2



Page 3



Page 4



Page 5