SUP'COM
Higher School of Communication of Tunis

Scope Statement
Pollution Monitoring System

Cloud of Things Project

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Scope Statement
Pollution Monitoring System

Cloud of Things Project

Problem:

Pollution has been dubbed as an essential problem in Tunisia. With more and more polluted areas across the country, the government is still struggling to control the toxicity levels caused by polluted areas, including random waste spots, uncontrolled dumpsters, etc.

Non-controlled dumpsters in cities are one of the main causes of urban pollution as they emit bad smells, are visually deterrent and can bring diseases and animals with it.

Solution:

The provided solution consists of tracking the pollution emitted in certain areas in a city to help the municipality of a city to reduce its level. The solution allows us to:

- Capture noise levels of the certain areas
- Capture PM2.5 and PM10 levels of dumpster areas
- Minimize the distance traversed by municipalities workers to clean the city
- Alert municipalities in case pollution levels reach a threshold
- View the emission history of pollution across different zones of a city

The solution makes it possible for municipalities to keep their cities clean and always monitored.

Used Sensors:

During the project we will use the following sensors:

- **Raspberry Pi Microphone:** To detect the noise levels of the corresponding polluted zones
- **SDS011 Sensor:** To detect the air quality level. Allows us to measure PM2.5 and PM10 levels.

Technological Choice:

We will be using the following technologies:

- **Client-Side :**
  - **Ionic:** This will allow us to support several platforms (Android & Web) using one code base
  - **Capacitor:** This provides us native-APIs to access smart-phone sensors such as GPS sensor.
  - **Angular (version 13):** This version is very optimized in comparison with Angular.js and is relatively fast to compile and build.
- **Middleware:**
  - **Node JS server:** using Express.js, we can create a backend server to protect our MQTT broker.
- **Server-Side :**
  - **MongoDB Database:** With this NoSQL database, we can save all the data that is being transmitted here.
  - **Mosquitto Broker:** we will be using Mosquitto MQTT broker which supports M2M communication.
  - **Flogo:** which allows us to manage the dataflow of the sensors to the MQTT broker.

Outcome :

- **Design Book :** contenant les différents diagrammes décrivant l'architecture de l'application ainsi les différents cas possibles que les utilisateurs peuvent faire
- **Solution Code Source :** We will be using GitHub to manage and store our code base for both the backend and the frontend parts of the solution.
- **Technical Documentation:** A README.md file, located on the GitHub repository, which elaborates the necessary instructions to launch the created apps from the code base.
- **Demonstration Video:** An mp4 video (which we will host on YouTube) showcasing the work that we have done.

Constraints :

- In this case, we need to use Xtreme Programming to advance on the project and stay synchronous.

