Export and Import of Renewable energy by Hybrid MicroGrid via IoT

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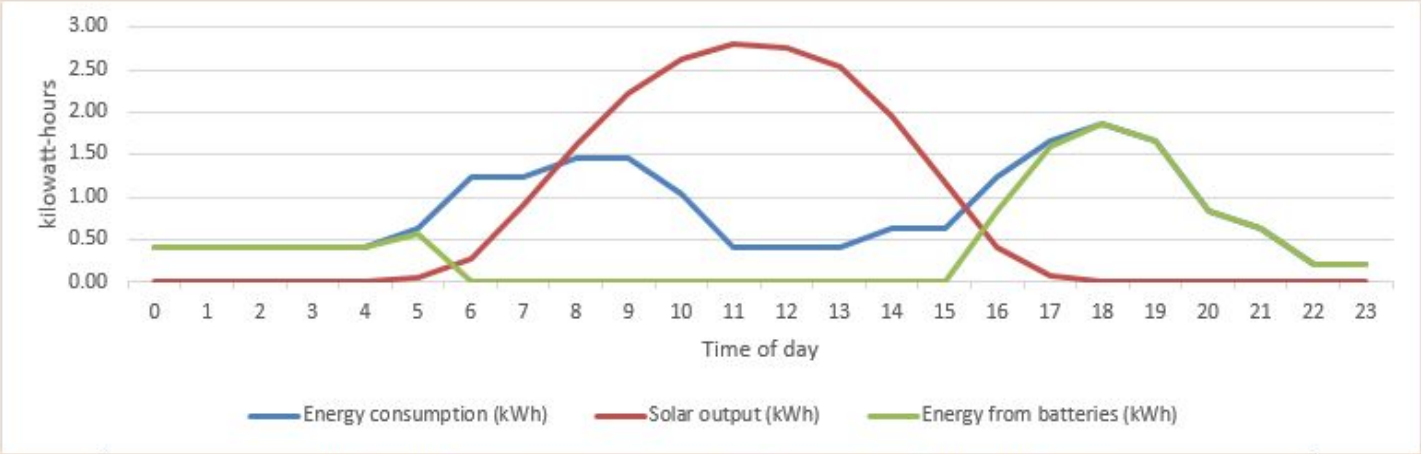
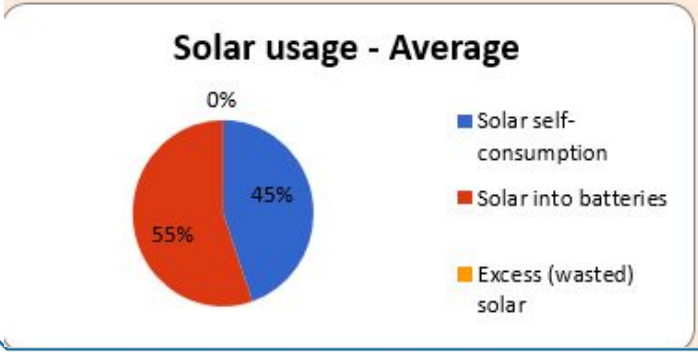
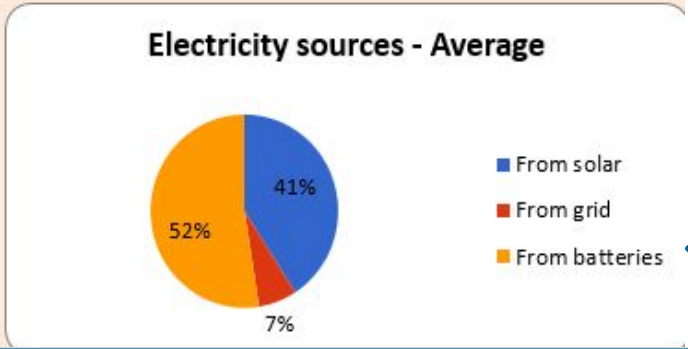
Abstract

A hybrid smart grid opens the possibility of ***Internet of things with solar power micro grid****. Also possible business model for export / import of Solar PV generation. IoT allows micro grid system to perform data logging over the internet and remotely control the grid. In this paper I am describing the enhanced approach of Hybrid power grid system in a home to connect to main grid connecting many other homes. The node owners can purchase or sell the generated/stored power at their homes using a web user interface.*



Household energy consumption, solar output and energy from batteries following an average day of full sunshine.

