Project Report (16 to 22 July 2020)

At present, our app uses local data and is able to successfully perform the calculations that the powerplant's app is performing and output the necessary graphs. This week's work was focused on adding functionality for using remote data and providing authentication to the user.

During this week we inspected the web-app already in place at the powerplant and figured out tried to figure out how it works. This has provided us with new ways of developing our app and the challenges which we'll face along the way.

How will the app work?

The device on which the app runs will be connected to the local area network, or the intranet, on which the main server is. The powerplant has several smart meters, each with their own unique IP address which is connected to the network and upload their readings in JSON format to the main server. JavaScript Object Notation (JSON) is a standard file format which stores and transmits data objects consisting of key-value pairs.

Example of a JSON representation describing a person:

```
{
  "firstName": "John",
  "lastName": "Smith",
  "isAlive": true,
  "age": 27,
  "address": {
    "streetAddress": "21 2nd Street",
    "city": "New York",
    "state": "NY",
    "postalCode": "10021-3100"
  },
  "phoneNumbers": [
    {
      "type": "home",
      "number": "212 555-1234"
    },
    {
      "type": "office",
      "number": "646 555-4567"
    }
  ],
  "children": [],
  "spouse": null
}
```

A JSON object makes data quickly accessible. Using the above example, we only need to prove the value “spouse” and the value of null will be returned immediately. After the JSON object is fetched server then processes these readings and calculates various parameters. This step will be done using mathematical formulas and To access this data, one needs to be authenticated to access it.

Authentication and session tracking in the app

We’re making the app on the HTTP protocol, that is, it will function in a similar manner to the web-app already in place. Firstly, the user’s device should be connected to the intranet. Then a login portal will be made which provides access after authentication. Now, after the authentication is successful, the app should be capable of session tracking.

A session is a conversation between the server and a client: In simple terms, when we log in to a site, the site ‘remembers’ that we’re logged in as we browse through other pages of the site or become inactive for, say 5 minutes. We aren’t required to log in again, unless a time limit, say 30 minutes, has expired. There are several methods to do this, we’ve decided to do this using cookie.

A Cookie is a key-value pair of information, sent by the server to the browser (or the app in this case) and then the browser sends back this identifier to the server with every request thereon. Once verified, cookies are then sent to the user’s device which keeps the user logged in for a period of time (~30 minutes).

Future Work

At present, it is not possible to test our app on-site due to the COVID-19 Pandemic. We are hopeful about visiting the plant as soon as the situation becomes better. Meanwhile, we will try to replicate the data the server (on-site) is receiving. This will be done by using pseudorandom number generators which are available in most of the programming languages. We will try to recreate the data on the powerplant in the same format which is available there to test our app.

P. S. A log of the work is attached on the next page.

Project Log

The log of the work done in the past week is as follows:

16 to 17 July	We talked with Bhaskar Sir and he agreed to give us access on 20th, 21st and 22nd July.
18 to 19 July	We researched various topics to make the most of the time the access would be provided to us. These included the implementation of cookies and providing authentication.
20 July	We spent ~5 hours on their system inspecting the code of the web app and trying to reverse-engineer it. We faced multiple issues regarding the network and was asked to contact IT support.
21 July	We contacted two other people (IT support) who explained the working of the powerplant network. We then contacted Bhaskar sir and he told us that the app must work on the intranet and not the internet.
22 July	We got access but we faced network issues from the powerplant's side. We contacted Bhaskar Sir, and he said that it may be due to bad weather. We expect to get access again in a week.