

SMART SOLAR INVERTER [SSI]



Solar Power is Sustainable Enough!!

However, solar powered grids are still facing some problems.



Excess energy cannot be shared efficiently.

Hard to measure and share energy of every house in real time.

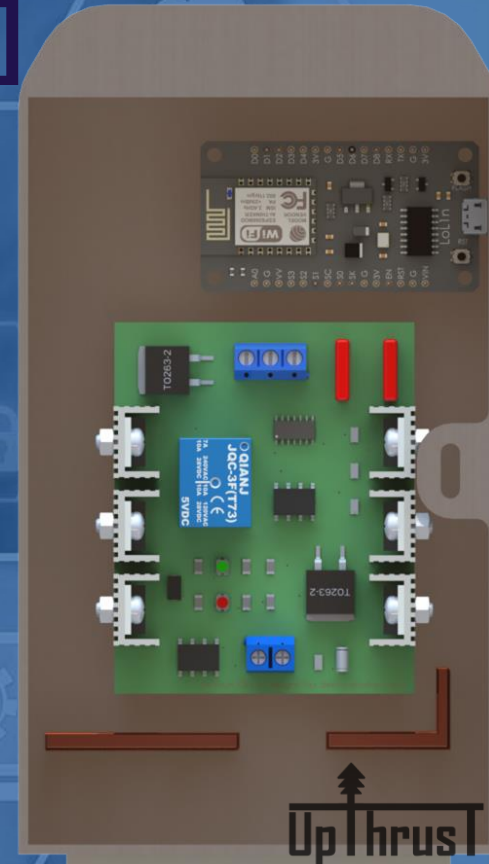
Inability to cut off power from every inverter, for maintenance of the grid.

To address those issues we invented a **SMART SOLAR INVERTER [SSI]**

Which connects with a IOT network enabling limitless capabilities.

Some of the capabilities are,

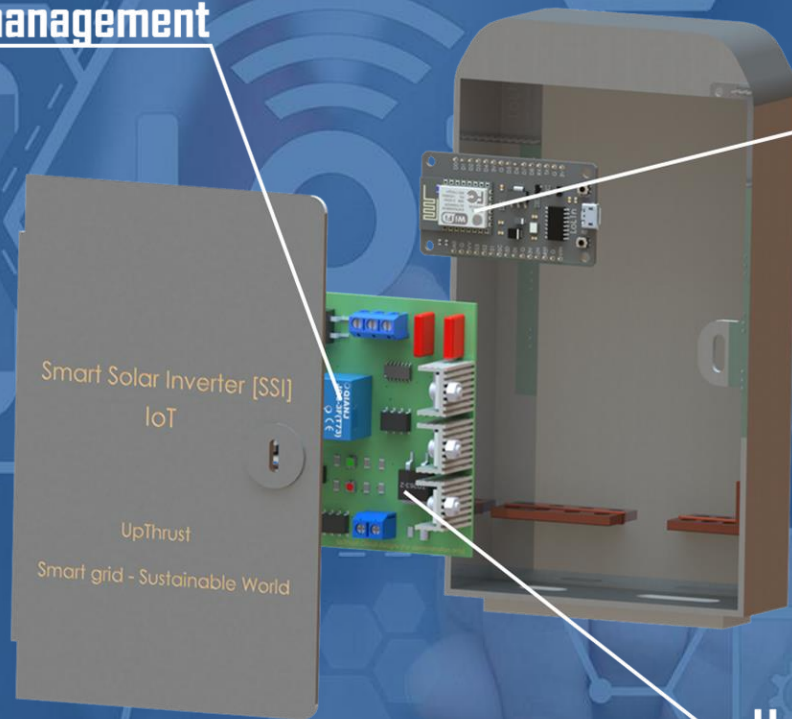
- Sharing Power among houses.
- Measuring and monitoring input & output power/energy values.
- Fully remotely controllable.
- Keeps track of when to share energy with other houses and when to take more energy from other houses.



