IntelliSmart
A JV of NIIF and EESL

INSTINCT 4.0

The leading Innovation Hackathon

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Team Name : Switchee Innovators

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Problem Statement :

Millions of households in India’s urban slums and low-income settlements lack access to safe,
reliable, and affordable electricity. Current alternatives include illegal wiring, diesel generators, and
inverter rentals — all of which are unsafe, unreliable, and up to 5× more expensive than grid power.

Brief about the Idea:

Switchee provides **Energy-on-Tap** to underserved communities using a **prepaid, solar-powered DC microgrid**. Instead of installing solar panels on individual rooftops, Switchee deploys a **centralized solar hub** with battery storage, distributing electricity to homes via **IoT-enabled prepaid smart plugs**. Users top-up credits using **UPI or USSD**, and energy is unlocked instantly.

Opportunity — Explanation 1 How different is it from any of the other existing ideas?

Unlike traditional solar solutions that rely on individual rooftop installation, Switchee deploys a shared community solar hub that powers multiple households through a DC microgrid.

This makes it viable for urban slums, rental homes, and informal settlements where:

residents do not own rooftops,

housing layouts change frequently,

and billing/collection is difficult.

Other products such as diesel generators, inverter rentals, and illegal electricity tapping are:

unsafe,

expensive,

polluting,

and unreliable.

Switchee is the only model engineered specifically for informal communities, focusing on access over ownership.

2. How will it be able to solve the problem?

Switchee solves the energy crisis in underserved communities through:

Shared solar hub + battery storage → continuous, safe power supply

Smart Plug IoT metering → real-time usage and access control

Prepaid energy tokens via UPI/USSD → eliminates billing risk and defaults

Tiered plans → families and small businesses choose power levels they can afford

This model ensures:

lower cost (up to 60% savings vs. generators)

no installation burden on households

no dependence on illegal wiring or unreliable grid

3 USP of the proposed solution:

“Pay for Power, Not the Panel.”

Switchee’s USP lies in three pillars:

Unique Advantage	Why it Matters
Shared solar infrastructure	No need for roof ownership, perfect for dense settlements
IoT-based prepaid access	Zero billing risk, no disconnections or debt traps
Blockchain energy credits	Transparent, tamper-proof prepaid accounting

The Smart Plug is the key innovation — it acts as a meter + circuit breaker + prepaid lock, unlocking electricity only when credits exist.

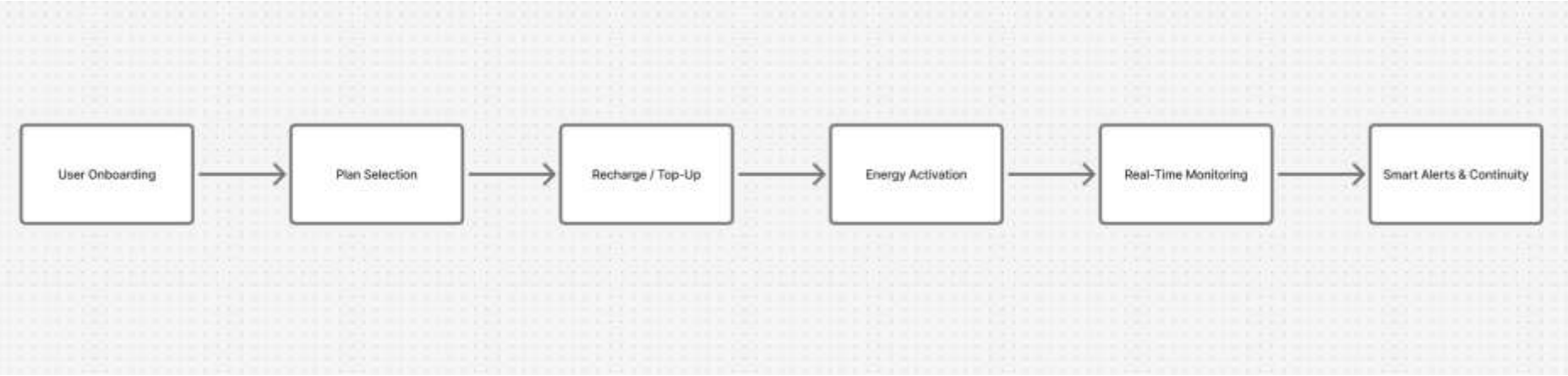
Summary in one line:

Switchee democratizes clean energy access for communities that the conventional solar market and power utilities cannot reach.