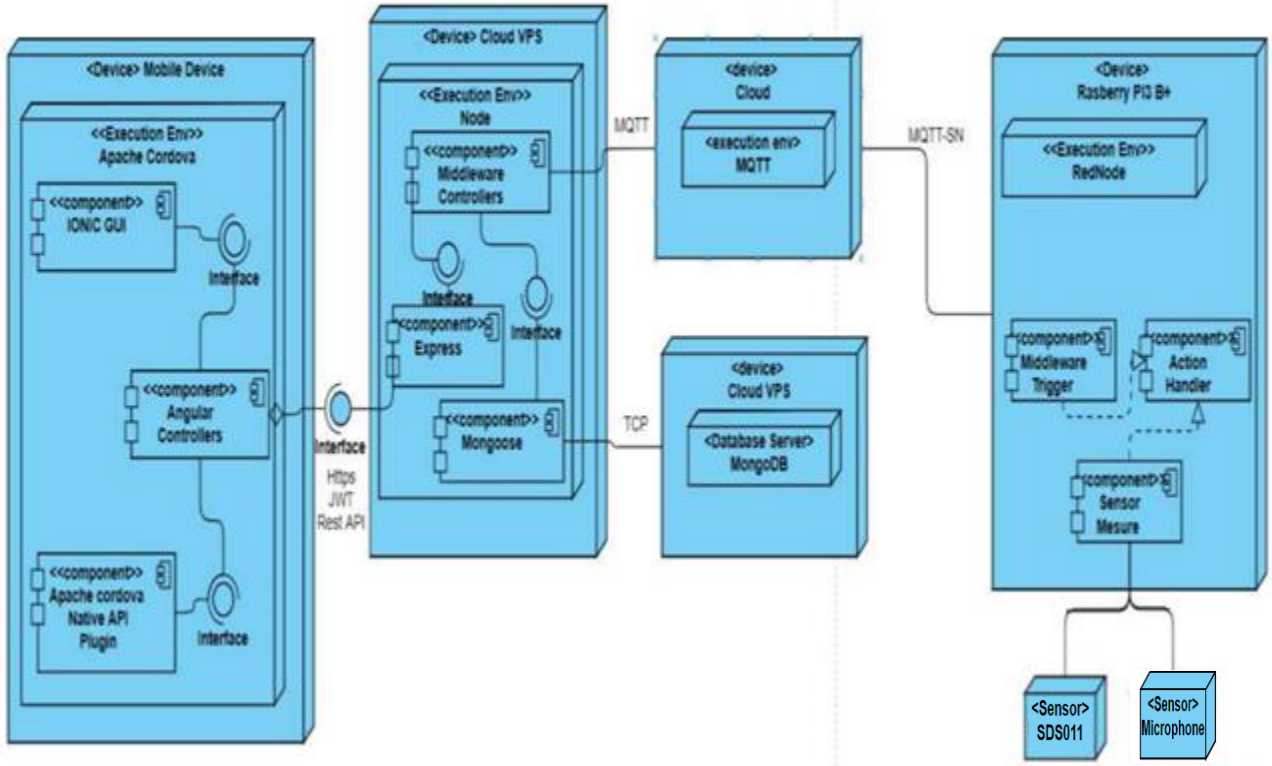
Hypothesis:

- During this project, we will be working with one pollution station. The solution is effective only when using multiple sensors for the data.