Main Technologies of Smart Solar Inverter [SSI]

Inbuilt Power management
circuit

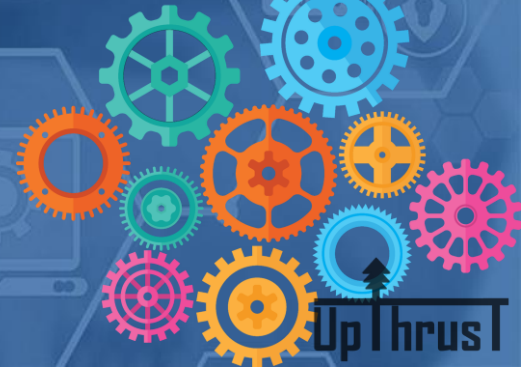
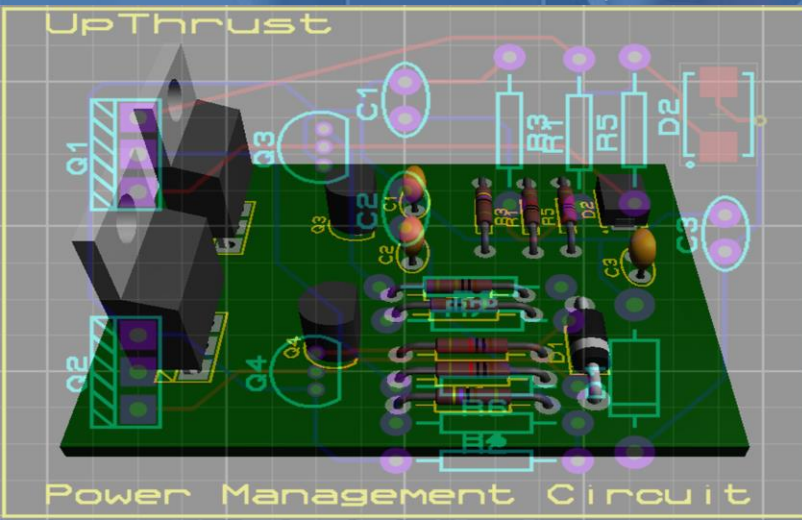
IoT network
Communication



Half Bridge Inverter

Power Management and Measuring

- Smart solar inverter(SSI) measures the power output of solar panels.
- SSI can also measure the power usage of the house.
- At first, extra energy is used to charge the batteries. Then excess power is transferred to nearby houses.



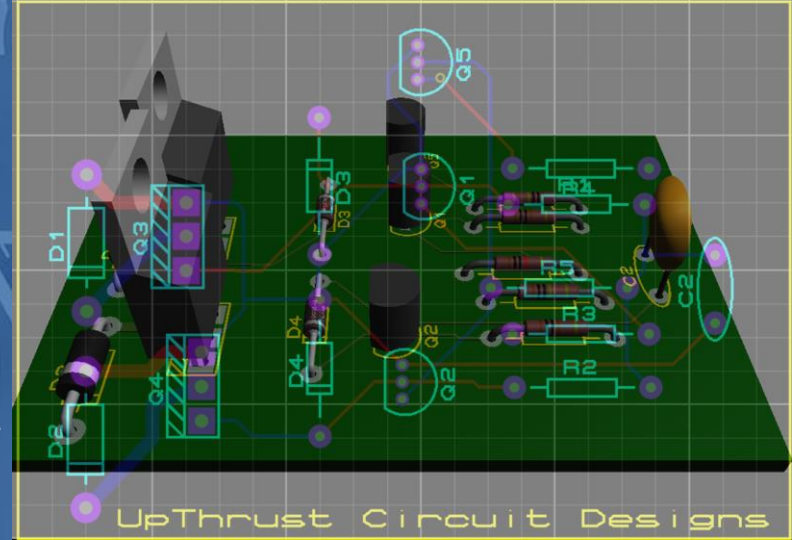
Diving into the circuitry ...

