Artefact Development and Evaluation Report

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1 Artefact development and Artefact Evaluation

The last artefact is the Battery Decision Making ability. As discussed, this will be coded through C Sharp. So to begin with, the four necessary scenarios are Day, Night, Evening and Rain.

[width=0.7]Scenarios for battery.PNG

Figure 1: Scenarios for the Battery's Decision Making

The day is when the solar energy generation takes place. It reaches its peak values at noon. The battery needs to ensure that the energy store doesn't exceed its capacity or else the microgrid system will be affected. The next scenario discussed is Night. During the night, the sky is completely dark and there's no solar energy generation. The Battery has to ensure to supply energy throughout the night. But there's a major dilemma and that is the battery might drain out all the energy it has stored.

The next scenario is Rain. During rainfall, ideally there's no solar energy generation. But in some cases, there's a small beam of light emitting from the sky and causing slight solar energy generation. Keep in mind, this solar energy generation is 1/5th of the solar energy generation during normal day light. The last scenario discussed is Evening. During Evening time, the sun sets down. It still has a portion of it left which is emitting light for the microgrid system. This generation might be around 2/5th of the generation during normal day light. In both these cases, the battery is being stored with energy, but at a very slow rate with comparison to the generation and storage at daytime.

[width=0.7]Variables declaration.PNG

Figure 2: Variables for battery scenarios

Moving on, here's a snapshot of the important variables declared in the code. The **storedEnergyInSolarPanel** variable checks whether the solar panels are generating energy or not. The **isBatteryDrained** variable checks if the battery

has drained out all the energy stored or not. The **batterycapacity** variable checks if the battery capacity is full or not. The **batteryEnergyConsumption** variable checks if the battery is consuming enough energy or not. The **ifSupplyBuilding** variable check whether the consumer buildings are receiving energy and the **isSolarSupply** variable check whether there is solar energy generation or not. This is used primarily at the beginning of the code as it allows the Battery to store energy during day time. The **isCloudy** variable is used during rain fall and checks if there are any clouds during the day as well. This leads to a major loss in solar energy generation. The **isCsvReader** variable is used for calling the csv file with the weather data. The rest of the code is explained in the Results and Discussion section. [**?**]

2 Details of Data Collection

As mentioned before, the data collection will be done with the help of the OpenWeatherMap API. For this firstly, we have to learn the basics on how to OpenWeatherMap. This tool works the most efficiently with the creation of a web page. This web page then displays the weather forecast of any location.

The web page can be created through a html file. The page is done with the basic style.css file. Lastly, the OpenWeatherMap API will be called on the javascript file. This is the most important part for our data collection as OpenWeatherMap collects and displays real-time data through its API and using the fetch url is important. The javascript file tag is done in the main html file.

3 Sprint Summary

The goal of my sprint was to research on my artefact and start working on it. As the weeks have passed by, I have made progress with my tasks and with my artefact. I worked on the scenarios I'll design and worked on a microgrid simulation tool. I read a few research papers for my artefact to understand how to design a microgrid environment and went through the simulation tools documentation as well. The data collection was done online by taking data from real-life microgrid scenarios, research papers and MATLAB documentation.