Department of Electrical And Electronics Engineering

VIDYUTH
-Explore-Create-Inspire-

Technical Magazine

JAN - JUL 2023

EDITORIAL BOARD

INSTITUTION

Vision of the Institute:

To be a premier center of learning in Engineering and Management education that evolves the youth into dynamic professionals with a social commitment

Mission of the Institute:

M1: To provide quality teaching- learning practices in engineering and management education by imparting core instruction and state-of-the-art infrastructure.

M2: To engage the faculty and students in acquiring competency in emerging technologies and research activities through Industry Institute Interaction.

M3: To foster social commitment in learners by incorporating leadership skills and ethical values through value-based education

DEPARTMENT

Vision of the Department:

"To be recognized for producing meritorious electrical engineers with research proficiency and social commitment".

Mission of the Department:

M1: Impart quality education with practice-based learning in producing electrical engineers with ethical values.

M2: Encourage the faculty and students to acquire mastery in cutting edge technologies.

M3: Implement research activities with social commitment.

Program Educational Objectives (PEOs)

PEO-I : Acquire a profound knowledge for a successful career in electrical engineering and allied fields

PEO-II :Pursue higher education and involve in research activities of electrical and electronics engineering.

PEO-III : Exhibit intellectual skills ethically and pursue life-long learning with social commitment.

EEE PBRVITS | DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Program Outcomes (POs)

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

PSO-1 : Analyze industrial electrical challenges by applying knowledge of fundamental electrical circuits, electronics and drives

PSO-2 : Apply standard practices in electrical power and control systems with safety and societal considerations.

DEPARTMENT PROFILE

The Department of Electrical and Electronics Engineering was established in 1998 with the approval of the All India Council for Technical Education (AICTE). The Department of Electrical and Electronics Engineering (EEE) is one of the oldest department in the institution, spanning 25 years of existence, and offers the undergraduate program B.Tech-EEE (and one post-graduate program, Power Electronics). The department has qualified and experienced faculty and excellent infrastructural facilities. It is well equipped with laboratories, audio-visual facilities, and software tools such as Multisim, MATLAB, and Pspice.

We also take up the social responsibility of inculcating awareness about energy conservation by promoting programmes about the same. Collaboration with industries for timely amendments of curriculum and laboratories is another credential of the department. The long-term goal of the department is to develop a centre for research and development activities in the thrust areas of solar and wind energy. The main objective of the department is to provide a better solution for industrial problems and to carry out academic and sponsored research projects.

The department is committed to providing students with exposure to state-of the art technologies by signing a Memorandum of Understanding (MoU) with reputed companies. The students exhibit their co-curricular and extra-curricular skills through the activities of the EEE student association and other student exhibition platforms. The Department of Electrical Engineering is committed to excelling in Electrical and Electronics Engineering through education and research with well-qualified and experienced faculty and technical staff members.

PROFESSOR DESK

Welcome to the Department of Electrical and Electronics Engineering, PBR VITS, Kavali, Andhra Pradesh. As a well-known fact, we cannot imagine the world without electricity. The Department of Electrical and Electronics Engineering is a center of preeminence where we nurture young talents by imparting technical training to them so that they can take up the challenges of real world. The Department of Electrical and Electronics Engineering was established in the year 1998 with an objective to develop professionals through quality education with an intake of 60 students.

The B.Tech and M.Tech programs are designed to achieve a balance between depth of knowledge acquired through specialization and breadth of knowledge gained through exploration. The courses offered by the department provide a comprehensive foundation in the core topics of EEE coupled with an area of specialization relevant to emerging engineering challenges.

The faculty in the department is a rich blend of personnel with industrial and professional experience. The dedicated staff members have sound knowledge in emerging areas like power systems, power electronics, and control engineering, etc. The breadth and depth of the research interests of the academic staff ensures a high standard of lecture courses and provides excellent opportunities for challenging and stimulating final year projects. All faculties supplement their delivery using videos, animations overhead projectors. The faculty keeps up with the latest technologies by publishing in reputed journals and presenting at various national and international conferences.

