

# APPLIED INDUSTRIAL INTERNET OF THINGS

## BATTERY CHARGING FROM SOLAR PANEL USING CISCO PACKET TRACER

### AIM:

The aim of this project is to design and simulate a smart IoT-based energy management system in Cisco Packet Tracer that charges a battery using renewable solar energy and automatically controls the connected devices based on the available energy.

### PROBLEM STATEMENT:

The rising global demand for electricity and the depletion of fossil fuel resources have created a need for renewable energy solutions. Solar energy is one of the most promising alternatives; however, efficient utilization of solar energy requires intelligent systems that can monitor power levels and manage loads accordingly. Without automation, excess energy may be wasted, and low-energy conditions may lead to device failures.

This project attempts to solve this problem by simulating a solar panel system that charges a virtual battery and controls a connected light source based on the solar power availability. The simulation demonstrates how IoT-based conditional automation can optimize energy usage in smart homes and industrial applications.

### SCOPE:

- Can be extended to **smart homes**, where devices such as lights, fans, and appliances are controlled automatically based on renewable energy availability.
- Can be implemented in **industrial IoT applications**, where machines can be scheduled to operate when solar energy is sufficient, reducing dependency on grid electricity.
- Provides a **low-cost training model** for students and researchers to understand IoT automation, renewable energy integration, and smart power management.
- Can be combined with **cloud-based IoT dashboards** to monitor energy usage remotely and make data-driven decisions

# REQUIRED COMPONENTS:

## Software/IDE:

- Cisco Packet Tracer (version 8.2.2 or higher)
- Optional: GitHub (for documentation and version control)

## Hardware (Simulated in Cisco Packet Tracer):

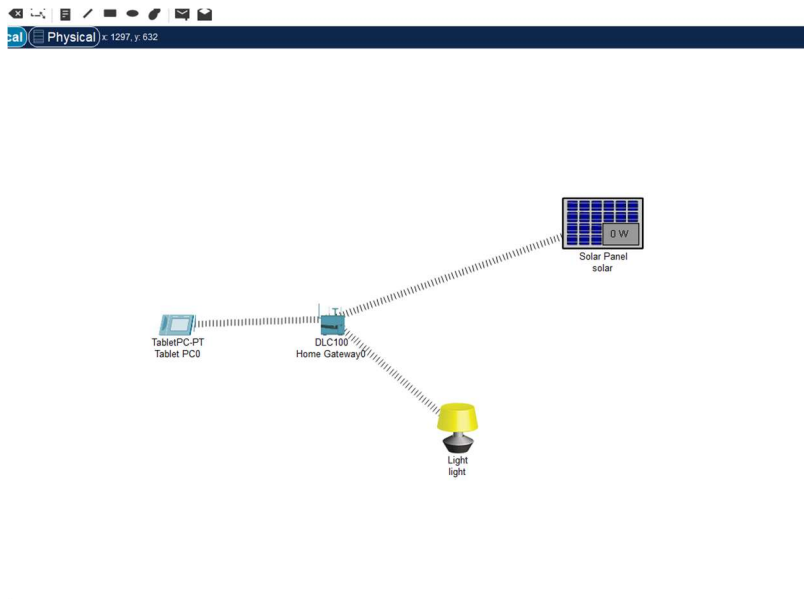
- **Solar Panel** – Generates energy (Wh values).
- **Battery/Light Device** – Acts as the load consuming solar energy.
- **Home Gateway (DLC100)** – Connects IoT devices and enables remote monitoring.
- **Tablet/PC** – Used to configure IoT conditions and monitor energy status.
- **IoT Server (inbuilt in Packet Tracer)** – Used for automation and condition-based control.

# SIMULATED CIRCUIT:

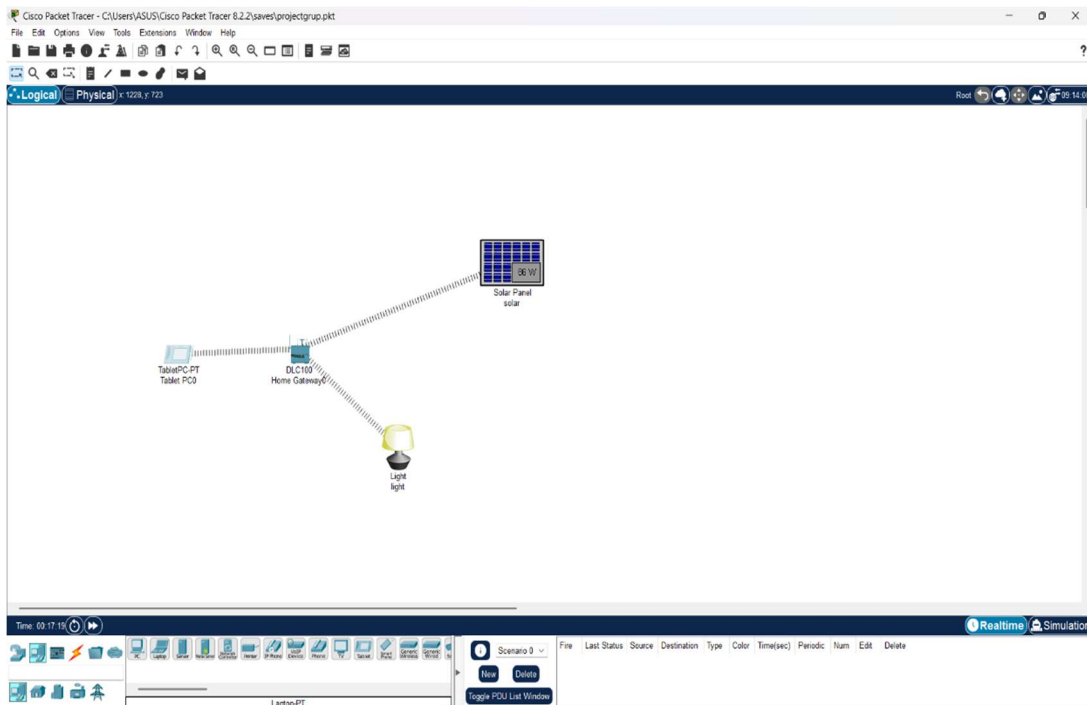
The simulation is designed in **Cisco Packet Tracer** as follows:

1. A **Solar Panel** generates variable energy (measured in Wh).
2. A **Light (IoT device)** is connected via the **Home Gateway** to represent the energy-consuming load.
3. A **Tablet PC** is used to access the IoT server and define automation conditions.
4. The following conditions are programmed:
  - If solar status is **0–10 Wh**, the **light turns OFF** (battery too low).
  - If solar status is **11–50 Wh**, the **light is set to DIM** (battery partially charged).
  - If solar status is **above 50 Wh**, the **light turns ON fully** (battery sufficiently charged).
5. These conditions replicate **real-world automation**, where device status depends on available renewable energy

## CIRCUIT DIAGRAM:



## DEMO:



Light turns on as the solar panel watt is more than 10 watts.