

Solar Power Management System

Powering a Sustainable Future

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Domain Overview

Solar panels convert sunlight into electricity through the photovoltaic effect using semiconductor materials like silicon.



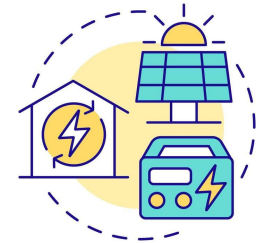
Solar panels benefits



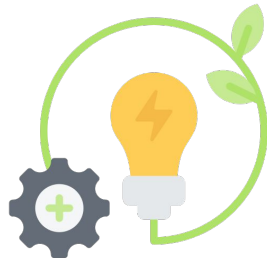
Generate clean,
renewable energy



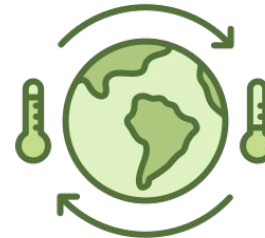
Reduce fossil fuels
dependence



Provides energy
independence



Lower long-term
electricity costs



Support climate
change mitigation

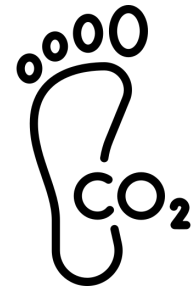
Problem Definition



High Energy Costs



Energy Reliability
Issues



Environmental
Impact

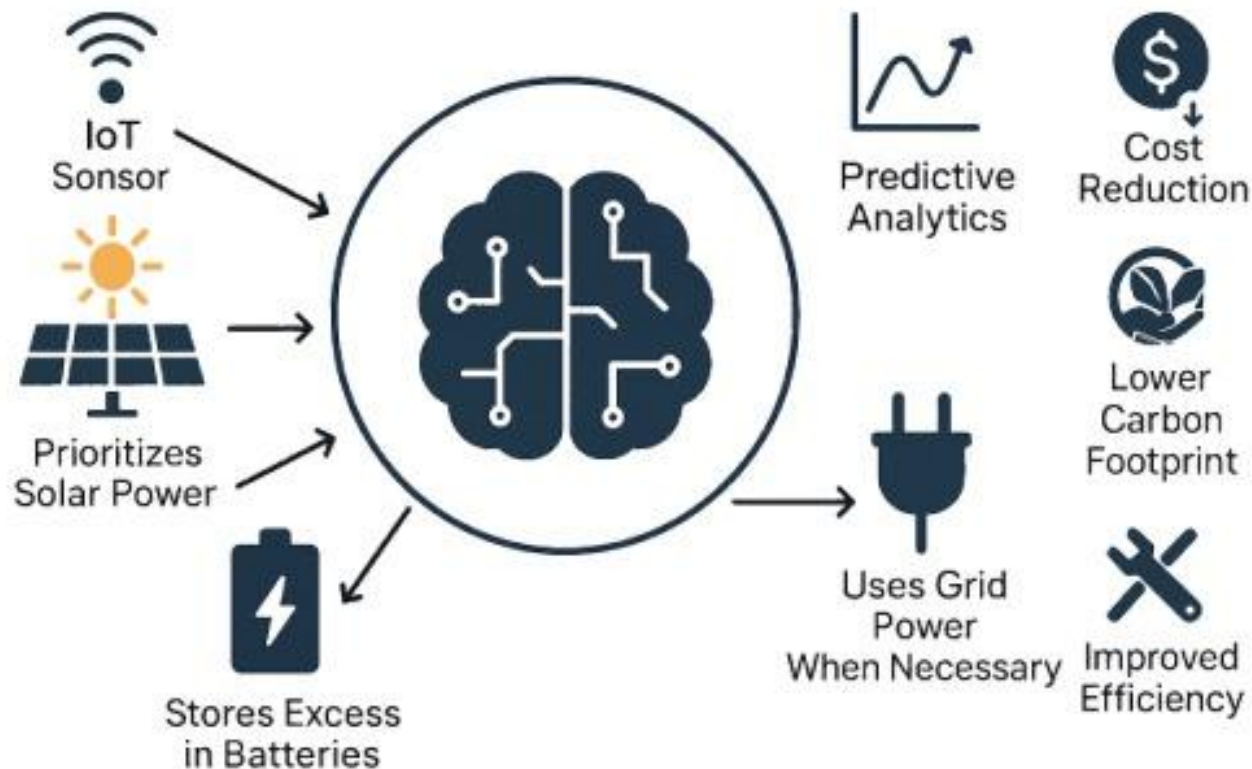


Inefficient Use of
Solar, Batteries, Grid



14–22% Energy Waste

Smart Energy Management Solution



Business Domain Analysis

Challenges

- High Maintenance Costs
- Data Integration
- Initial Investment Costs



Opportunities

- Cost savings
- Sustainability Goals
- Scalability
- Enhanced Operational Efficiency
- Global Renewable Energy Targets