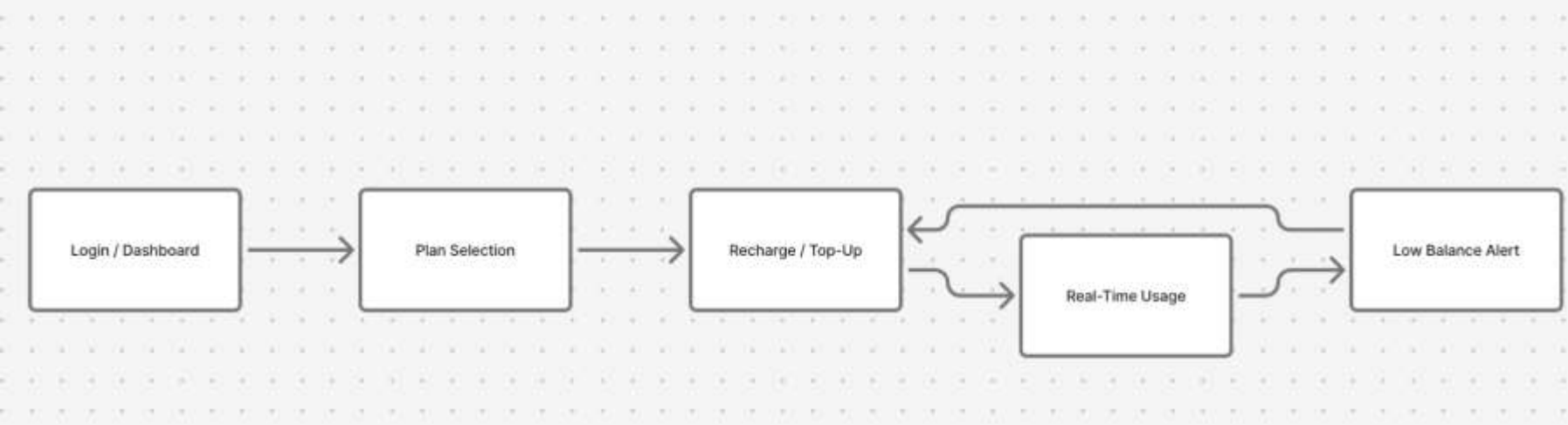
List of features offered by the solution:

- Community solar hub with battery storage
- Switchee Smart Plug — prepaid IoT energy meter + circuit control
- UPI / USSD based credit top-up
- Blockchain-recorded energy tokens
- Mobile & USSD balance tracking
- Low-balance & sunshine forecast alerts
- Dashboard for hub health, usage analytics & carbon offset metrics

