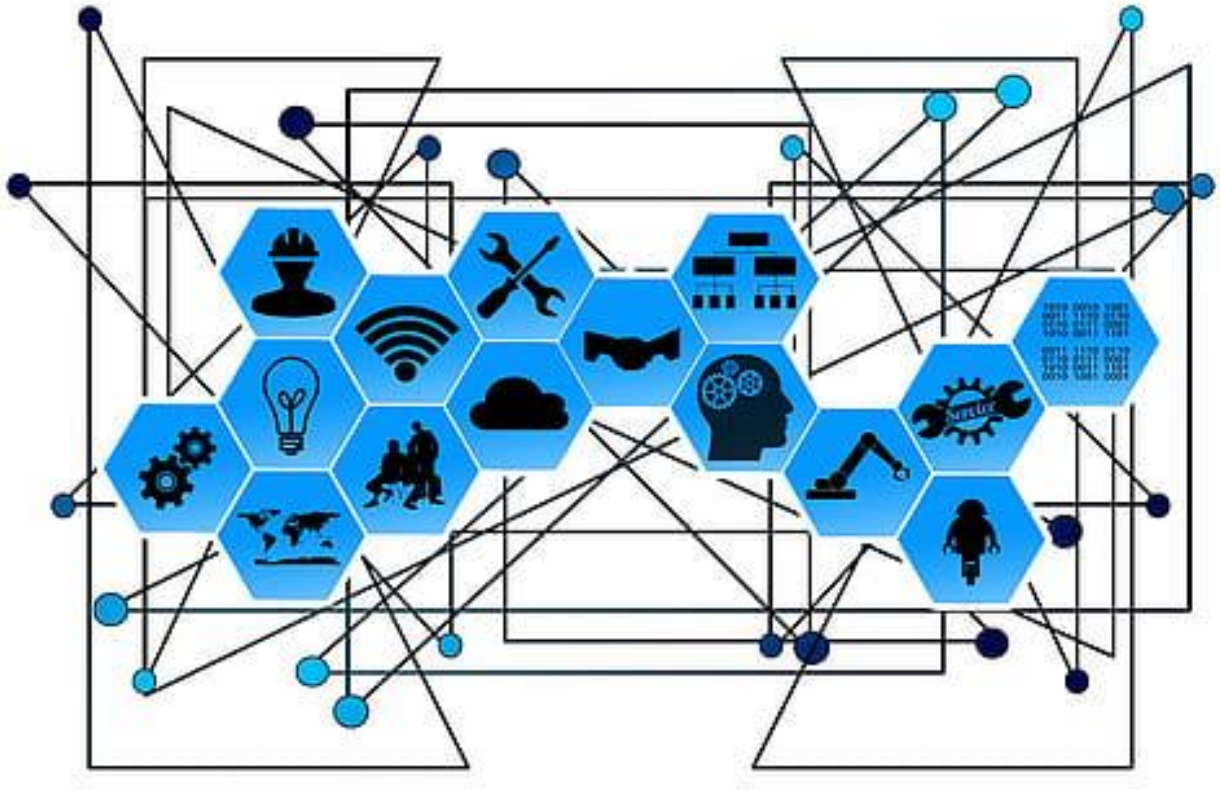

ELECTRO-TRENDS

EDITION VI

2022-23

DEPARTMENT OF ELECTRICAL ENGINEERING
VIVA INSTITUTE OF TECHNOLOGY
VIRAR EAST

OVERVIEW

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THE PRINCIPAL DESK

Dear Readers,

It is a matter of immense pleasure to know that the Department of Electrical Engineering has taken a keen interest to create a common platform for the faculty and students to go beyond classroom activities, to explore new possibilities and collaborate with technology dynamically. I am confident that this magazine will give impetus to research culture amongst students and faculty with emphasis on entrepreneurship.

I congratulate the entire editorial team for their hard work and dedication in giving the requisite shape to this magazine. I hope this magazine will inspire passion among the faculty and students.

I wish them all the very best in their future endeavors as well.