Stakeholder Identification

<p>Meet Their Needs</p> <ul style="list-style-type: none"> • Farm Owners (Agribusiness Owners) • Government Agencies and Regulators 	<p>Manage Closely</p> <ul style="list-style-type: none"> • Energy Utility Companies • Financial Institutions and Investors
<p>Keep into Account</p> <ul style="list-style-type: none"> • Farm Managers and Operators • IoT and Technology Providers • Solar Installation & Maintenance Companies • Renewable Energy Suppliers 	<p>Keep informed</p> <ul style="list-style-type: none"> • Agricultural Workers • Local Communities and Residents • Research Institutions & Universities • NGOs and Environmental Organizations



Solution Validation

1. Two stakeholder Interviews
2. Survey





Key features based on survey

Budget Optimization

Technical Knowledge Support

Real-time Energy Monitoring

Energy Source Transition

Cost Effective Scaling

Rural Connectivity Solutions



Key features based on interviews

Consumption Monitoring

Energy Storage Control

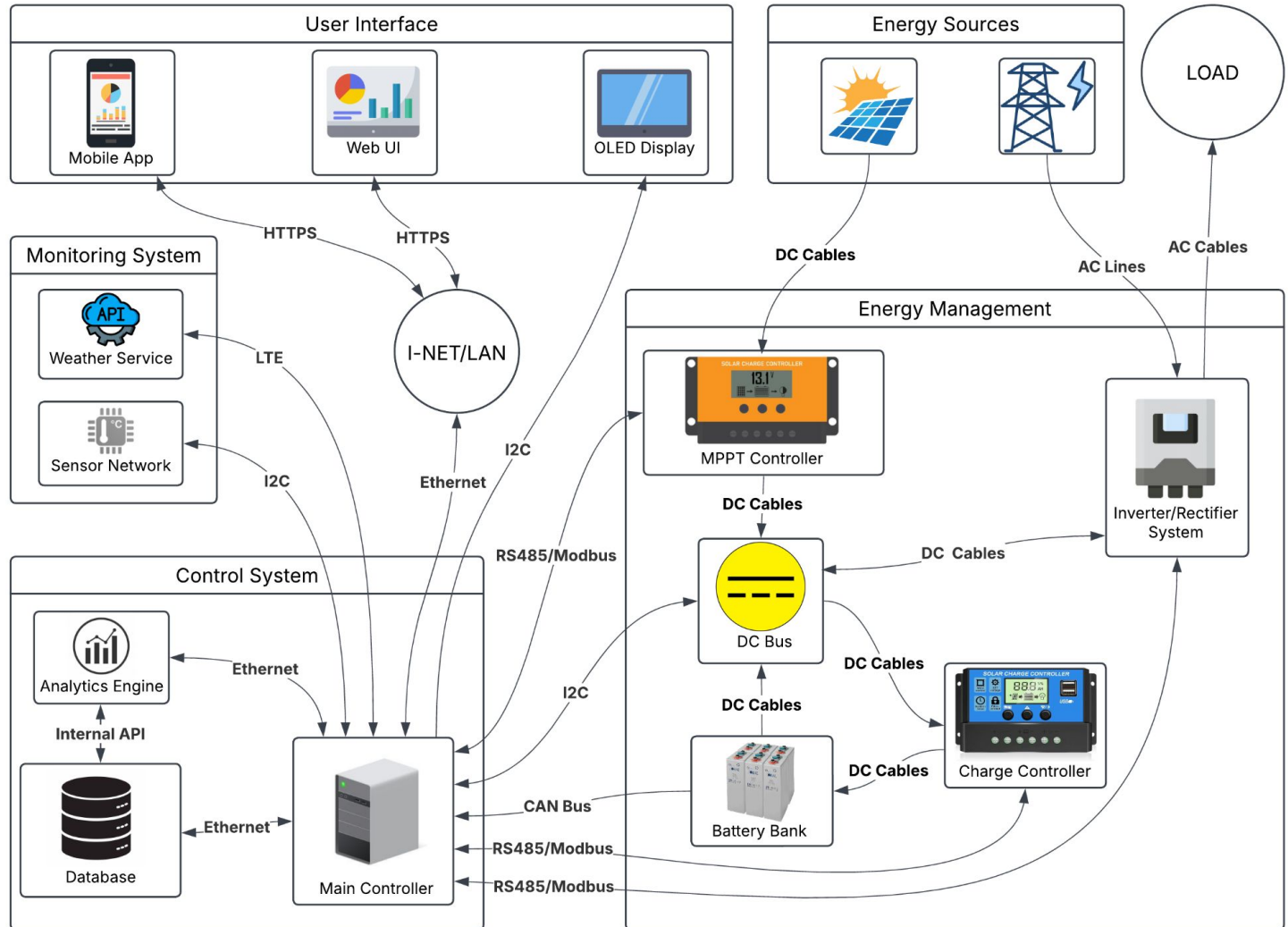
Mobile Alerts & Notifications

Climate Control Integration

Production Forecasting

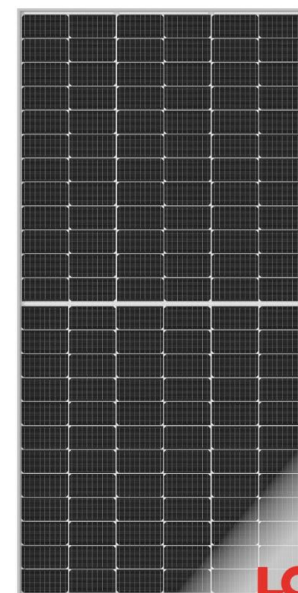
Energy Optimization

Static System Architecture





Hardware components



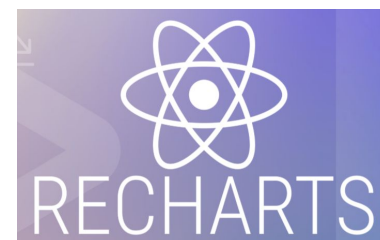
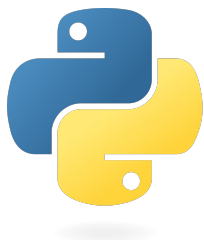
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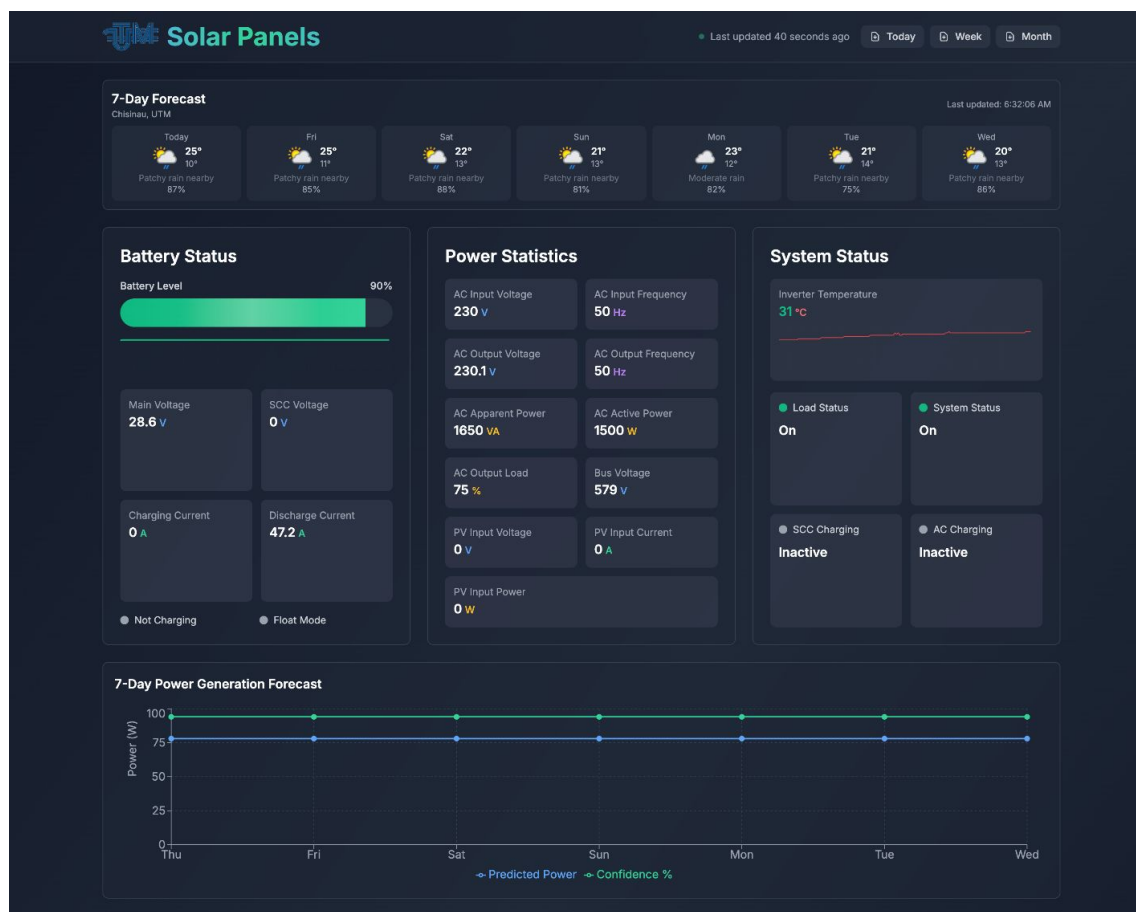
FCIM

