Project - EET 4818

Progress Report Report No: 03

Project Title: Matching Faculty's Power Demand Variability with Solar Power Supply.

Group No: 05

Date: 02/12/2024

Introduction

The primary objective of our project is to optimize electricity generation and consumption based on predictive data derived from the faculty's solar energy system. By leveraging forecasted a dynamic system capable of adjusting electricity demand and supply in real time to ensure operational efficiency. To achieve this, we have systematically identified all equipment within the facility and collected comprehensive data on energy usage over the past few months. This data has been meticulously calculated, tabulated, and analyzed to derive actionable insights for informed decision-making and system adjustment.

Progress

This involved collecting and tabulating data for each part of the building, and also tabulating details for the entire building. We also identified critical and non-critical loads for the equipment in the building.

Figure 1: Data Sheet

GROUND FLOOR				
PLACE	EQUIPMENT	MODEL	POWER (W)	QUANTITY
LECTUR HALL 1	SMART BOARD	PC-65LED	260	1
LECTUR HALL 1	FAN		75	10
LECTUR HALL 1	BULB (2ft)	LED	18	45
LECTUR HALL 1	AIR CONDITIONER	CHIGO	2080	2
LECTUR HALL 1	PROJECTER	EPSON	221	1
LECTUR HALL 1	ROUTER	ARUBA	15.6	1
LECTUR HALL 1	EMEGENCY LAMP	GLORY 104L	10	2
LECTUR HALL 1	SPEAKER		35	4
LECTUR HALL 1	AMPLIFIER		40	1
CORRIDOR	BULB		10.5	17
CORRIDOR	WALL LAMPS		64	10
PIU OFFICE	PHOTOCOPY MACHINE		1500	1
PIU OFFICE	FAN (TELESONIC)		60	1
PIU OFFICE	BULB (4ft)		20	4
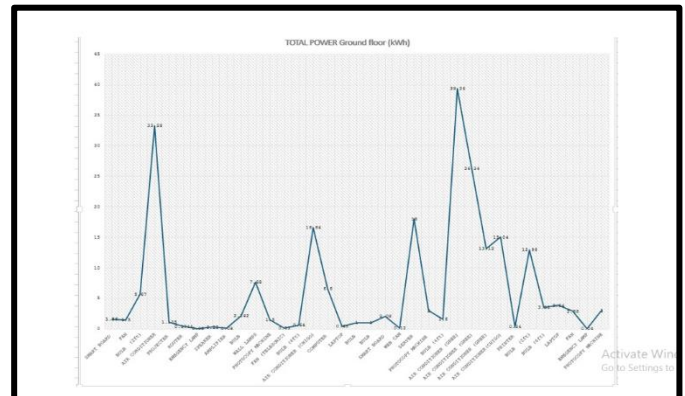
Figure 2: Data graph

FIRST FLOOR				
PLACE	EQUIPMENT	MODEL	POWER (W)	QUANTITY
LECTUR HALL 2	SMART BOARD	PC-65LED	260	1
LECTUR HALL 2	FAN		75	10
LECTUR HALL 2	BULB		18	45
LECTUR HALL 2	AIR CONDITIONER	CHIGO	2080	2
LECTUR HALL 2	PROJECTER	EPSON	221	1
LECTUR HALL 2	ROUTER	ARUBA	15.6	1
LECTUR HALL 2	EMEGENCY LAMP	GLORY 104L	10	2
LECTUR HALL 2	SPEAKER		35	4
LECTUR HALL 2	AMPLIFIER		40	1
EXAM DEVITION	AIR CONDITIONER (CHIGO)		2080	1
EXAM DEVITION	BULB (4ft)		20	4
EXAM DEVITION	LAPTOP		75	2
EXAM DEVITION	PRINTER		340	1
EXAM DEVITION	SEVER		750	1
PHYSICS LAB	FAN		75	25
PHYSICS LAB	BULB (4ft)		20	26

Figure 3: Data sheet
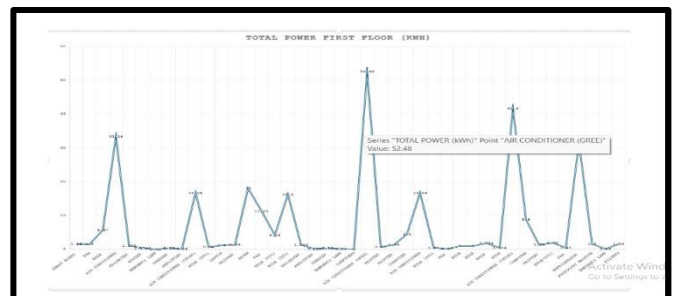
Figure 4: Data graph

