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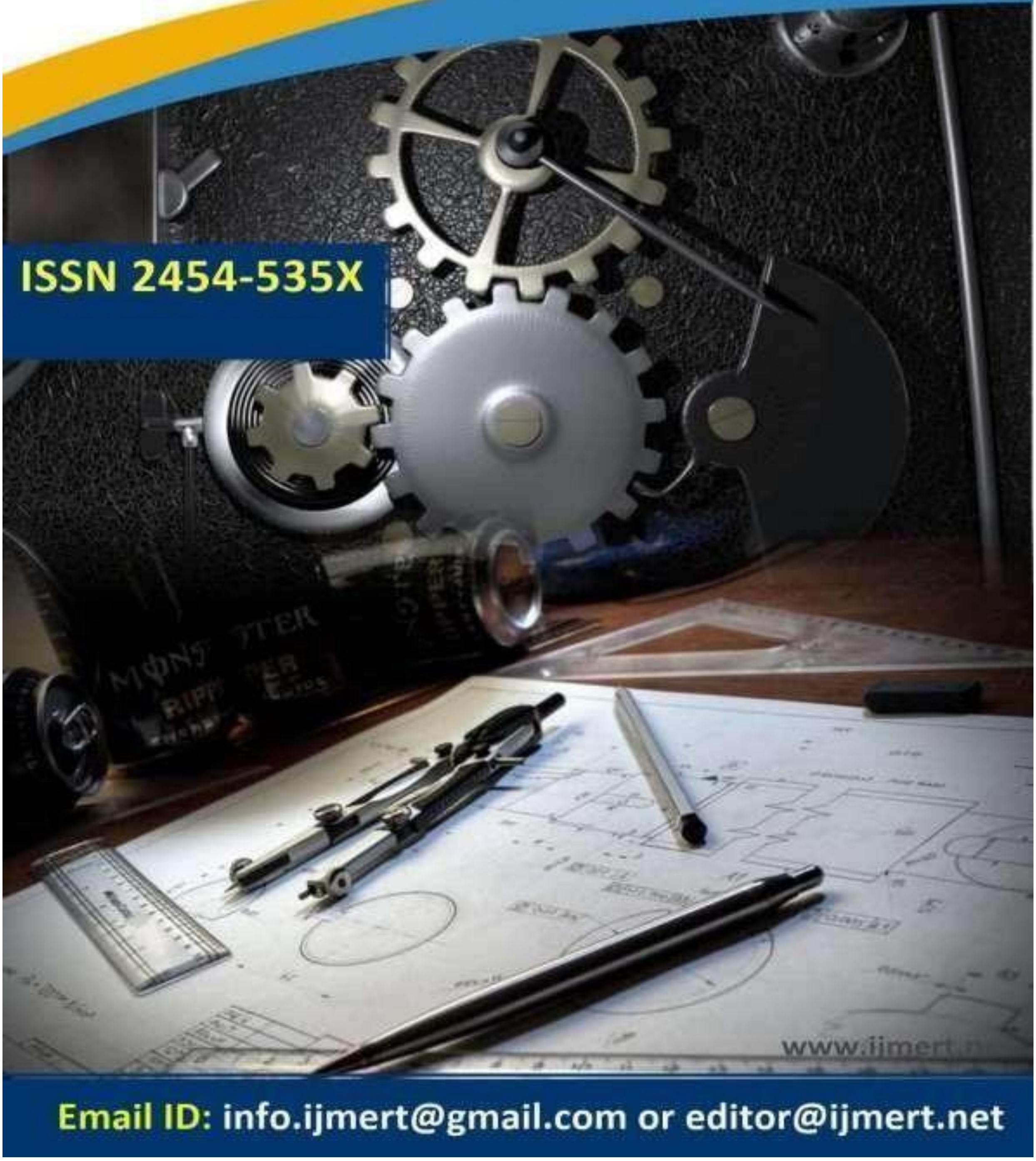