DR. ARUN KUMAR

PRINCIPAL

VIVA INSTITUTE OF TECHNOLOGY

FROM HOD'S DESK

Dear Readers,

Learning is a continuous process. Throughout life, a human being remains a student. Based on the same, the Department of Electrical Engineering of VIVA Institute Of Technology is glad to present in front of you a new technical magazine "ELECTROTREND". In this, we encourage our students and faculty members to present articles on new technologies in engineering going on all across the world. Nowadays technology changes at rapid speed; due to this it's impossible for anyone to survive with his existing knowledge for long term without upgrading to recent trends. It seems to be very important to be in touch with recent trends in engineering. To achieve this effectively faculty members and students need to be motivated to read and write articles based on new technology in engineering. "ELECTRO-TRENDS" is a platform provided by the Department of Electrical Engineering to explore the hidden talents of faculty and students.

The department of electrical engineering also focuses on a high level of teaching quality during lectures and practicals. We also encourage students to participate in workshops, conferences, STTP and technical competitions. "ELECTRO-TRENDS" will help students to grow in all aspects of electrical engineering such as Power system Analysis & Protection, Renewable Energy & its sustainability, Smart grid Technology, Advance trends in Electrical engineering and so on.

At last, I wish to congratulate all members who have participated for making this magazine successful.

PROF. BHUSHAN SAVE

HEAD OF DEPARTMENT

DEPARTMENT OF ELECTRICAL ENGINEERING

DEPARTMENT VISION

To aspire for excellence in imparting quality education in the field of Electrical Engineering with an eagerness of developing a professional mindset along with good human values.

DEPARTMENT MISSION

● To maintain a benchmark in quality of educational standards in the field of Electrical Engineering.

● To provide a platform for exploring a professional mindset.

● To promote ethical practices for developing good human values.

PROGRAMME EDUCATIONAL OBJECTIVES

- To provide students with the knowledge of basic sciences and social sciences in general and Electrical engineering in particular, so as to impart the necessary skills to analyze and synthesize electrical circuits, algorithms and complex apparatus.
- To inculcate in students Professional attitude, effective communication skills and capability to succeed in multi-disciplinary and diverse fields.
- To provide technical knowledge, skills and competence to identify, comprehend and solve problems in industry, research and academics related to power, information and hardware.
- To prepare and inspire the students to become future researchers/scientists with innovative ideas for sustainable development.

CONTENTS

EXPLORING PROJECT TOPICS IN ELECTRICAL ENGINEERING

Graduating Electrical Engineers in various universities all over the country finds challenges , while selecting Topics of their final year Projects. The field of engineering advances with every new technological breakthrough, and new technologies in electrical engineering are particularly exciting. This Article covers some of the most recent new inventions in electrical engineering that will enable students to claim significance of their topic for industry and society.

TOPICS ON APPLICATIONS IN DIFFERENT INDUSTRIES

Graduating electrical engineers can explore Topics on applications across various industries, a few key fields are discussed below.

1. MEDICAL

Notable recent innovations in medical electronic engineering have come in robotics and augmented and virtual reality.

ROBOTICS

One of the most significant recent inventions in medical electronic engineering involves robotic surgery. In minimally invasive procedures, robotic tools are useful because they offer precision, flexibility and extreme control. The result is that surgeons can use automated capabilities to perform surgeries .

VIRTUAL AND AUGMENTED REALITY

The development of virtual and augmented reality (VR/AR) is one of the most influential trends in electrical engineering. In medicine, VR/AR is helpful for providing convalescent patients with an immersive way to participate in rehabilitation exercises. students can engage in projects developing augmented or virtual scenarios to become familiar with new procedures or see 3D representations of difficult-to-visualize human anatomy.

2. CONSUMER

Many recent innovations in consumer electrical engineering have to do with wearable devices and electric vehicle capabilities.

WEARABLE DEVICES

In wearable consumer devices, wireless technology has been making exciting advances. Smartwatches and similar devices help users monitor their health and athletic performance. Wireless technology ,often Bluetooth Low Energy devices that are smaller and more convenient to use because they run on smaller, longer-lasting batteries.