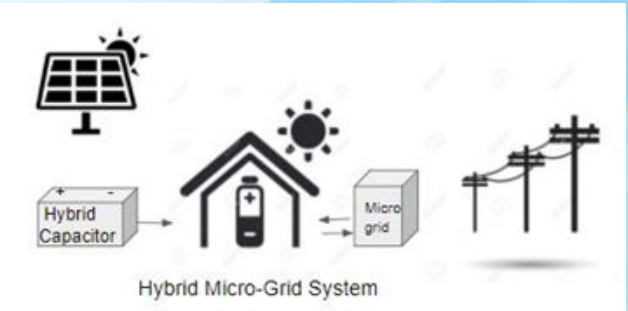




Design and Architecture of a Hybrid Micro Grid System

Single Hybrid Micro Grid components

Interconnected Micro Grids



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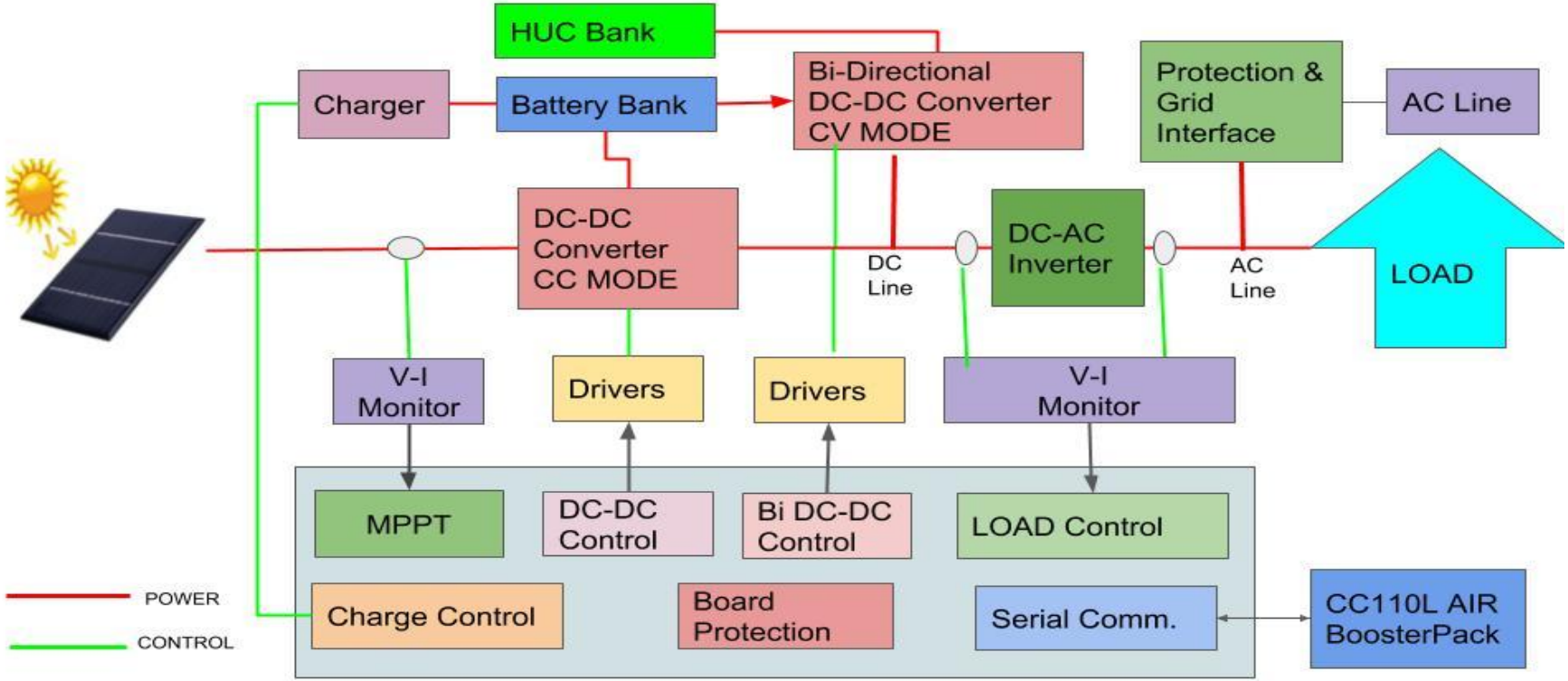
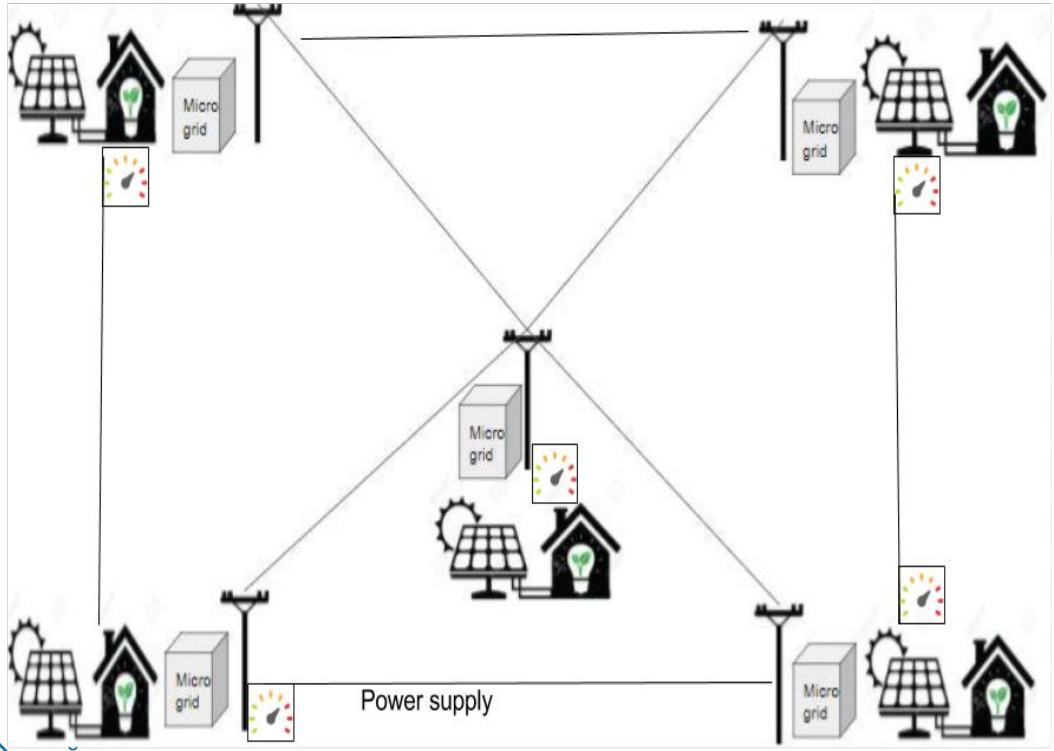

HUC Bank
Charger
Battery Bank
Bi-Directional
DC-DC Converter
CV MODE
Protection &
Grid
Interface
AC Line
DC-DC
Converter
CC MODE
DC
Line
DC-AC
Inverter
AC
Line
LOAD
V-I
Monitor
Drivers
Drivers
V-I
Monitor
MPPT
DC-DC
Control
Bi DC-DC
Control
LOAD Control
POWER
CONTROL
Charge Control
Board
Protection
Serial Comm.
CC110L AIR
BoosterPack

Hybrid Micro Grid System for Renewable Energy

Power Transaction between Hybrid micro grid system nodes of Micro-Grid



- Interconnection of Hybrid Micro Grids
- Connection to Main Power Grid
- Two Way Power Flow and Metering
- Data Analytics and Monitoring
- Forecasting