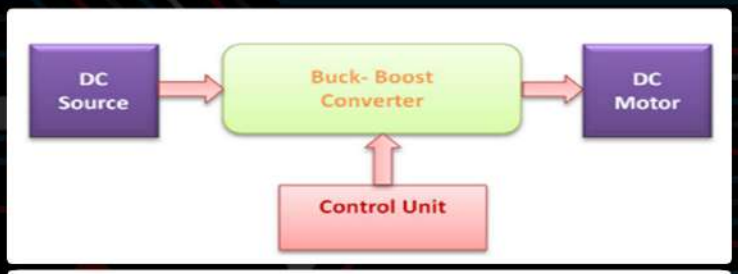
The department is active in organizing the various workshops and seminars for the growth and development of faculty and students' research knowledge further. Our department students are also highly encouraged to implement their innovative research ideas with the help of the expert faculty members and the available standard lab facilities in the department.

"Education can be a powerful weapon to change the world"

Dr. V. MadhuSudhana Reddy
Professor & HOD, EEE.

A SMOOTH STARTER FOR DC SHUNT MOTOR USING BUCK-BOOST CONVERTER

A smooth dc motor starter using dc/dc buck-boost converter simulated using MATLAB - SIMULINK. This type of converter is mainly used to regulate the desired output voltage level and maintain dc motor speed constant. The dc motor is a self- starting motor, having various starting methods. The main limitation of 4-point starter is that it has no control on the high speed of the motor. These limitations are overcome by the present research work. The obtained results show that the starting current of dc shunt motor has been controlled with in the desired limit.



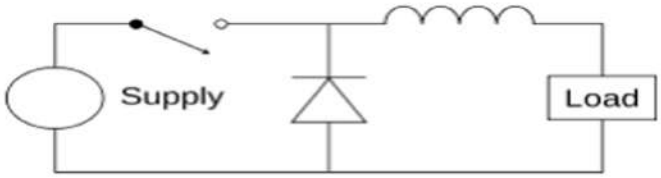


Fig 4.1 Buck converter circuit diagram.

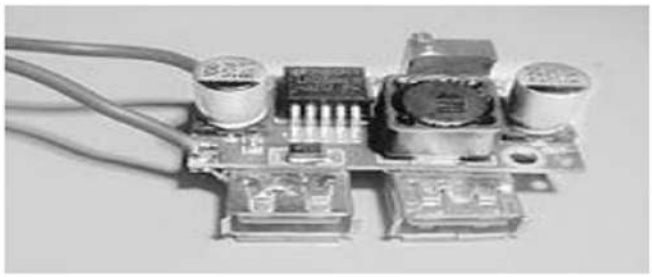


Fig 4.2 A buck converter

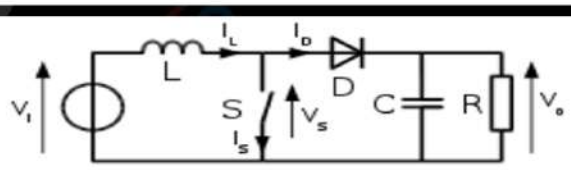


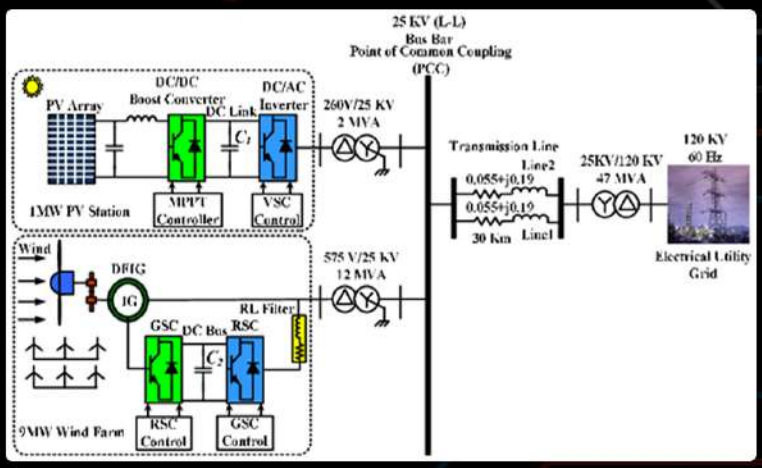
Fig 4.10 Boost converter schematic

CONCLUSION: A a smooth starter for dc shunt motor and study shows that, the power electronic starting method is better than four-point starter. Advantages of considering these starters for dc shunt motor are that, it provide smooth starting of motor, by varying the duty cycle of both buck boost converters speed control of dc motor is also possible, require comparatively less maintenance and no power loss occurs due to absence of starting resistance. Simulink model results has been successfully achieved.