Innovations in wearable devices also have life saving potential in industrial applications.

ELECTRIC VEHICLES

Electric vehicles have steadily been gaining in popularity, and they are almost certainly the vehicles of the future because of their energy efficiency and reduced carbon emissions.

Industry experts predict that the number of electric vehicles on the road will remarkably increase year on year. Heavy investments in electric vehicle technology mean consumers have seen and can anticipate the emergence of various innovative improvements, including more powerful, longer-lasting batteries; enhanced charging technology; genuinely functional autonomous driving; and solar-powered vehicles. There's even the possibility of electric airplanes.

WIRELESS CHARGING

One area of technology that holds particular promise for expanding the electric vehicle market is wireless charging. Wireless charging has some current applications for personal devices like laptops, smartphones and earbuds, and it will likely eventually become standard for electric vehicles as well. An electric car owner will be able to park on a charging spot without the hassle of plugging in the car. Wireless charging docks will also be smaller, so they'll likely become easier and more cost-effective to build.

3. INDUSTRIAL

In the industrial field, a few different innovative technologies are emerging as game-changers. Here is some of the latest technology in electrical engineering for industry:

AUGMENTED REALITY

Advances in augmented reality are taking place substantially for industrial use — 65% of VR/AR companies report that they are working on industrial applications, while only 37% are working on consumer products. VR is useful in industrial facilities because it allows companies to simulate dangerous industrial scenarios without putting their employees through the actual risks. AR is useful because it superimposes data on a real visual to give engineers and technicians real-time information about the industrial systems they're working with and helps them take more informed approaches to repairs and maintenance.

SMART GRID

More and more commercial and industrial consumers can generate their own power and even sell their surplus. This development has changed electrical delivery infrastructure, in part with the advent of smart grids.

Smart grids contain smart devices throughout their infrastructure, including in homes, offices and industrial facilities. These smart devices collect and supply data that allows industrial facilities to analyze trends and make more informed, efficient and cost-effective choices about their electricity use. The devices can predict surges in usage and prepare for the higher demand, and they detect outages at once and notify the personnel who can rectify them.

Perhaps most importantly, the smart grid allows for communication between the power company, distributors and end-users and helps boost efficiency and lower costs by facilitating a quick resolution of any issues.

GRAPHENE SUPERCAPACITORS

Supercapacitors store energy and have higher capacitance values and lower voltage limits than traditional capacitors

and can function somewhat like rechargeable batteries. Graphene supercapacitors are supercapacitors that use graphene in place of activated carbon in their electrodes.

A supercapacitor, which can often store almost as much energy as a lithium-ion battery, offers the advantages of increased energy storage. Supercapacitors allow for the power density of capacitors — they can deliver a lot of energy in quick bursts — while also providing high energy storage capabilities and charging incredibly rapidly. Graphene helps enhance supercapacitors because it is exceptionally conductive, so graphene supercapacitors are ideal for high-frequency applications, whereas traditional supercapacitors are not. Graphene allows for structuring and scaling down, so it has applications in computer processing units (CPUs) and integrated circuits where standard capacitor materials do not.

Graphene supercapacitors may also be able to combine with carbon nanotubes to help connect the geometrically unique graphene structures into a comprehensive network. This combination might reduce costs and boost capacitance and performance.

ARTIFICIAL INTELLIGENCE

Artificial intelligence (AI) can help make electrical engineers' jobs much easier in an industrial setting. They allow for several significant improvements in engineering work, including:

- Constructing AI and machine learning platforms for more complex and capable equipment.
- Crafting complicated algorithms for data analysis.
- Developing new codes or enhancing current code.
- Processing images.

AI image processing, in particular, opens substantial new doors in engineering for industrial applications. Image processing with AI is easier because AI allows for more sophisticated algorithms — they can perform tasks like detecting structural irregularities in equipment and sending feedback to alert facility managers to the necessity of repairs, thereby promoting safety in the workplace.