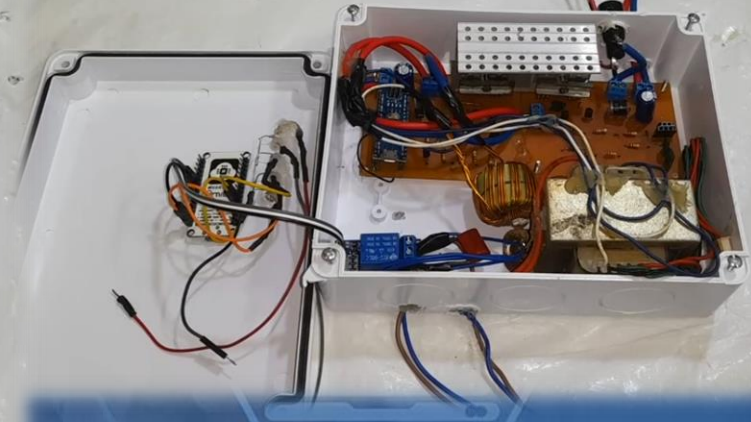
1. Power management circuit

- PWM method is used for battery charging.
- Programmed microcontroller is used to operate the circuit.

2. Inverter circuit

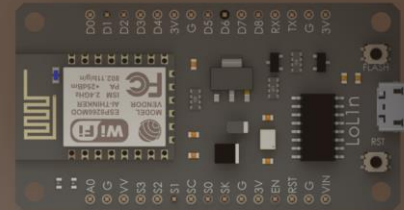
- Half-bridge type inverter is used.
- Mosfets with lower On-Resistance is used to maximize the efficiency.
- Current design produces Modified Square Wave AC output.
- Can be further developed to output Pure AC sine wave.





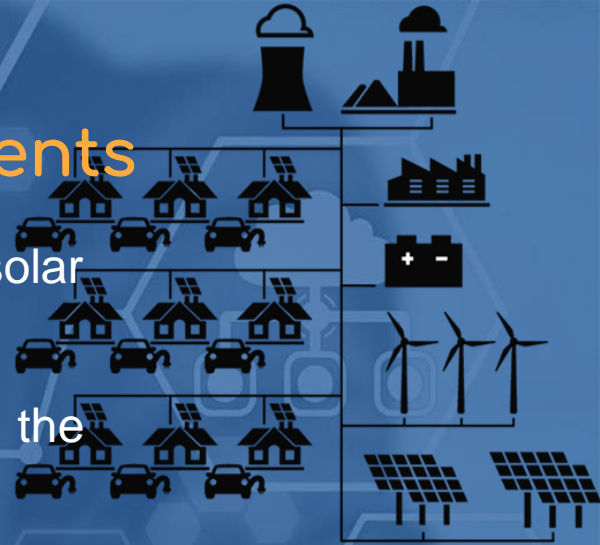
Using IOT to Communicate

- In existing solar inverters, excess power is directly supplied to the grid.
- That power may be transmitted over longer distances, resulting in significant losses.
- SSI uses a IOT network to communicate with other nearby SSIs to find houses with excess power generation as well as higher consumption.
- When a power request came from a SSI, nearby SSIs with excess power, start supplying power to the village's power grid. This way transmission losses will drop dramatically.
- Therefore, self sustaining solar powered villages/cities can be formed.