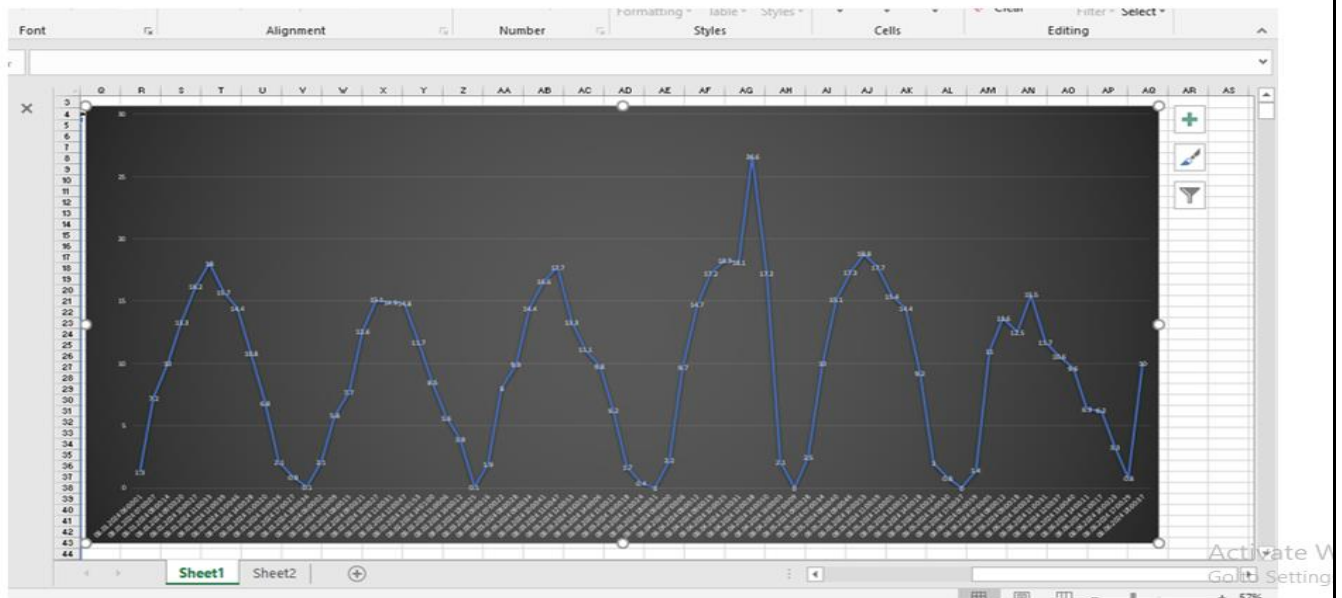Also, data from the faculty's solar panels is being collected and analyzed.

Figure 5: Solar Data Graph

Also, the equipment that consumes the most electricity in the facility was identified, and the electricity bill for each piece of equipment was calculated. In addition, measures that can be taken to reduce the bill for each electrical appliance were identified.

Ex: Power consumption (W): 2080 W per unit
    Quantity: 2 units
    Working hours per day: 8 hours

Electricity tariff in Sri Lanka; Electricity charges typically depend on consumption slabs. If you provide the tariff rates (e.g., per kWh), we can be precise. Otherwise, I can use an approximate rate (e.g., LKR 32 per kWh, a common average).

Calculation

Total power consumption per day (kWh),

   Total power = Power per unit × Quantity × Working hours
   Total power = 2080W × 2 × 8h = 33,280Wh = 33.28kWh

Electricity cost for one day,

  Cost per day = Total power (kWh) × Tariff rate (Rs. per kWh)

  Using Rs. 32 per kWh as an approximation:

  Cost per day=33.28×32= **Rs.1,064.96**

  Electricity cost for a month (30 days),

Cost per month $\quad$ = Cost per day×30
Cost per month $\quad$ = 1,064.96×30=R**s. 31,948.8**

Final Estimate,

Daily electricity cost: Rs. 1,065 (approximately)
Monthly electricity cost: Rs. 31,949 (approximately)