K. ANUSHA
(19731A0247)

PERFORMANCE ANALYSIS OF A GRID-CONNECTED PHOTOVOLTAIC/WIND HYBRID POWER SYSTM

The design and control strategy of a grid- connected photovoltaic(PV)/Wind hybrid power system. The hybrid power system consists of PV station and wind farm that are integrated through main AC-bus to enhance the system performance. The Maximum Power Point Tracking (MPPT) technique is applied to both PV station and wind farm to extract the maximum power from hybrid power system during variation of the environmental conditions. The simulation of hybrid power system have been implemented using Matlab/Simulink software. The effectiveness of the MPPT technique and control strategy for the hybrid power system is evaluated during different environmental conditions such as the variations of solar irradiance and wind speed. The obtained result show that the hybrid power system operates at unity power factor and the control strategy maintains the grid voltage constant irrespective of the variations of environmental conditions and the injected power from the hybrid power system.



MPPT CONTROLLER:

• Maximum power point tracking (MPPT) or sometimes just power point tracking (PPT) is a technique used with variable power sources to maximize energy extraction as conditions vary.

• The technique is most commonly used with photovoltaic (PV) solar systems, but can also be used with wind turbines, optical power transmission and thermophotovoltaics.

• MPPT devices are typically integrated into an electric power converter system that provides voltage or current conversion, filtering, and regulation for driving various loads, including power grids, batteries, or motors.

• The power at the MPP (Pmpp) is the product of the MPP voltage (Vmpp) and MPP current (Impp).

DFIG:

• Doubly-fed electric machines also slip-ring generators are electric motors or electric generators, where both the field magnet windings and armature windings are separately connected to equipment outside the machine.

• • By feeding adjustable frequency AC power to the field windings, the magnetic field can be made to rotate, allowing variation in motor or generator speed. This is useful, for instance, for generators used in wind turbines.

• By feeding adjustable frequency AC power to the field windings, the magnetic field can be made to rotate, allowing variation in motor or generator speed. This is useful, for instance, for generators used in wind turbines.

• DFIG-based wind turbines, because of their flexibility and ability to control active and reactive power, are almost the most interesting wind turbine technology.

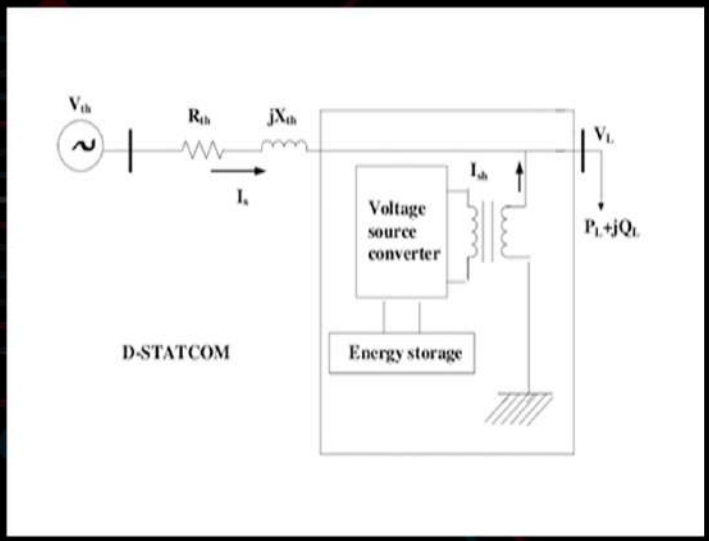
CONCLUSION:

A detailed design and control strategy of a grid-connected PV/Wind hybrid power system has been successfully investigated. The incremental conductance MPPT technique is applied for the PV station to extract the maximum power during variation of the solar irradiance. On the other hand, modified MPPT technique based on mechanical power measurement is implemented to capture the maximum power from wind farm during variation of the wind speed. The simulation results have proven the validity of the MPPT techniques in extraction of the maximum power from hybrid power system during different environmental conditions such as the variations of solar irradiance and wind speed. Moreover, the hybrid power system successfully operates at unity power factor since the injected reactive power from hybrid power system is equal to zero. Furthermore, the control strategy successfully maintains the grid voltage constant regardless of the variations of environmental conditions and the injected power from the hybrid power system.