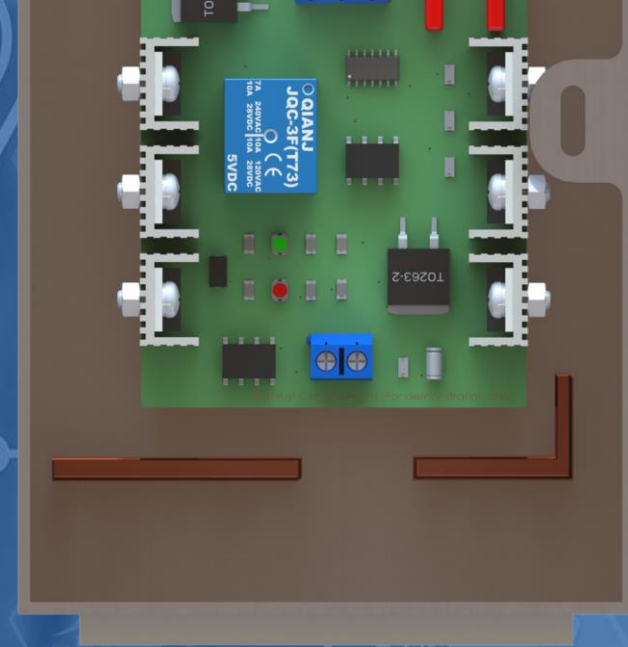
IoT Network and Further Developments

- In the initial stages, SSI function as a normal solar inverter.(Grid following Inverter)
- First firmware update will enable it to transfer data to the owner via home LAN / Wifi.
- Owner can access the power generation, consumption and storage data using a web browser.
- After SSIs become popular, secondary firmware update will enable it to connect with other SSIs and share power. (Grid Forming Inverter)



Smart Solar inverter [SSI] connects with the National Grid

- When the power supply of all the connected houses are not enough, SSIs use electricity from the grid to supply the required energy.
- When the total power supply exceeds the total energy usage, the SSI supply the excess energy to the grid.



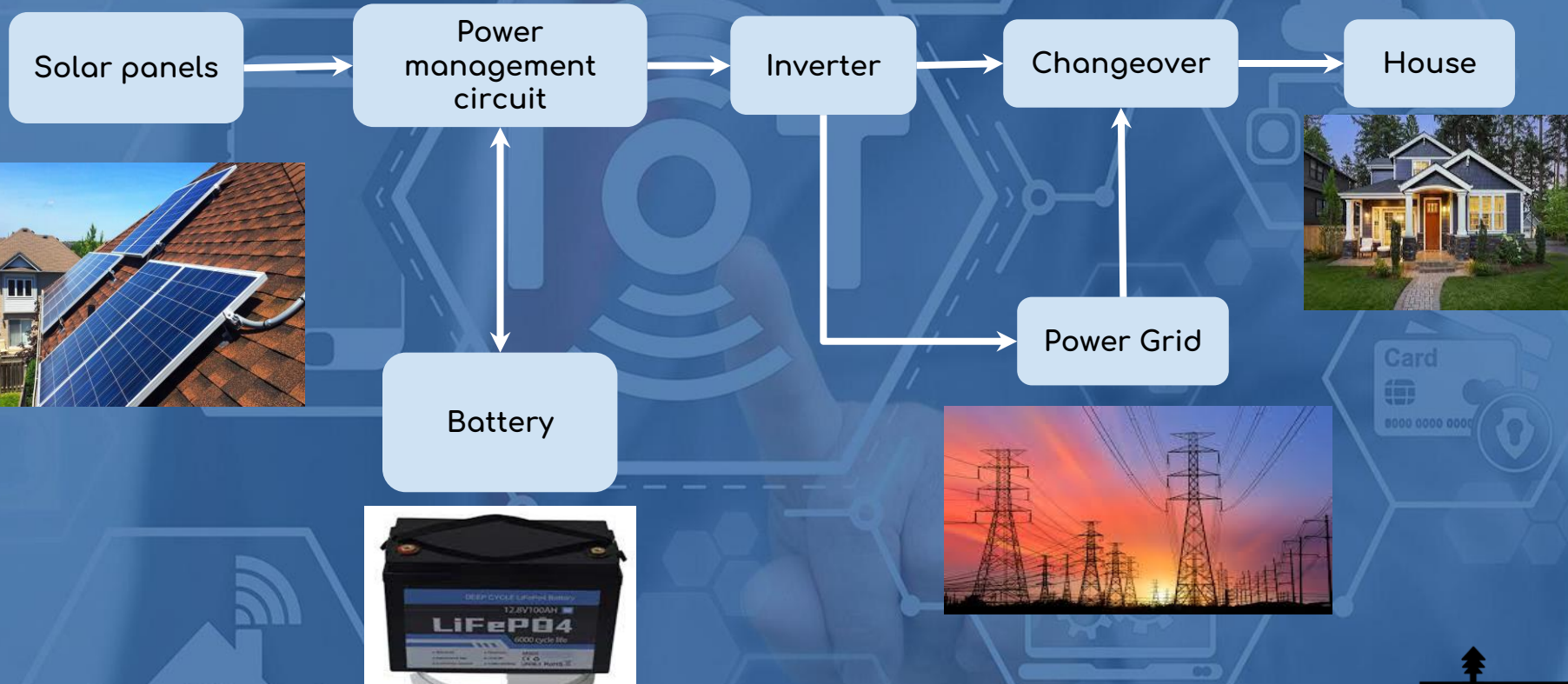
Power Generation(kWh)



Power Consumption(kWh)



Power Flow Diagram of a SSI system



So What's next

We are hoping to expand this to village/small city level using interconnected SSIs.