Also, software is currently being created related to solar data and the equipment available in the faculty. This software will be created by entering the data of all the equipment into the software and adding the amount of electricity consumed according to its working hours, displaying the power generated by the solar, etc.
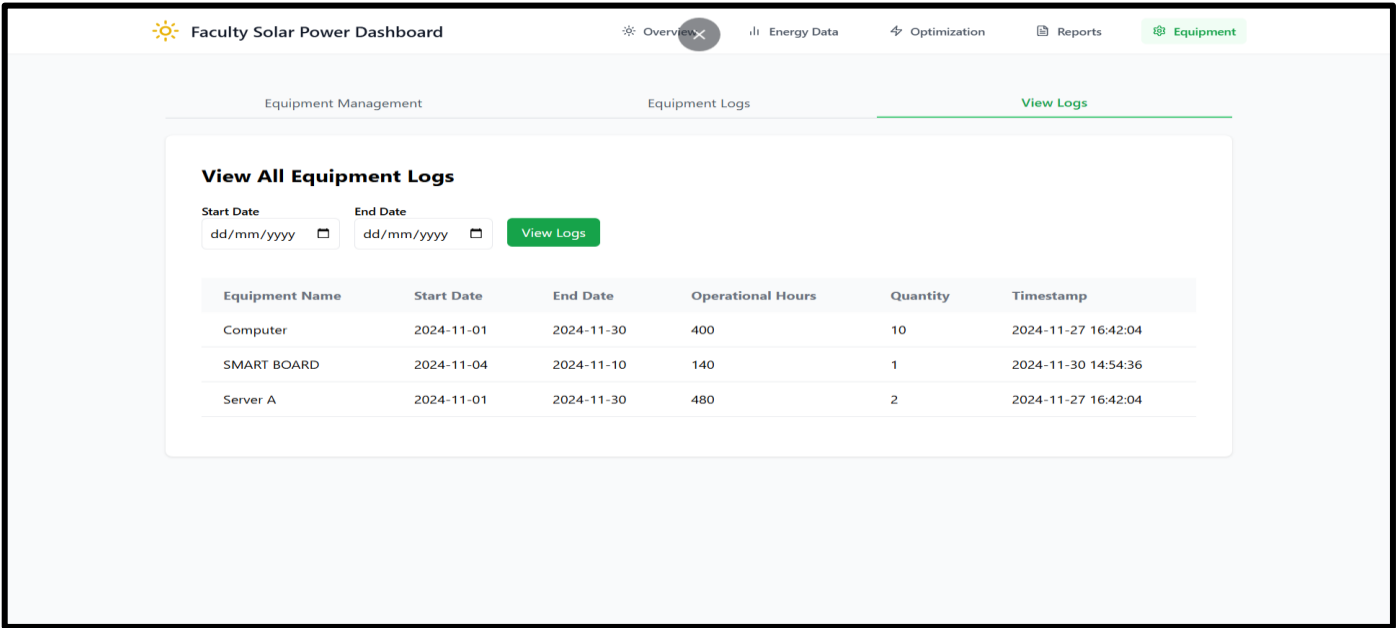
Figure 6: Software Interface