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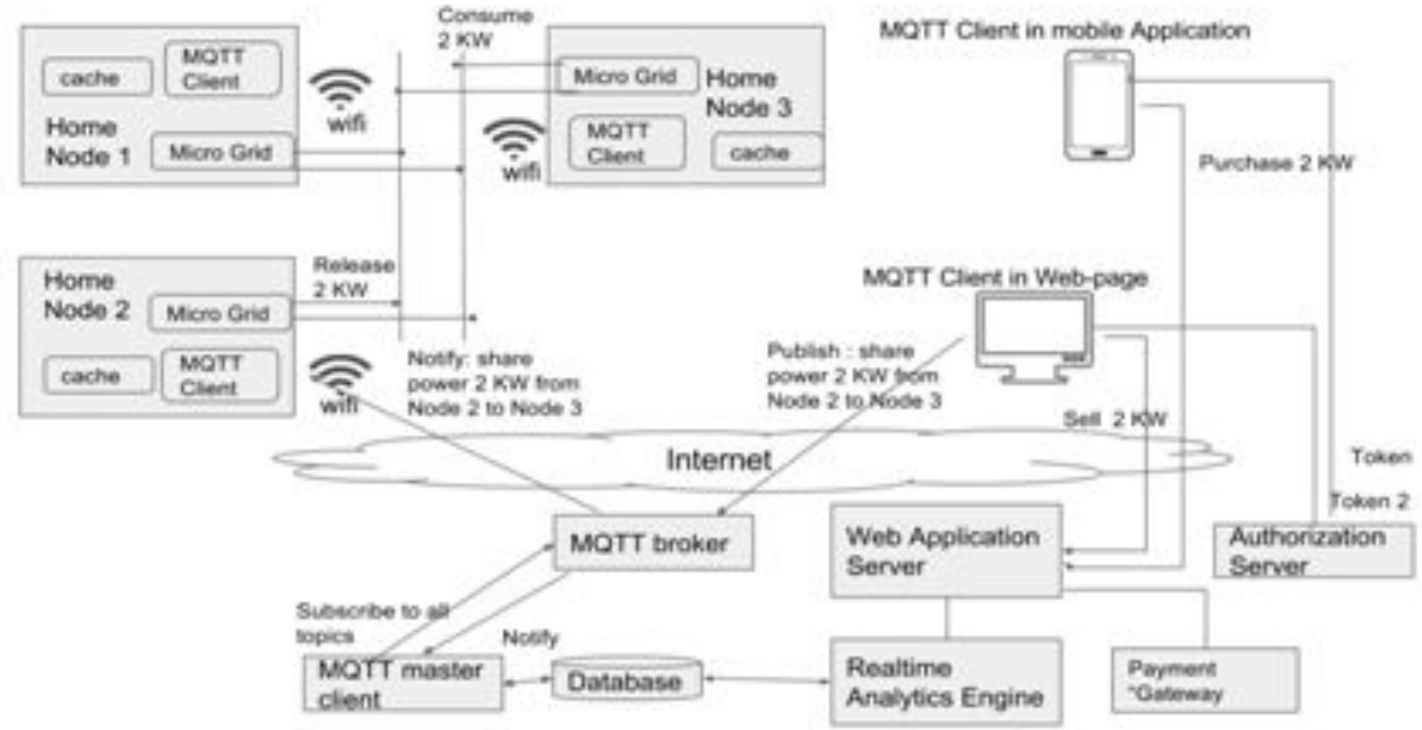
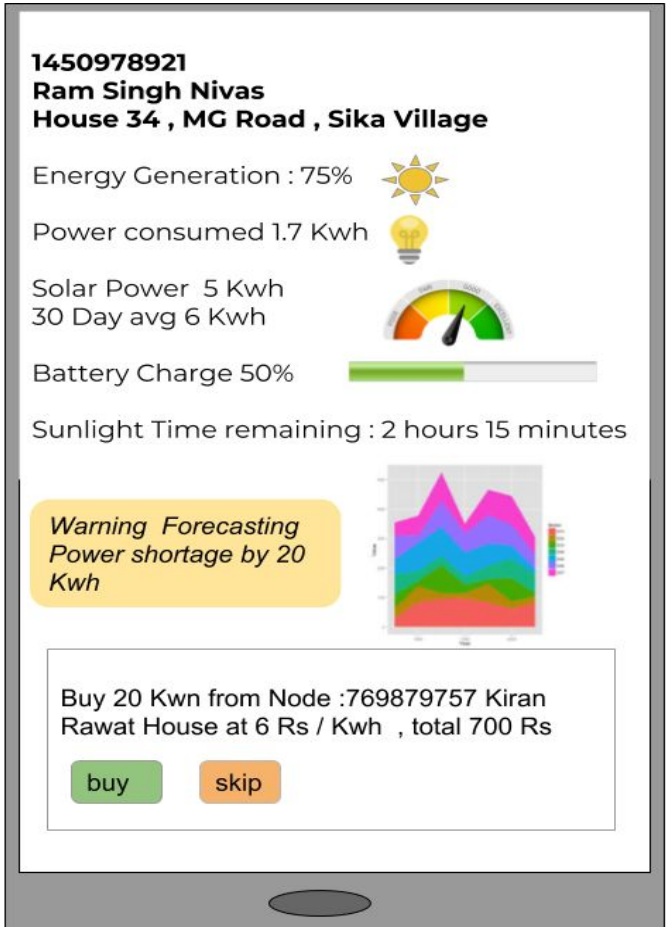
Export and Import of energy from Hybrid Micro Grid