Making small off-grid smart villages leading to a sustainable energy based economy.

Electricity billing can be done with SSI systems, eliminating the need for additional electricity meter.

Other smart home appliances can communicate with SSIs to avoid consumption peaks.

Benefits of being a SSI customer

Targeted customer base - *Landlords and homeowners.*

1. *Benefits for homeowners,*

- a. Lowers your electricity bill.
- b. As you are sharing power with your neighbours, you can consume more power than the total output of your solar panels in certain times.
- c. This extra power consumption is free of charge as long as it is supplied by neighbouring houses.

2. *Benefits for house landlords,*

- a. SSI will create a self sustaining housing complex using solar power. Therefore, the electricity bills of your customers will drop significantly.
- b. Green housing complexes attracts many enthusiastic customers, resulting higher sales.
- c. A hotel can convert its apartments into a SSI interconnected system. It will monitor power usage values and lower the overall electricity bill.



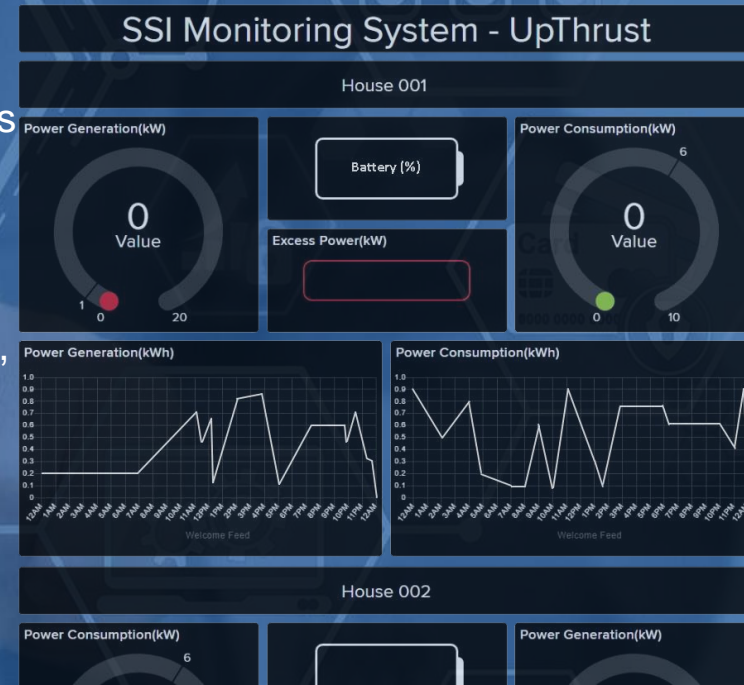
Marketing plan for the smart solar inverter

- Our initial step is to found a Start-up around this product and start small scale deployment testing.
- Then we will reach out to already established solar panel companies and introduce **SSIs** to their line up where we could reduce our customer acquisition cost.
- Then we plan to introduce **SSIs** as an upgrade to houses with already installed solar panel systems.
- We also plan to reach out to remote villages and remote tourist hotel complexes.
- In addition, an appropriate website for the SSI will also be created.



How our project addresses 'sustainable energy consumption through IoT'

- We can efficiently utilize excess energy generated through SSIs by sharing energy with others.
- We can reduce the energy wastage caused by delivering power from power plants over large distances as in a smart grid, electricity mostly travels small distances.
- We can create off-grid villages/small cities where it is expensive to implement power lines. Lowering material, deployment and maintenance costs as a result.
- Introducing our **SSIs** to remote tourist destinations where the concept of “sustainable tourism” can be accomplished.



Thank You !!

Smart Solutions for a Sustainable World....

- UpThrust -

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