

Comparison of the proposed system

| S. No | Properties | Existing System | Proposed System |
|-------|------------------------------------|--|--|
| 1. | Renewable Energy Integration | Reliance on fossil fuels for charging electric vehicles. | Generate electricity from sunlight, which is a renewable and sustainable energy source. |
| 2. | Energy Efficiency and Cost Savings | Not Efficient during peak hours, potentially increasing the demand on the grid. Lead to high cost for both the charging station operators and the electricity consumers. | Efficiently even during peak hours, potentially reducing the demand on the grid. Lead to cost savings for both the charging station operators and the electricity consumers. |
| 3. | Fed back into the grid | Doesn't exist, since the EV charging station takes the calculated power from the grid. So, the power is only sufficient for the charging but not fed back to grid. | The excess energy generated by the solar panels can be fed back into the grid, contributing to energy conservation and potentially earning credits through net metering programs. |
| 4. | Reliability and Resilience | It is not reliable and resilient charging solution, especially in areas prone to power outages. This can be crucial for industrial operations that depend on uninterrupted power supply. | Provide a reliable and resilient charging solution, especially in areas prone to power outages. This can be crucial for industrial operations that depend on uninterrupted power supply. |
| 5. | Energy Generation | The energy generation is influenced by the availability and cost of electricity from the grid. The cost of grid power can vary widely depending on the region, time of day. | A solar panel array can generate upto 10 kWh of energy. This energy can then be used to charge EVs |

Working Principle: -

The solar connected in series and parallel to have a sufficient amount of power. Here we are generating 12VDC.

The generated power is fed to the boost converter which helps to have constant power even during non-suitable condition like on cloudy day, which helps to have desired power.

This generated power is fed to the solar charge controller which helps to indicate the power generated, load ON and OFF, specifying the wide range of battery like lithium-ion battery, lead acid battery, liquid acid battery, gel acid battery. In this the energy supply, battery, load are connected in parallel, which helps for the easy maintains and understating of the connection.

In this project, we are using Sealed Lead Acid Battery, to store the energy from the solar panel, which has the rating of 12VDC, 1.3Ah. We can also select different type of battery, since the solar charge controlled can select wide range of battery.

At the load terminal of the solar charge controller, we connected a Buck converter which helps in high current upto 15A with the constant voltage of 12VDC at output side. The purpose of using a buck converter is to support the fast charging, which helps to reduce the charging time of an EV, if the EV supports the fast charging.

This power is fed to the Inverter, which convert the DC to AC at 3 different level 110VAC, 172VAC, 200VAC, 220VAC. For

| S. No | LEVEL | VOLTAGE |
|--------------|--------------|----------------|
| 1. | LEVEL 1 | 110VAC |
| 2. | LEVEL 2 | 172VAC |
| 3. | LEVEL 3 | 200VAC |

Then during no use of the power, the power can be fed to the grid which helps for the reducing the cost of the power supplied from the grid. This power can also be shared to other EV station which are installed with solar.

As for the battery management, we are considering two values such as Humidity, Temperature. To sense this we are using DTH11 sensor with NodeMCU which helps for internet connection for displaying the values in the Blynk IOT platform. Here we considering the average temperature is 30 degrees Celsius, if the value exceeds the red LED glow indicating the high temperature of the battery and same for the humidity (the water level in the air).