D.ABHINAYA
19731A0212

POWER QUALITY IMPROVEMENT BY USING D-STATCOM

The problems faced in Transmission line like Voltage sags , voltage swell , harmonics distortions . which are leads to Power quality problems .We have analyzed some problem and thus with the help of D-STATCOM in the system , we were able to improve the quality health of the overall system.D-STATCOM is known for its mitigation property, it's efficient of engrossing and producing reactive power which decreases voltage flickering.



DSTATCOM operating modes:

• If the magnitude of the DSTATCOM voltage is greater than the grid voltage (>), the DSTATCOM supplies reactive power to the grid, and the DSTATCOM is operating in the capacitive mode.

• If the grid voltage is greater than the DSTATCOM voltage (>), the DSTATCOM absorbs reactive power from the grid, and the DSTATCOM is operating in the inductive mode.

• If the grid voltage and the DSTATCOM voltage are of the same magnitude (=), there is no exchange of reactive power between the grid and the DSTATCOM, the DSTATCOM is operating in the floating state.

CONCLUSION:

That the voltage sags , voltage swells and harmonic distortions could be compensated by inserting the DSTATCOM in distribution system. The power factors expanded near unity.By inserting the D-STATCOM in the distribution system we overcome the power quality issues and also supply the reliable power supply to the load in order to meet the load demand and the system is improved.

SK. Jakee sharif
19731A0232

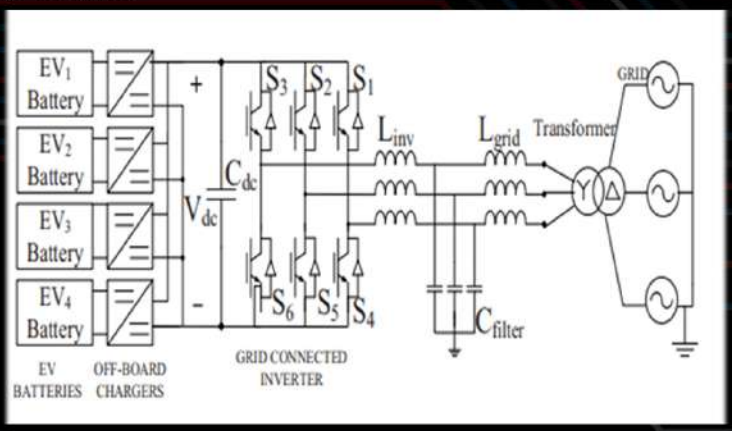
VEHICLE-TO-GRID TECHNOLOGY IN A MICRO-GRID USING DC FAST CHARGING ARCHITECTURE

• Electric Vehicle (EV) batteries can be utilized as potential energy storage devices in micro-grids. They can help in micro-grid energy management by storing energy when there is surplus (Grid-To-Vehicle, G2V) and supplying energy back to the grid (Vehicle-To-Grid, V2G) when there is demand for it.

• Proper and control systems have to be developed in order to realize this concept. Architecture for implementing a V2G-G2V system in a micro-grid using level-3 fast charging of EVs is presented in this project.

• A micro-grid test system is modeled which has a dc fast charging station for interfacing the EVs. Simulation studies are carried out to demonstrate V2G-G2V power transfer.

• Test results show active power regulation in the micro-grid by EV batteries through G2V-V2G modes of operation. The charging station design ensures minimal harmonic distortion of grid injected current and the controller gives good dynamic performance in terms of dc bus voltage stability.



EV CHARGING STATION FOR FAST DC CHARGING

• Vehicle-to-grid (V2G) is a system that lets electric vehicles (EVs) communicate with the public power grid — and even provide electricity back to the grid to meet energy demand.

• EVs spend much of their time plugged in, either at the owner's home or in a parking lot.