Monetization via Energy Transaction to meet the demand and supply gaps
Scope of micro transaction and cryptocurrencies

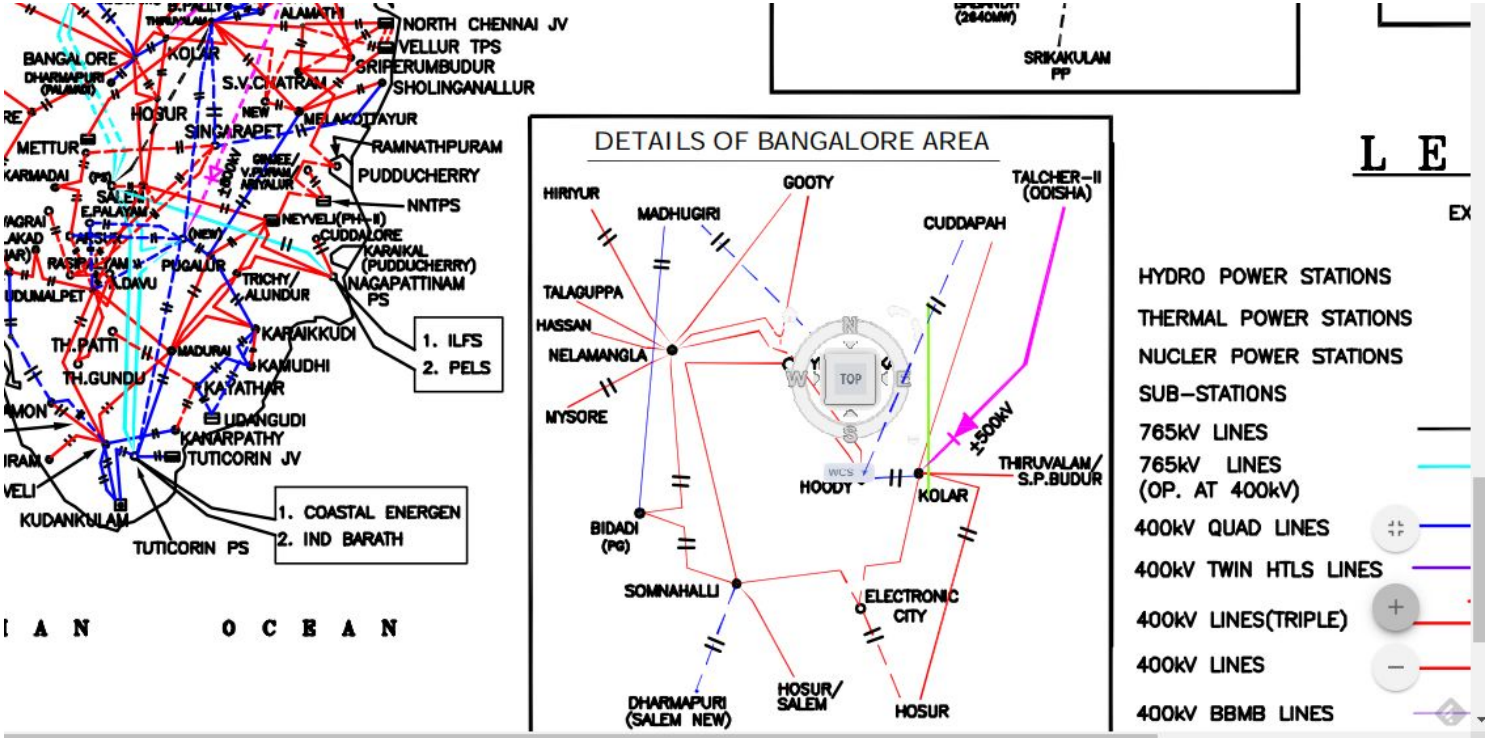
Export and Import Of Renewable Energy



Buying and Selling Power between nodes in Hybrid Microgrid system



- Importing/buying and exporting/selling Power
- Tracking Generation and Consumption
- Microtransactions

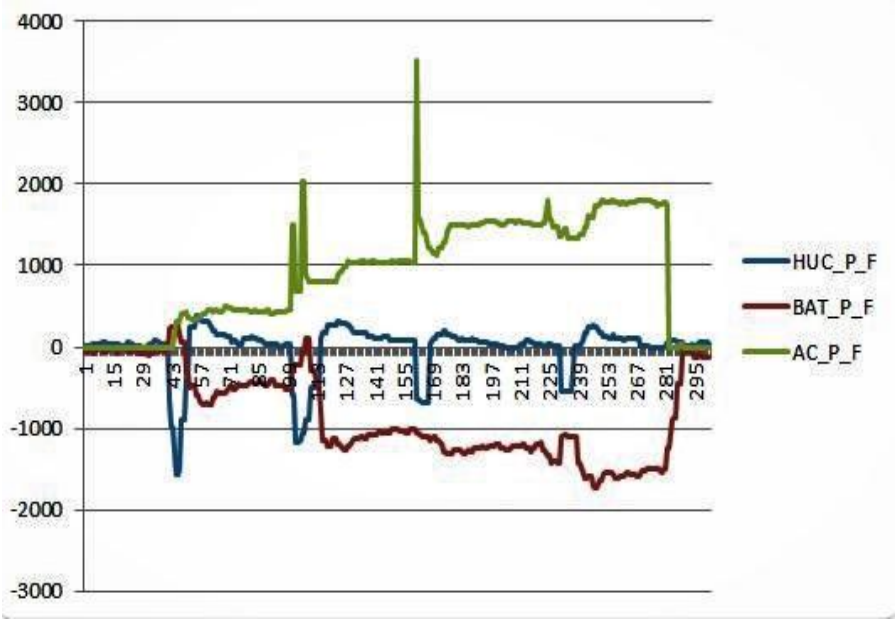


- Real Time Monitoring , Data Analytics and statistics at Main Power station

Derivations

Understanding the graphs and Logs collected

Time vs Power, battery and Current graph from data collected on a sunny day



Load generate surge and absorb by HUC.

filtered and represented in various graphics models and views. An Algorithmic system can also enable predictive analysis according to demographics and weather conditions.