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CENTRALIZED HYBRID POWER GENERATION BY A REGENERATIVE METHOD FOR A MICROGRID

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Abstract: ***A renewable energy resource inter combined with electric vehicle has been more popular due to its attractive specifications along with in it (i.e.) enegy flow beween storage device to load and after that power flow between load to storage devices. The surpless power generation from solar panel incorporated with battery and supercapacitor gained more attention with continuous power flow under standstill condition. Ahead continuous conduction, the enriched one cycle contro lworks under discontinuousmode and shotern the integrator reset time in comparison with discharging time of an inductor.***

Keywords: Switched Reluctance Motor (SRM), supercapacitor, Non Isolated dc-dc converter, Asymmetric Half Bridge Converter.

I.INTRODUCTION

The transportation is the enlarged growing aspects among all. As long ago the fuels such as petrol, diesel, coal are became more popular. Also they pollute environment severe. Few years back lot of people followed past. At that time Plug-in charging electric vehicle is the only solution to dispense environmental pollutant and maintains a eco-friendly nation. Most of the electric vehicle use battery and supercapacitor as source. They are not enough to fulfilll the requirment. Because they need charging station everywhere to charge it. To compensate this problem and consider the time taken to charging, manufacturing unit prescribe renewable resource. Renewable resources are solar, wind, hydro, biomass, geo-thermnal, tidel, etc.the main renewable resources are sun, hydro, biomass, wind,etc.Among with this the hydro and biomass are need a huge locality for installation and it need a separate space for energy storage system. But solar and wind blades are available in compact size; also it is easy to fix in vehicle. Among all solar power production is choosen due to its size and efficiency.it produce maximum power during day-time and given it to the battery. During vehicle running condition it charges the source. So there is no need to charge the battery externally.

The photovoltaic system with maximum power point tracking is the initial case to fulfill the load. It is essential to overcome with control techniques available in recent work. The maximum power point tracker (MPPT) trace the maximum power production from pv panel and fed to the conversion system. All of the PV system enroles boost conversion to overcomethe total requirment.

Advancement in hybrid electric vehicle includes satisfies itself by power production and supplies externally as charging station.There are several conditions in this type of production and distribution. In this proposed system there is no regularities available. If the power production from renewable resource must energise battery and supercapacitor. The regenerative power flow from motor also fed to the storage element. After the completion of charging the generative power is supllied to external means by primary and secondary winding.The principle of electromagnetic interference is evolved with in this power transmission.

To establish charging and discharging in a medium we require a specifiede converter to peform whole

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action uniformly. Thus, a non isolated birectional power flow dc-dc converter is preffered.The bidirectional switches are controlled by ancontroller named one cycle control. In this paper one cycle controller based non isolated dc-dc converter is studied with energy storage devices.Literally a control switch can contol the wireless power transfer. It allows the system share the power whenever the production is to be high.

In section 2 the proposed methodology and it's modes of operation is explained. The section 3 prescribe about one cycle contol mechanism. The working of non isolated bidirectional dc-dc converter is reviewed in section 4. In section 5 the simulation rresults are discussed. The entire system is conclluded in section 6.

II. METHODOLOGY

The variable energy resources are PV panel, battery and supercapacitor. These variable energy resources are well suited for different operating modeds and notably adapt with the inconvenience in weather changes. The converter's are responsible for the load. During day time the solar panel generate power and supplies the load. Excess power from the panel is stored in battery and supercapacitor via non isolated bidirectional dc-dc converter. During fair weather conditions the both battery and supercapacitor satisfies the load requirment. During regenerative braking the amount of power generated is said to charge the storage devices. Apart the need the excess available power is transferred to the others as wireless charging station. The various modes of operations are listed below:

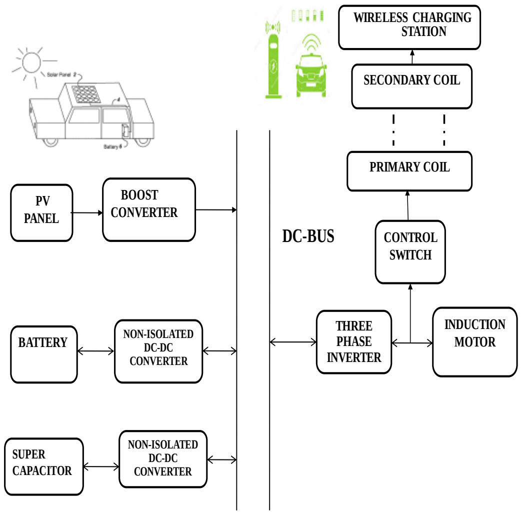

Fig.1.proposed topology with vehicular functioning

Vehicle Normal Energy Flow: All of the electrical components need certain amount of electrical energy to power on and function in initial condition.In this mode battery supplies certain amount of power to the entire network.

Vehicle Acceleration Energy Flow: During acceleration condition the motor need more power.Both battery and supercapacitor supply huge power to the motor to rotate at maximum speed.

Regenerative Breaking Mode: During retardation of motor, the motor rotates in a reverse direction to act as generator.It generates some voltage and it is driven to the energy storage elements to energies.

Vehicle Charging Mode: At rest condition the roof top solar panel receives abundant light energy and convert it into electrical energy. After regenerative breaking mode, bttery and supercapacitor needs additional energy to fulfill its capacity.This mode satisfies the need.

Vehicle Discharging To Charging Stations : The excess power generated by the solar panel is utilized in this section.An wireless power charging can make electric power transfer in an successive way and it supplies the neighboring charging stations.

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III.NON ISOLATED DC-DC CONVERTER

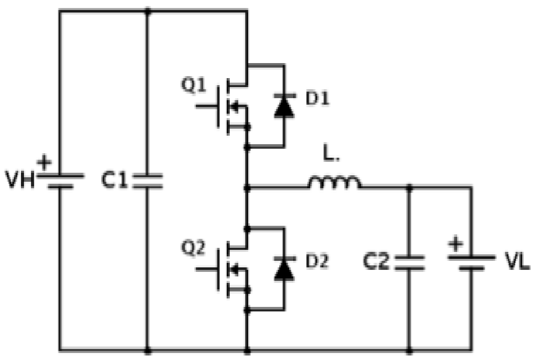

Fig.2. visualizes non isolated bidirectional dc-dc converter

The non isolated bidirectiopna;l dc-dc converter is a comboination of both buck and boost converter with some similar changes with in it.(i.e.) bidirectional power flow control.It comprised of two capacito, one inductor, two switches. Normally cascaded buck-boost converters suffers switching stress, capacitor undergoes thermal and electrical stress. This decreas the efficiency and the lifetime of semiconductor devices. To overcome this problem we moves upon with non isoltaed bidirectional dc-dc converter. The reduced switching stress and heat loss improves the efficiency.

During boost operation the diode D2 and switch Q1 conducts; others in rest condition. In this mode, converter boost the voltage during discharging.Similar to boost operation, the buck operation performed. In this Q1, D2 are turned on; Q2, D1 turned off. The converter buck the input voltage and stores within storage elements.