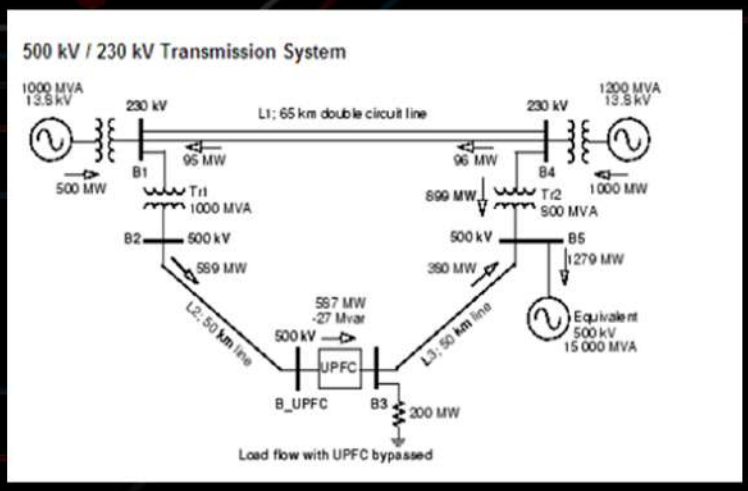
• Vehicle -to-grid helps balance out electricity demand and avoid any unnecessary costs for building an electricity system.

K. Amrutha
20735A0221

POWER QUALITY ENHANCEMENT BY USING UPFC

• The maintenance and reliability of the power system has become a major aspect of study

• The study of UPFC with its various modes of operation Conclusion is created on completely different results to see the power quality improvement and removable of congestion in transmission system using UPFC through MATLAB.



• The impact of increase in industrialization has lead to the tremendous increase in electrical energy demand in order to satisfy the demand there is the need to upgrade the electrical system.

• But up-gradation is extremely difficult, time consuming and expensive.

• Hence FACTS technologies provide optimal alternative solutions. It is generally a power electronics-based system.

• It is meant to enhance controllability and increase power transfer capability of the network.

• Incorporating FACTS devices especially Unified power flow controller (UPFC) the power quality and reliability of system is improved.

• UPFC can provide simultaneous control of real and reactive power flow by modelling the power system in MATLAB- SIMULINK, thereby improving the performance, power quality and reliability of the power system.

CONCLUSION:

In power system transmission, it is desirable to maintain the voltage magnitude, phase angle and line impedance. Therefore, to control the power from one end to another end, this concept of power flow control and voltage injection is applied.

Modeling the system and studying the results have given an indication that UPFC are very useful when it comes to organize and maintain power system. Following conclusions are made

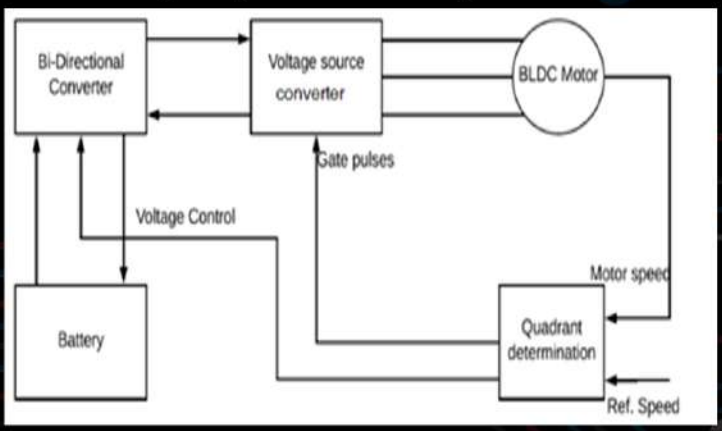
1. Power flow control is achieved and congestion is less.
2. Transient stability is improved.
3. Faster Steady State achievement.
4. Improved Voltage Profile

These are the factors of the power quality. Thus, the power quality was improved.

B. Saritha
19731A0204

FOUR QUADRANT OPERATION AND CONTROL OF THREE PHASE BLDC MOTOR FOR ELECTRIC VEHICLES

* The control of brushless direct current (BLDC) motor in all four quadrants(forward/reverse motoring/braking)with the help of bidirectional DC-DC converter.
*The output of the DC-DC converter is fed to three phase voltage source inverter (VSI) to drive the motor.
* During the motoring mode boost operation through the bi-directional converter of the battery takes place , and during regenerative mode , the mechanical energy is converted into electrical energy and is stored in same chargeable battery through buck operation.
* As electric vehicle operates with frequent start/stop, the scheme proposes recovery of energy for every stopping operation through regenerative braking.



