Green Electrification Approach for Remote & Rural Areas

(Project GEAR)

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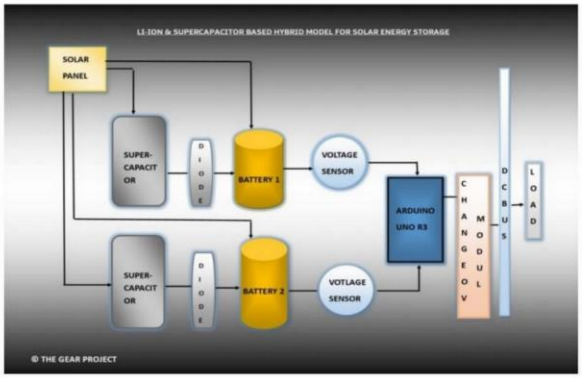
OVERVIEW

The **'Cop26Summit**' has reached a consensus of deadline **1.5°c**. Burning of fossil fuel is one of major causes of global warming. Renewable energy is the future and solar cell is one of the promising ways to replace fossil fuels. Solar energy harvesting isn't a new concept. In the present scenario, solar energy is being harvested mainly using lead-acid batteries. It is reported that **lead-acid batteries have less efficiencies than li-ion batteries of about 80-85%, whereas li-ion batteries promise efficiency close to 97%**. Moreover, the lead – acid batteries degrade over time, thus requiring change of it frequently. In case of li-ion batteries, they don't need frequent change. On the other hand, the super capacitor has very high storage capacity. In this project proposal, we will adapt the technology of hybrid storage system consisting of li-cells and supercapacitors for supplying electricity to remote as well as remote areas through a well-designed circuit.

SCHEMATIC DIAGRAM FOR LI-ION & SUPERCAPACITOR BASED HYBRID ENERGY STORAGE

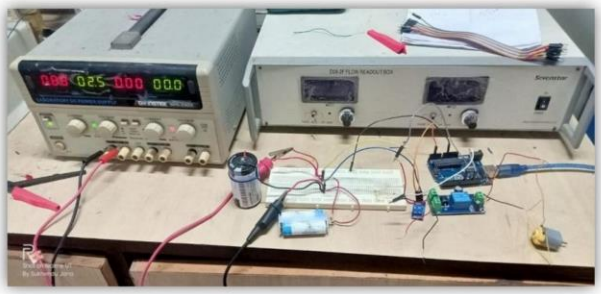


Methodology (for small scale)

Our plan entails around the use of **2 battery packs of li-ion cells of equal capacity (1.2 V Capacity. 700 mAh)** while keeping two **2.7v 500F Supercapacitors** in parallel arrangement with the batteries in order to avoid deep-discharge states of Li-ion batteries. Voltage sensor(s) are used to detect the voltage level of the batteries along with a voltage change-over module, as at a point when a battery voltage reaches at a level of deep-discharge, the other fully-charged battery will supply to the DC Bus so as to keep the voltage level of the bus constant. When the power supply is replaced the other battery will be charged using the supercapacitor during change-over, voltage level of the DC Bus shall be maintained by the voltage change-over module. For the control action of the mechanism of the change-over, an Arduino UNO R3 is used.

Result and Conclusion

Preliminary investigation has been done as per proposed method. We have used a dc power supply as a solar panel and a dc motor is used as a load. It has been observed that the battery was charging by the supercapacitor. There are two major objectives of the proposed work. As there are two storage of energy (each of them hybrid storage system), so there is a controller to detect and compare the voltage and connect to the load automatically. Secondly, the charging limit of the battery will be controlled by Arduino UNO R3. The first objective is completed successfully.



The image of proposed circuit at preliminary stage

FUTURE PROSPECTS OF SCALING UP

In terms of scaling, we may use various IoT devices and mechanisms to support the functioning of our venture.