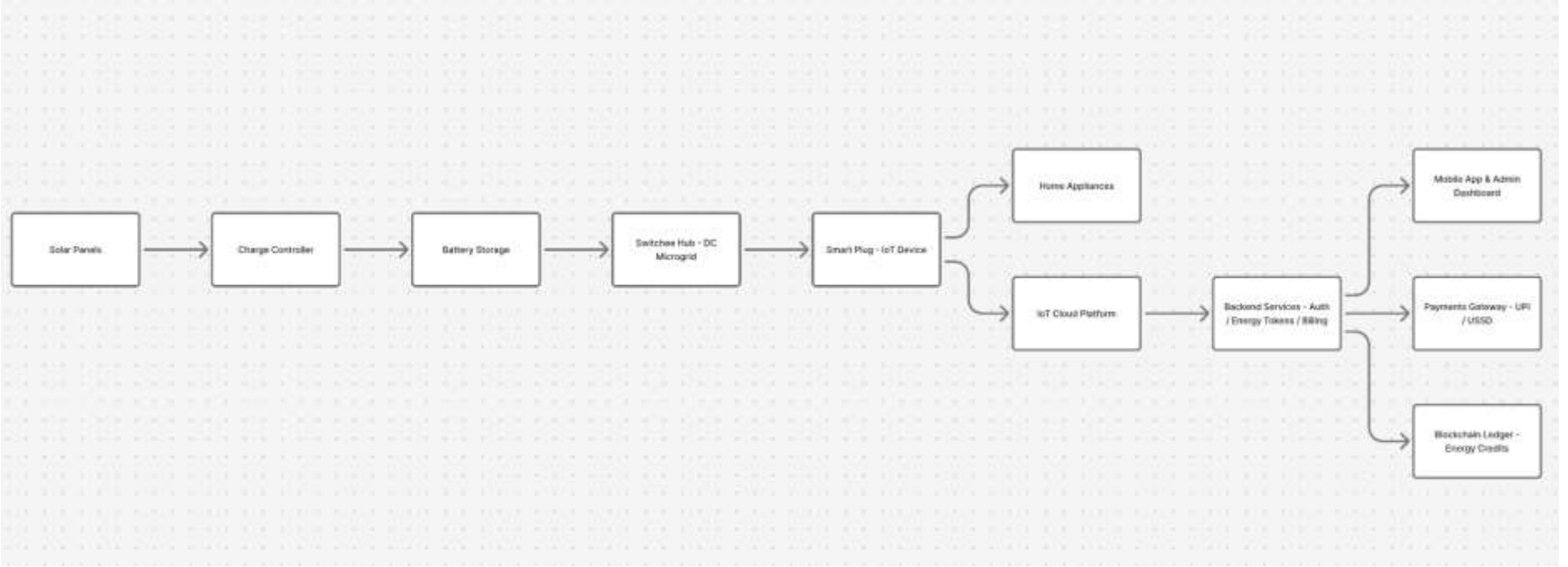
Process flow diagram or Use-case diagram:



Wireframes/Mock diagrams of the proposed solution:



Architecture diagram of the proposed solution:



Technologies to be used in the solution:

Technologies to be Used in the Solution

Hardware & Edge Layer

Component	Technology
Solar Hub	Solar Panels + MPPT Charge Controller + $LiFePO_4$ Battery
Microgrid	48V DC Distribution
Smart Plug (IoT)	ESP32 / STM32, Relay, CT Sensor, Voltage Regulator
Connectivity	Wi-Fi / LoRaWAN / NB-IoT

IoT & Device Communication

Purpose	Technology
Messaging Protocol	MQTT / HTTPS
Device Provisioning	IoT Core / ThingsBoard / AWS IoT
Telemetry & Commands	JSON payloads with secure tokens

User Interfaces

Platform	Technology
Mobile App	Flutter / React Native
USSD App	Telco USSD interface + shortcode
Web Dashboard	React.js + Chart.js / D3.js
Alerts	SMS Gateway (Twilio / MSG91) + WhatsApp Cloud API

Monitoring & Analytics

Purpose	Technology
Metrics Dashboard	Grafana / Power BI
Predictive Maintenance	Python + ML models
Sunshine Forecast	OpenWeather / Solcast API

Backend & Core Platform

Purpose	Technology
Backend Framework	Node.js + Express / Django REST
Microservices	Docker + Kubernetes
Database	PostgreSQL / MongoDB
Time-series Data	InfluxDB / TimescaleDB
Authentication	JWT / OAuth2
Energy Token Logic	Smart Contract / Hedera Hashgraph / Hyperledger

Payments & Finance Layer

Function	Technology
Recharge / Top-Up	UPI API (Razorpay / Cashfree)
USSD Support	Airtel / Jio USSD Gateway
Prepaid Energy Accounting	Blockchain-based credit ledger

Security

Layer	Technology
Transport Security	TLS 1.3
Device ID & Access	Zero-trust device tokens
Data Security	AES-256 / SHA-256

Deployment & DevOps

Purpose	Technology
CI/CD	GitHub Actions
Containerization	Docker
Hosting	AWS / GCP
Monitoring	Prometheus

Estimated implementation cost (optional):

💰 Estimated Implementation Cost (Pilot – Optional)

Component	Cost
Solar Hub 3kW + Battery	₹2,75,000
30 Smart Plugs	₹90,000
IoT Backend + App	₹1,20,000
Deployment & Operations	₹65,000
Total Pilot Cost (30 households)	**₹5,50,000**

Add as per the requirements for the hackathon:

- Prototype available for live USSD/UPI simulation
- Plug ON/OFF IoT demonstration supported
- Dashboard supports real-time monitoring
- Ready for scale via franchise or CSR partnerships

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Thank you!