Battery Capacity Test

S.No.	Test date	No. of Cycles	Capacity (Wh)		Decrease in capacity (Wh)		Decrease in capacity(Wh) in %	
			Hybrid	Battery alone	Hybrid	Battery alone	Hybrid	Battery alone
1.	04th Nov. 2017	0	7119	6932	-	-	-	-
2.	28th Nov.2017	267	6978	6756	141	176	1.98	2.5
3.	12th Dec.2017	554	6954	6608	165	324	2.31	4.7
4.	21st Dec. 2017	845	6833	6372	286	560	4.02	8.1

Capacity reduction of batteries in hybrid and battery alone systems with test cycles

Machine Learning and Data Analytics

Data Acquisition , Real Time Analytics and Forecast

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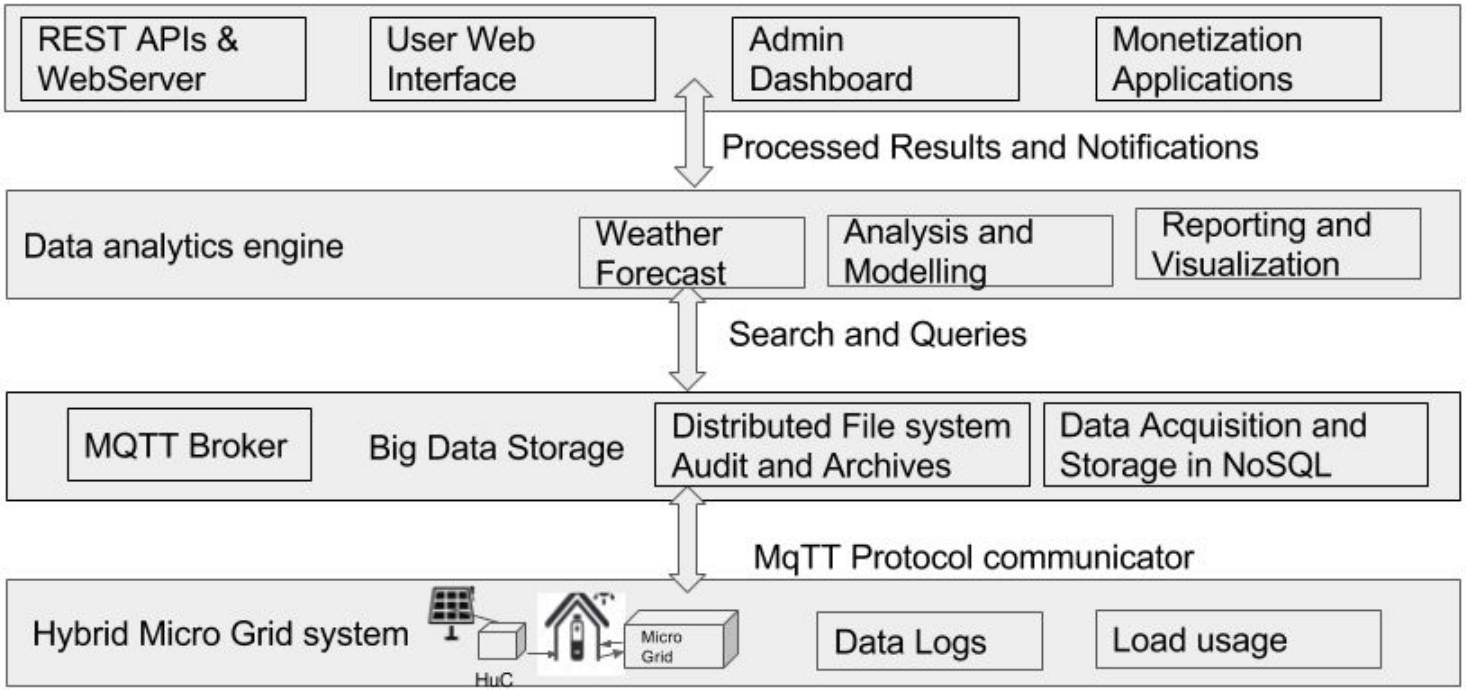
Data Acquisition , Real Time Analytics and Forecast



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Thank you !