IV.ONE CYCLE CONTROL

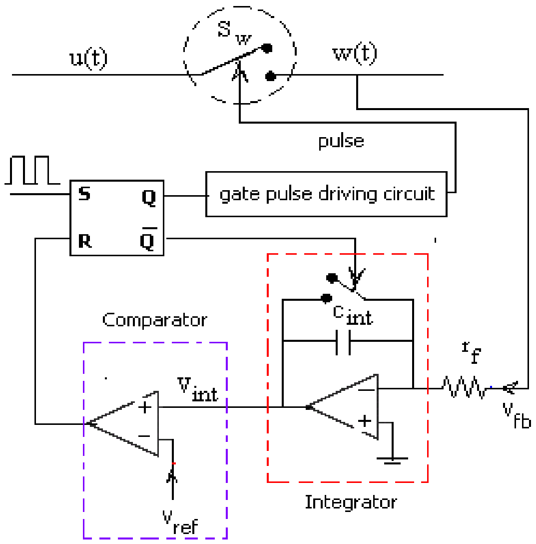

Fig.3. one cycle control

The opeartion of switches are controlled with one cycle control. The variation between copntrol reference and switching variab ais conmtinuosuly integrated is continuously moniterd to attain zero average error in one switching cycle. It is similar to that of continuous time integral control. It avoids disturbance in load sinusoidally with the error correction. An adequate duty ratio can be attained by measure and compare the contrrol reference. Further it incorporates with regulation or distortion in load. The deteoriation in input and output is compensdated with this control toplogy. Hencve this method is well suited for variable conditions.

V.RESULT AND DISCUSSION

The above simulnk explains about induction motore based hybrid electric vehcle associated with non isoltaed bidirectional dc-dc power flow converter. The performance and operation are evaluated within this section.

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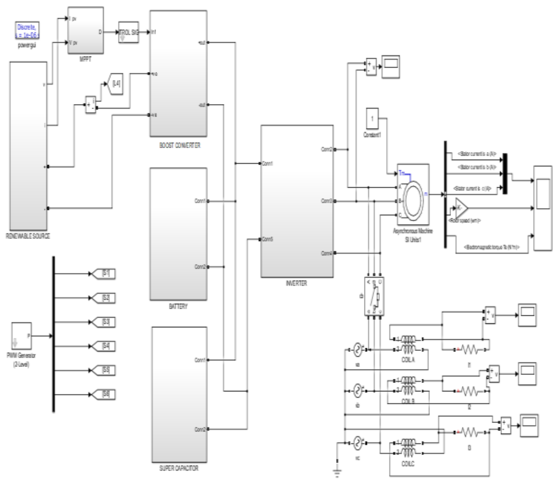

Fig.4.simulink blocks showing hybrid electric vehicle

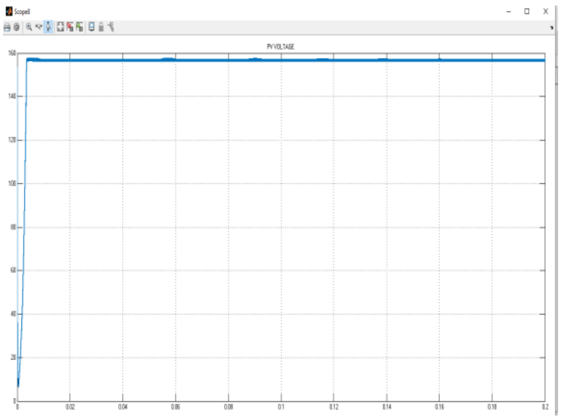

Fig.5.output voltage from PV source

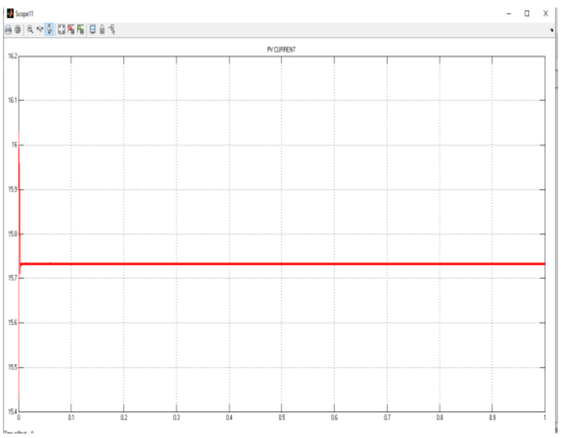

Fig.6.depicts pv current

At constant temperature the total amout opf power generation is said to be nearly 155V, 15.5 A and is depicted in the below waveform. Also the power generation varies with variation in climate. This output voltage is directly fed to the dc bus. Depends upon the requirment this voltage may deliver to load or to storage devices.