Dr. Deepak Sajnekar

BRUSHLESS DC MOTORS

Generating motion from electricity is possible in large part thanks to the invention of the electric motor. These highly useful machines have gone through extensive diversification due to the discoveries of recent years, and now come in many varieties based on power supply, mechanism of action, and application. One such design is the brushless DC (BLDC) motor -an advancement on the common DC motor- and uses many principles from AC motors to generate precise, powerful torque. This article will explore the basic functionality of a BLDC motor design, how it works to create power. Using this readers will have a better idea as to when to choose one of these motors.

What are Brushless DC (BLDC) Motors?

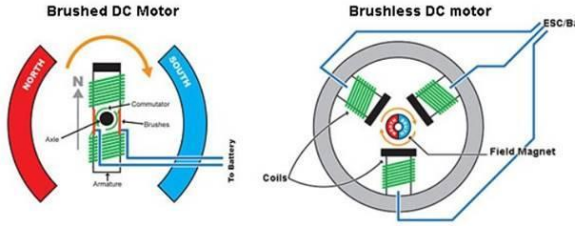
BLDC motors are similar to the permanent magnet motor, brushed DC motor, and synchronous motor, and share many of the same functional principles. A BLDC motor differs from a brushed DC motor in that they do not use brushes and commutator rings. Instead, they are electrically commutated; that is, they leverage the physics of electromagnetism to impart torque on their output shaft. They do this by utilizing permanent magnets on their rotor, which are magnetically attracted to the powered coil windings in the stator. By doing so, the speed of rotation can be altered by simply adjusting the magnitude and direction of the current in the stator coils, and there is no need for brushes or mechanical commutators.

How do BLDC Motors Work?

BLDC motors are different from other DC motors in that their rotor contains no coils, and is simply made of a permanent magnet. The stator contains coils which induce a magnetic field when a current is passed through them. When any given stator coil (or “pole”) is energized, the rotor will align its constant magnetic field to it; in simpler terms, the rotor will be attracted to any powered pole in the stator. Designers have cleverly created electronic commutators that power the stator poles around the rotor on and off in sequence, thus leading the rotor around and causing rotation on the output shaft. This is similar to how AC current creates a rotating magnetic field in AC motors, except that BLDC motors use DC current and electronically switches the current back and forth in each pole, simulating AC phases. While not producing a truly rotating magnetic field, electronic commutation gives the operator exact control over the effective motor speed, which is something induction motors and other AC designs cannot do. By adjusting the magnitude and direction of current flow through the stator, operators can generate a range of speeds and torques, all synchronous to the input frequency.

BLDC Motor Specifications

- Peak, Locked Rotor, & Rated Torque
- Motor Size
- Rated (Nominal) Voltage
- No-Load Speed & Speed Range



Comparison of BLDC and Brushed DC motor

Feature	BLDC motor	Brushed DC motor
Efficiency	High	Moderate
Speed/Torque Characteristics	Flat	Moderately Flat
Output Power-to-Frame Size Ratio	High	Moderate
Dynamic Response	Fast	Slow
Speed Range	High	Low
Lifetime	Long	Short

As seen above, it is abundantly clear that BLDC motors have many benefits over both brushless and AC induction motors. These advantages come at a literal cost, however; due to their construction and need for electrical commutation circuits, these motors are buy-and-large more expensive than most other electric motors of the same size. So, while they provide great characteristics over more popular motors, it is held back by a financial barrier of entry.

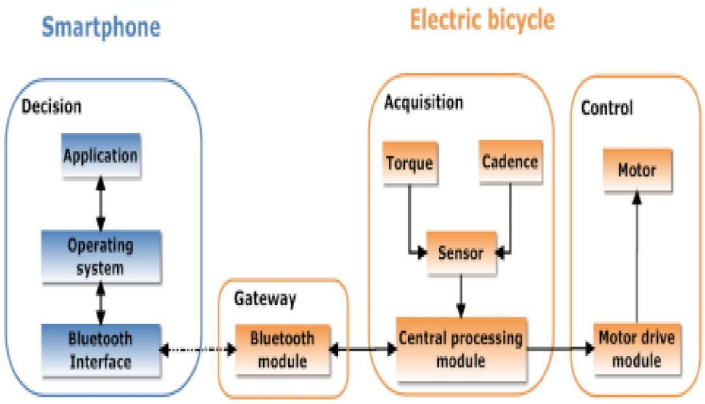
Summary

This article presented an understanding of what brushless DC motors are and how they work.