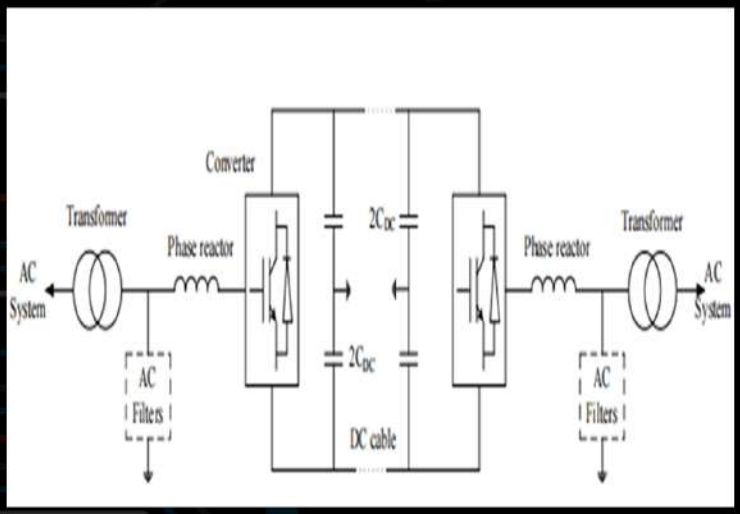
FOUR QUADRANT OPERATIONS:
* A motor drive capable of operating in both directions of rotation and both motoring and regeneration is called a Four quadrant operation.
* In motoring mode, the machine works as a motor and converts the electrical energy into mechanical energy ,supporting.
* In braking mode the machine works as a generator and converts mechanical energy into electrical energy and as a result, it opposes the motion.
* Four quadrant operation depends upon rotation of rotor. Any drives or dc motor means that means the machine operates in four quadrants.
* In the first and third quadrant, both the torque and speed are having the same sign either positive or negative.
The product of angular speed and torque is equal to the power developed by a motor.

CONCLUSION :
• The four quadrant operation is simulated for the electric drive with maximum efficiency keeping in mind the fuel constraint.
• The battery is charged during the regenerative mode and the speed control using the closed loop control is performed.
• The proposed method requires the minimum hardware and the operation can be controlled in all the four quadrants.
• During the regenerative mode, the kinetic energy is returned via the bi-directional converter to charge the battery

A.Sujitha
19731A0201

VOLTAGE SOURCE CONVERTER BASED HVDC TRANSMISSION

• High Voltage Direct Current system based on Voltage Source Converters (VSC-HVDC) is becoming a more effective, solution for long distance power transmission especially for off-shore wind plants and supplying power to remote regions.
• Due to its advantages, it is possible that VSC-HVDC will be one of the most important components of power systems in the future.
• Power transmission using AC system over the past years has proven to be robust and efficient.
• One main problem with respect to AC power transmission is the complexities involved in precise power controllability.

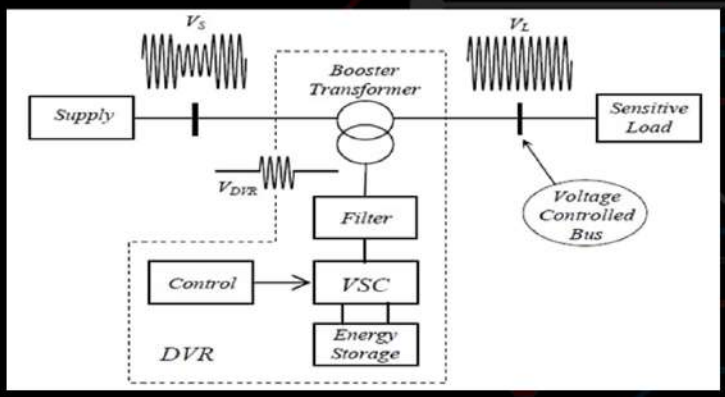


CONCLUSION:
HVDC transmission system suitable for transmitting the power over long range by overhead lines and submarine cables with minimum cost and reliability.