Figure 7: Software Interface

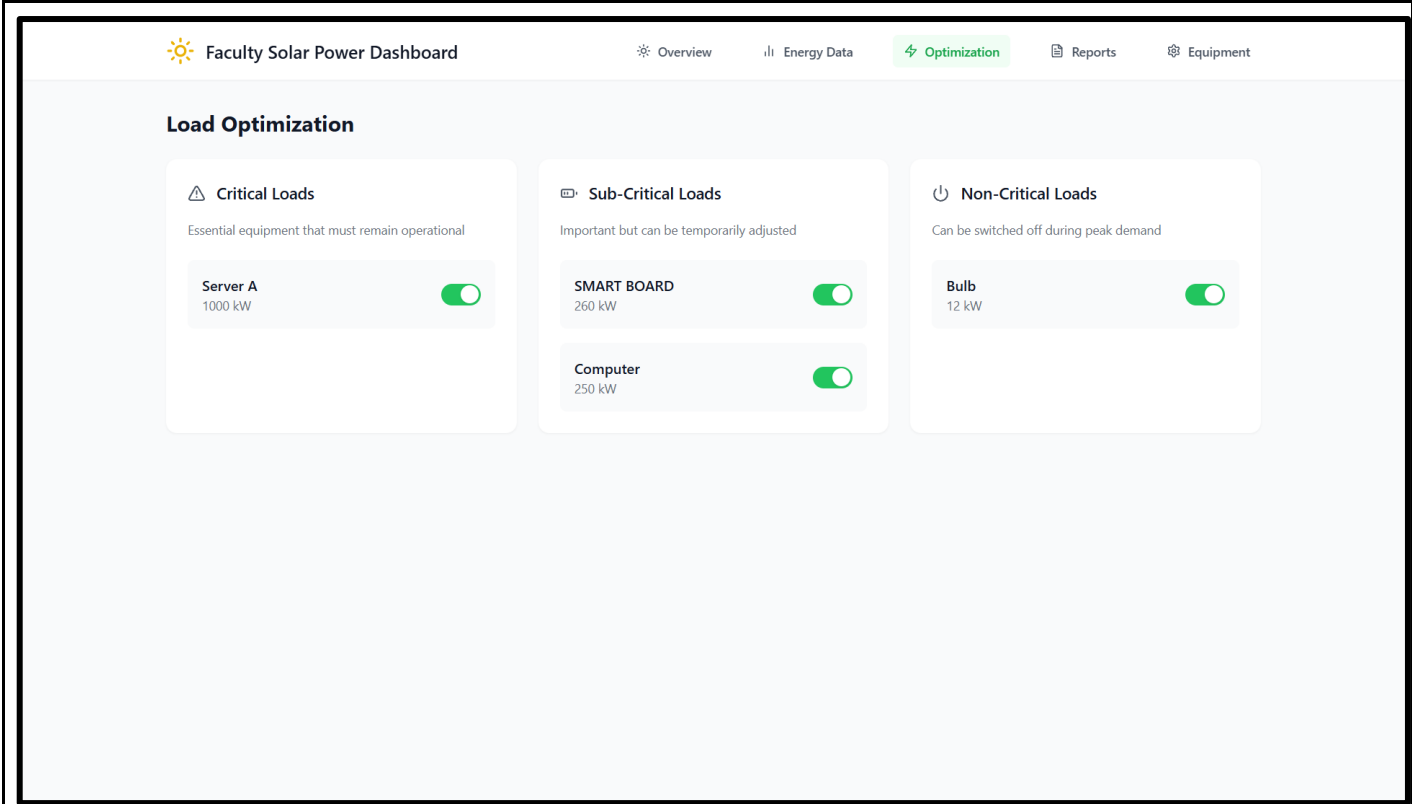*Figure 8: Software Interface*
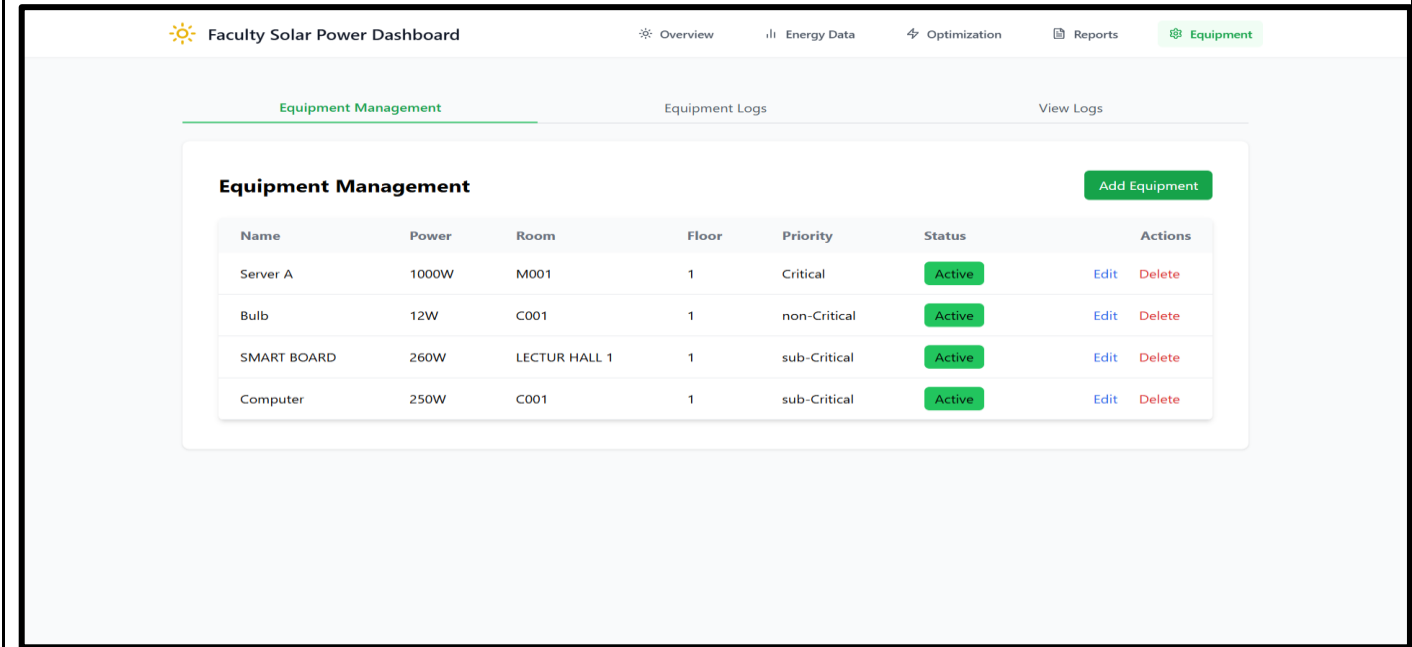
Figure 9: load optimization

Figure 10: Equipment details

Supervisor's Comment:

During the period of time, students were collected required days needed for the project and software interface was developed according to the requirements.

They were faced lots of difficulties and find out the solution in the time period.

Signature: **Date: 2ⁿᵈ December 2024**