Theme 1: *Engineering & Technology*
Theme 2: *Renewable Energy Sources*

Title: **HYBRID ENERGY STORAGE SOURCE FOR RENEWABLE ENERGY SYSTEMS**

Abstract: Energy crisis is increasing enormously day after other, electric power generation using traditional methods causing global warming and environment degradation. Electricity is a key to economic growth and sustenance in global scenario. Above aspects draws an attention of green and clean energy technology using renewable energy sources. The decentralized power generation and energy smoothening draws an attention to hybrid energy storage system (HESS). Combination of energy and power sources such as battery and super capacitors need to improve life span of battery. And it is essential to increase life span of batteries as well as uninterrupted power supply to critical loads. Frequent maintenance of traditional batteries will be of an expensive solution and research focus will be an optimization and cost reduction. Each DG is equipped with its own storage unit/centralized storage system. Existence and sustenance of RES depend on energy storage. Impossible imagine existence of DGôs without HESS.

HESS technology is under investigation to promote to the societal needs not only for electrification of rural areas but also for urban development. Such as vehicle to grid (V2G), energy recovery schemes in electric traction to reduce specific energy consumption and also energy efficient lamps such as LEDôs for street light applications. There is tremendous change is happening in RES and the right time to innovate and advance in this HESS arena.

Above aspects makes me to attend the congress to enhance research activity by interacting with eminent people and to know current scenario of smart grid technologies development. To strengthen & disseminate knowledge in energy storage systems and distributed generation the congress will be helpful.

Intention to attend congress is that to promote & utilize renewable energy sources for day to day activities not only for house hold appliances but also for academic research and industrial applications. Europe and United States are well advanced in this HESS with inclusion of super conducting magnetic energy storage (SMES) system. Certain technologies with HESS using super capacitors are patented in Europe and United States. Much of the programs and research activities in South American and United Arab Emirates are based on energy storage for development of smart micro grid systems.

Proposed and developing a research proposal on HESS. It uses novel bidirectional DC-DC power converter topology to interface a hybrid energy storage system (HESS) to a DC micro grid for the purpose of voltage regulation. The converter topology is based on standard single phase H-bridge inverter module. HESS constitutes of battery ï super capacitor (SC) combined storage which have virtues of high energy and power densities respectively. The inherent problem of slow dynamics of battery is overcome by diverting fast acting dynamics to the SC system which also improves life span of battery and reduce current stresses. Control strategy is to be validated on the designed micro grid for different load conditions. A bidirectional DC-DC converter topology is proposed and analyzed by simulation & hardware of forward buck operation and backward boost operation. Further it is aimed to control the power distribution between the battery and super capacitor as per the load requirement. A block diagram of HESS work is shown below.