Software components





Results





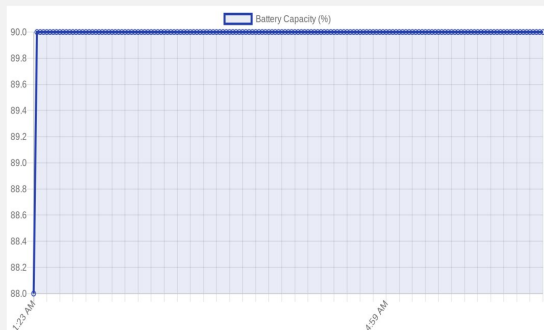
Results



Generated reports

Solar Panel Report

Time Period: Today

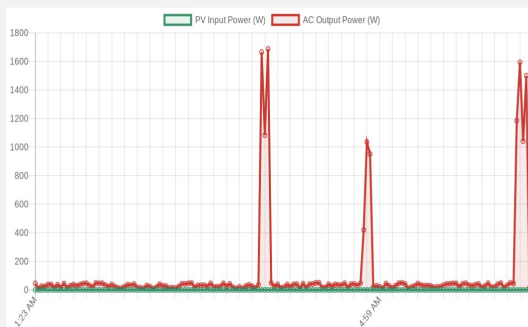


Battery Statistics

Average Battery Capacity: 90.0%
Minimum Battery Capacity: 88.0%
Maximum Battery Capacity: 90.0%
Average Battery Voltage: 28.6V
Total Charging Time: 0.0 hours

Power Analysis

Time Period: Today

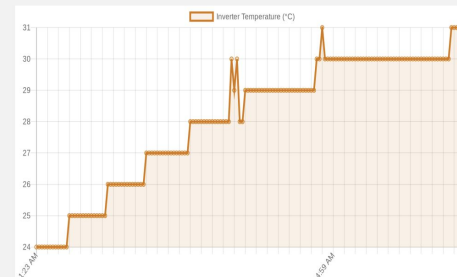


Power Statistics

Average PV Input Power: 0.0W
Maximum PV Input Power: 0.0W
Total PV Energy Generated: 0.0Wh
Average AC Output Power: 106.6W
Maximum AC Output Power: 1687.0W
Total AC Energy Consumed: 556.5Wh

System Health

Time Period: Today



Temperature Statistics

Average Inverter Temperature: 28.1°C
Maximum Inverter Temperature: 31.0°C
Minimum Inverter Temperature: 24.0°C

System Health Summary

System Health Summary:
• Battery Health: Excellent
• Power Generation: Low
• Temperature Status: Normal



Conclusion