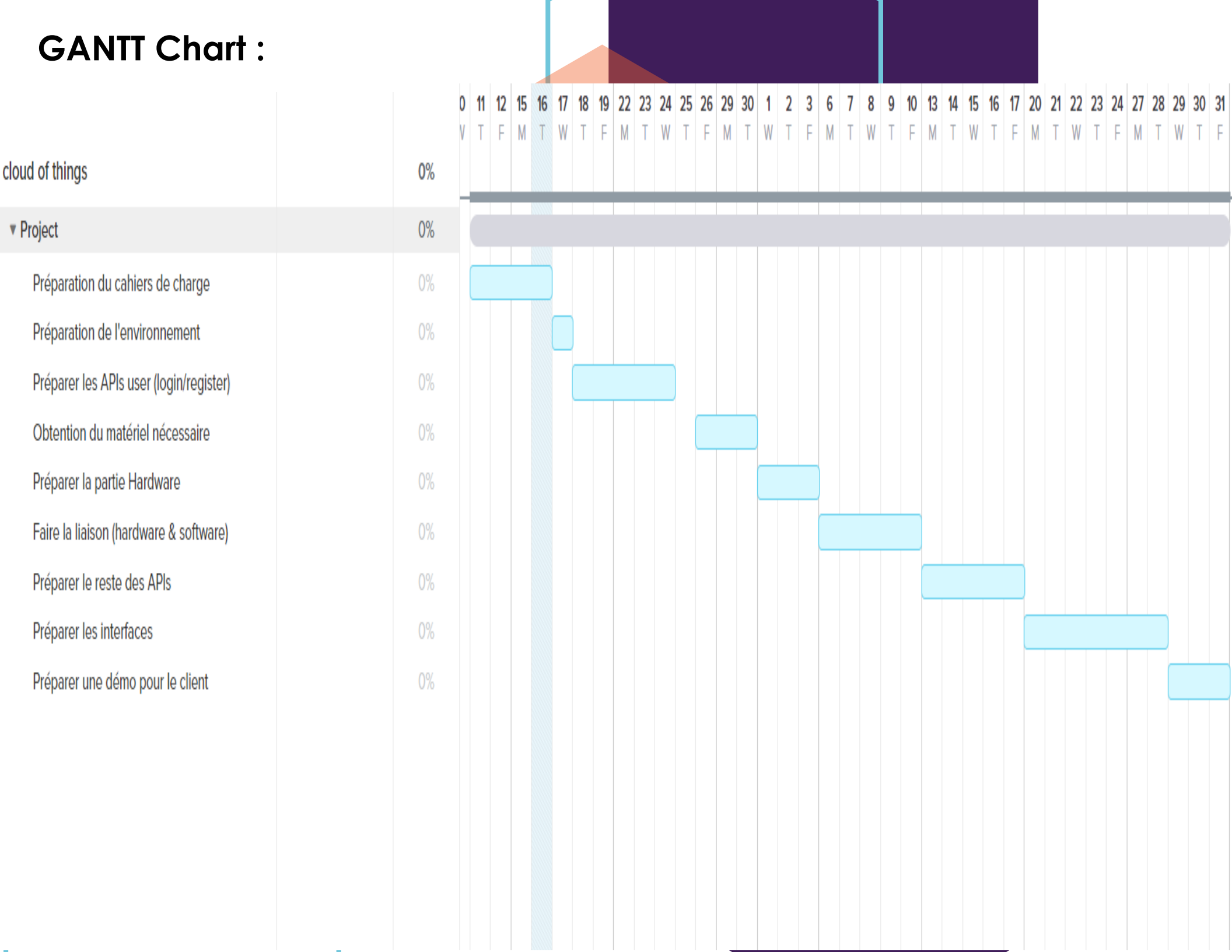
Marketing Study :

- **Customer Needs :** The user needs to know in real-time the levels of pollution.
- **Convenience of Buying:** The product is distributed online. The hardware can be bought through a retail shop.
- **Cost to satisfy:** Reduce the cost of transportation for the municipalities workers to collect the garbage.
- **Communication:** We will create a Facebook web page to better showcase our product.

Deployment Diagram :



GANTT Chart :


0 11 12 15 16 17 18 19 22 23 24 25 26 29 30 1 2 3 6 7 8 9 10 13 14 15 16 17 20 21 22 23 24 27 28 29 30 31
V T F M T W T F M T W T F M T W T F M T W T F M T W T F M T W T F M T W T F
cloud of things 0%
Project 0%
Préparation du cahiers de charge 0%
Préparation de l'environnement 0%
Préparer les APIs user (login/register) 0%
Obtention du matériel nécessaire 0%
Préparer la partie Hardware 0%
Faire la liaison (hardware & software) 0%
Préparer le reste des APIs 0%
Préparer les interfaces 0%
Préparer une démo pour le client 0%

Pollution Monitoring System

Version: 0.9

Date: 7/11/2021

Key Partners

- Microprocessor Providers
- Cloud Providers
- Sensors providers

Key Activities

- Hybrid solution
- Monitor pollution levels in certain zones

Key Resources

- Software Technologies
- Human Resources

Value Propositions

- Comfort
- Economy
- Optimization
- Reduce transportation time

Customer Relationships

- Support and Maintenance team
- Availibility on Social Media
- Secure Application

Channels

- Personal Communication
- Online store
- Social media

Customer Segments

- Municipalities
- individuals

Cost Structure

- Cost of Development
- Hardware
- Cloud services fees
- Human resources

Revenue Streams

- Maintenance Costs
- Sales of the product
- Pay-as-you-go Model