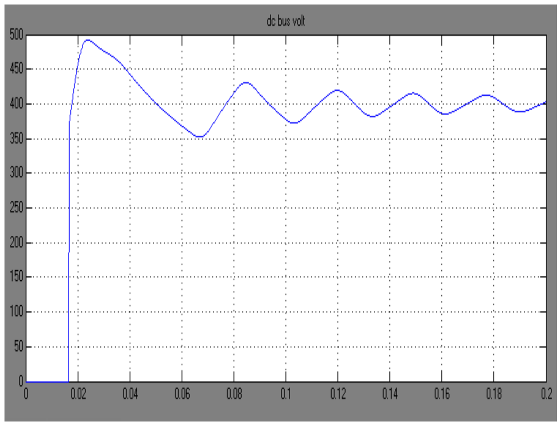

Fig.7.showing voltage maintained at dc bus

The total amount of power from various sources integrated with boost converter and non isolated bidirectional dc-dc convereter is fede to the dc busbar. The bus acts as a major terminal to the inpurt and output. A total of 400V continuously maintained in this bus.

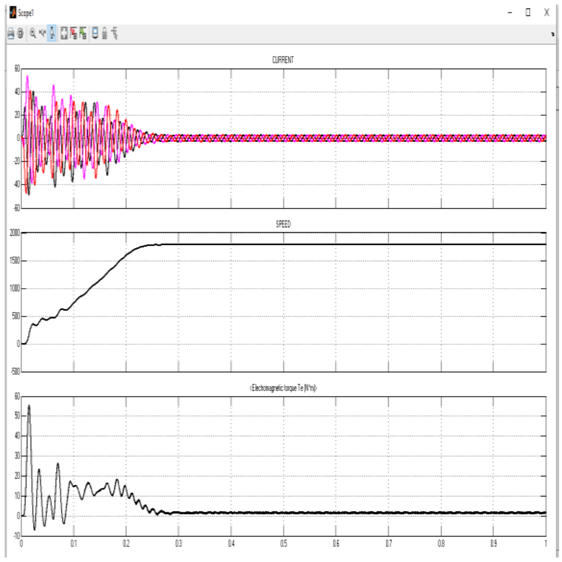

Fig.8.depicts a combination of current, speed, torque corresponds to time

Fig.8 hardware image

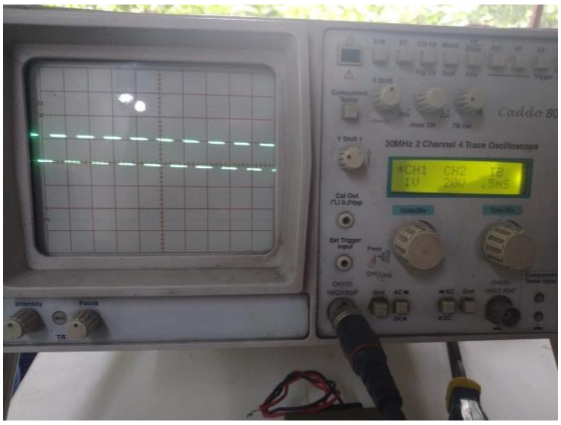

Fig.9 gate pulse

The induction motor torque, speed, current are depicted in below waveform. During starting condition the motor needs huge amount of input voltage to accelerarte. The oscillation in torque shows how much amount of forque acts upon motor during starting condition. Literally the torque becomes constant at running condition. The motor attains synchronism under constant torque.

VI.CONCLUSION

The simulation study breifly explains about the efficiency of the motor under normal energy flow, acceleration energy flow, regenerative breaking mode, charging mode, discharging to charging stations.This method could replenish the energy requirment for electric vehicles at present and future. The wireless power transmission also evolved further advantages in this topology. The one cycle control avoids zero average error and then prevent the voltage disturbance in source and load. This converter avoids switching stress, thermal and conduction loss in comparison with cascaded buck-boost converter. This trend may enlarge in future with lossless power transmission.

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