SK.SULTHAN BASHA
19731A0207

POWER QUALITY IMPROVEMENT USING DYNAMIC VOLTAGE RESTORER UNDER VARIOUS FAULT CONDITION

• Power quality improvement has become a very serious concern in present days due to increase in modern sensitive loads connected to the Distribution System.
• Because of non-standard voltage, current or frequency causes a failure of the loads connected to the system.
• Power electronics and advanced control technologies have made it possible to improve the quality of power and operate the sensitive loads.
• Dynamic Voltage Restorer (DVR) is a solution to improve voltage quality, under various fault conditions. which is connected in series with the network.
• The results exhibit clearly the performance of the DVR in voltage quality improvement.

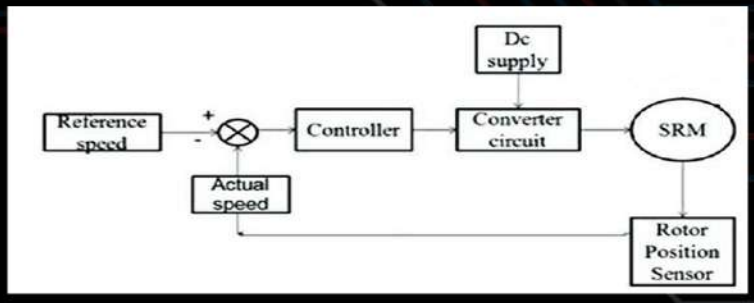


CONCLUSION:
• The simulation shows that the DVR performance is satisfactory in mitigating voltage sags/swells.
• This project introduces detailed overview of Dynamic Voltage Restorer so that young electrical engineers come to know about such a modern custom power device for power quality improvement in future era.
• It can be concluded that DVR improves more effectively the power quality in distribution networks as compared to the other custom power devices.

G.SREEJA
19731A0213

SPEED CONTROL TECHNIQUES OF SRM

The simulation of speed control techniques of switched reluctance motors (SRM) using MATLAB Simulink. Three controllers: P, PI, and PID were used for the simulation and after proper tuning using trial and error, the PID controller gave the best response in terms of reduction in settling time, elimination of steady-state error and minimization of speed overshoot.



CONCLUSION:
• Overall we observed that PID CONTROLLER is the best controlling technique .
• Why because it having the overall functions including P and PI having.
• It reduces the overall ripple content in the output and the SRM will work more efficiently.
• Finally we reduce the Risetime ,Peak time ,Peak over shoot , Settling time.

K.SANGEETHA
19731A0220

DESIGN AND ANALYSIS OF BIDIRECTIONAL BATTERY CHARGER FOR ELECTRIC VEHICLE

• The increase in the electric vehicle mobility has encouraged the growth of vehicle to grid technology. The vehicle to grid technology allows bidirectional power flow between the battery of electric vehicle and grid.
• This allows peak load sharing, load levelling voltage regulation and improvement of power system stability.
• In this project we developed onboard bidirectional battery charger for Electric Vehicles (EVs) targeting Grid-to-Vehicle (G2V), Vehicle-to-Grid (V2G), and Vehicle-to-Home (V2H) technologies.

