Battery-Charging-From-Solar-Panel: Simulation Of Solar Battery Charging Using Cisco Packet Tracer (Applied Industrial IoT Project)

Aim:

To design and simulate an IoT-based smart energy system in Cisco Packet Tracer where a solar panel charges a battery, and the stored energy is used to power multiple LED loads. The system also includes a power meter for monitoring energy flow and a network setup for remote data access and control.

Problem Statement:

Conventional energy systems depend heavily on non-renewable power sources, leading to sustainability issues. This project aims to design a renewable energy model that utilizes solar energy for charging a battery, which in turn powers connected IoT devices (LED loads). The setup also demonstrates how IoT networking enables monitoring and data logging using a PC and server through a network switch in Cisco Packet Tracer.

Scope of the Solution:

• To simulate a renewable energy-based smart system using Cisco Packet Tracer.

• To demonstrate how solar energy can be stored in a battery and used to power multiple loads (LEDs).

• To show real-time energy monitoring through a power meter.

• To integrate IoT networking (PC, Server, Switch) for data communication and system control.

• To provide a conceptual foundation for smart grids and solar IoT energy systems.

Required Components:

Software / IDE:

• Cisco Packet Tracer (IoT Version)

Hardware (Simulated Components):

1. Solar Panel (IoT1)

2. Battery (IoT3)

3. Power Meter (IoT2)

4. 2960-24TT Switch

5. PC (PC0)

6. Server (Server0)

7. Custom LEDs (LED 1 to LED 2)

8. Connecting Wires

Working Description:

1. The solar panel generates DC power and transfers it to the battery for storage.

2. The battery powers the connected LED loads, simulating energy consumption.

3. The power meter continuously measures the power generated and consumed.

4. The switch links the PC and server to create an IoT network for monitoring.

5. The PC or server can display battery and solar data, simulating remote IoT control.

Conclusion:

The simulation of a solar-powered battery charging system using Cisco Packet Tracer successfully demonstrates how renewable energy can be integrated with IoT-based monitoring and control. The solar panel efficiently generates DC power, which is stored in the battery and later used to operate the connected LED loads, showcasing a complete energy flow cycle from generation to consumption. The inclusion of the power meter provides real-time visibility of energy production and usage, while the PC–Server–Switch network setup enables seamless communication and monitoring. This reflects the core principles of modern smart energy systems.

GitHub Link:

https://github.com/pratham6778ce24-lab/Battery-Charging-From-Solar-Panel