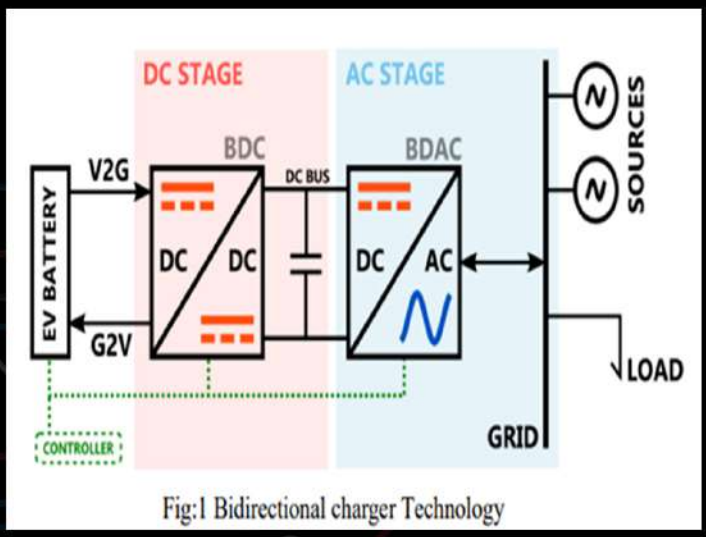


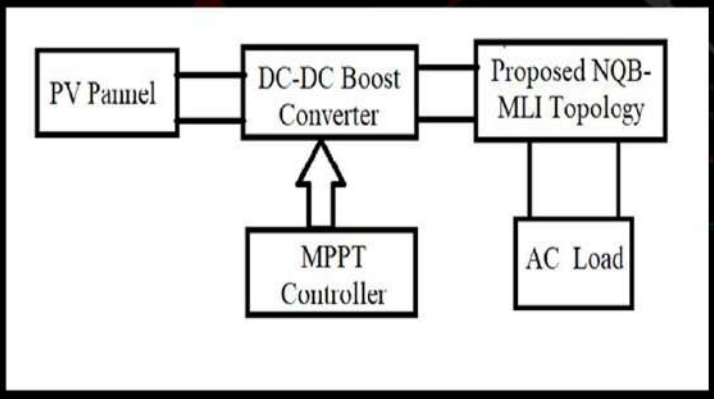
Fig:1 Bidirectional charger Technology

Conclusion:
• The development of an on-board bidirectional battery charger for Electric Vehicles (EVs) capable of work in the operating modes Grid-to-Vehicle (G2V), Vehicle-to-Grid (V2G) which consist in important technologies for targeting the future smart grids scenario.
• The control algorithms of the presented battery charger are validated through computer simulations, using the MATLAB software.
• The experimental results obtained with the three operation modes (G2V, V2G) are in accordance with the expected, validating the viability of the proposed topology.

M. PRASAD REDDY
19731A0223

A NEW SINGLE-SOURCE NINE-LEVEL QUADRUPLE BOOST INVERTER (NQBI) FOR PV APPLICATION

- Multi-level inverters (MLIs) with switched capacitors are becoming popular due to their utilization in AC high-voltage applications as well as in the field of renewable energy.
- To achieve the required magnitude of output voltage, the switched capacitor (SC) technique employs a lesser number of DC sources in accordance with the voltage across the capacitor.
- Designing an efficient high-gain MLI with fewer sources and switches needs a rigorous effort.
- This project, introduces a prototype of a nine-level quadruple boost inverter (NQBI) topology powered by one solar photo-voltaic source using fewer capacitors, switches, and diodes when compared to the other SC-MLIs topology.
- The suggested NQB inverter produces nine levels of voltage in its output by efficiently balancing the voltages of the two capacitors.



CONCLUSION:

- A reduced-switch, nine-level, switched-capacitor-based quadruple boost inverter topology is proposed in this Project. The NQBI is suggested for PV applications by using a solar PV panel as the only source. Though the inverter topology employs two capacitors of unequal voltage rating, the capacitor voltage equilibrium is established without employing an additional voltage balancing strategy. The proposed nine-level inverter topology has several advantages such as performance, total component count, and manufacturing cost. Finally, the results from the simulation show that the proposed NQB inverter-based PV system can work.

V.Pavan Kumar
20735A0209

SYMBOLS USED IN ELECTRICAL ENGINEERING

Frequently used symbols (selection)					
1.		Direct current	18.		Conductor that is installed underground
2.		Alternating current	19.		Conductor installed on the plaster
3.		Direct or alternating current	20.		Conductor installed in the plaster
4.		Series connection	21.		Insulated conductor installed in a pipe
5.		Parallel connection	22.		Fix line connection
6.		Delta connection	23.		Removable line connection
7.		Y-connection	24.		Crossing without connection
8.		Line, generally	25.		Line runs upwards
9.		Line, flexible	26.		Line runs downwards
10.		Number of conductors	27.		Ground, generally
11.	L1 L2	Conductor identification	28.		Protective ground
12.	L3	Outer conductor	29.		Mass
13.	N	Neutral conductor	30.	V	Voltmeter
14.	PE	Protective grounding	31.	A	Ammeter
15.		Transformer	32.		Resistance, generally
16.		Capacitor	33.		Resistance, adjustable
17.		Fuse	34.		Coil

SIMPLE VIEW OF POWER SYSTEM