Prof. Anojkumar Yadav

E- BICYCLE WITH MOBILE LINKAGE

The main parts of the planned system area unit a smartphone and an electrical bicycle, as shown in Fig. The smartphone contains a call block, whereas the bicycle integrates a buying deal block composed by a central processing module and sensors; an effect block containing the motor drive module and also the motor; and an entry. The developed application on the smartphone interfaces with the user and implements the trouble management algorithmic rule, which is to blame for the choice relating to the motor assistance level to be applied, at every moment, during the cycling activity, supported predefined user profiles. This application uses Bluetooth to speak with the bicycle. The central processing module of the acquisition block is responsible for periodic reading and pre-processing of the torque signal, which is necessary for implementation of the effort control method based on the pedaling resistance. This signal is obtained from a torque and cadence sensor, and is sent to the smartphone application using the gateway (Bluetooth module). The cadence signal is not used in the context of this effort control method.



Prof. Mukeshkumar Mishra

ELECTRICAL SAFETY: A KEY POINT FOR THE USERS

Electricity can kill or severely injure people and cause damage to property. However, you can take simple precautions when working with or near electricity and electrical equipment to significantly reduce the risk of injury to you, your workers and others around you. This section provides a summary of those precautions.

What Are The Hazards?

- electric shock and burns from contact with live parts
- injury from exposure to arcing, fire from faulty electrical equipment or installations
- explosion caused by unsuitable electrical apparatus or static electricity igniting flammable vapors or dusts, for example in a spray paint booth

What Do I Have To Do?

You must ensure an assessment has been made of any electrical hazards, which covers:

- who could be harmed by them
- how the level of risk has been established
- the precautions taken to control that risk

The risk assessment should take into consideration the type of electrical equipment used, the way in which it is used and the environment that it is used in.

You must make sure that the electrical installation and the electrical equipment is suitable for its intended use and the conditions in which it is operated only used for its intended purpose

In wet surroundings, unsuitable equipment can become live and make its surroundings live too. Fuses, circuit-breakers and other devices must be correctly rated for the circuit they protect. Isolators and fuse-box cases should be kept closed and, if possible, locked.

Cables, plugs, sockets and fittings must be robust enough and adequately protected for the working environment. Ensure that machinery has an accessible switch or isolator to cut off the power quickly in an emergency.

Maintenance

So far as is reasonably practicable , you must make sure that electrical equipment and installations are maintained to prevent danger. Users of electrical equipment, including portable appliances, should carry out visual checks. Remove the equipment from use immediately and check it, repair it or replace it if the plug or connector is damaged, the cable has been repaired with tape, is not secure, or internal wires are visible etc

Repairs should only be carried out by a competent person (someone who has the necessary skills, knowledge and experience to carry out the work safely).

Have more frequent checks for items more likely to become damaged (e.g. portable electrical tools and equipment that is regularly moved, or used frequently or in arduous environments). Less frequent checks are needed for equipment less likely to become damaged (e.g. desktop computers etc).

Key Points To Remember

- Ensure that workers know how to use the electrical equipment safely
- Make sure enough sockets are available. Check that socket outlets are not overloaded by using unfused adaptors as this can cause fires
- Ensure there are no trailing cables that can cause people to trip or fall
- Switch off and unplug appliances before cleaning or adjusting them
- Make sure anyone working with electricity has sufficient skills, knowledge and experience to do so. Incorrectly wiring a plug can be dangerous and lead to fatal accidents or fires
- Stop using equipment immediately if it appears to be faulty – have it checked by a competent person
- Ensure any electrical equipment brought to work by employees, or any hired or borrowed, is suitable for use before using it and remains suitable by being maintained as necessary
- Consider using a residual current device (RCD) between the electrical supply and the equipment, especially when working outdoors, or within a wet or confined place

Overhead Electric Lines

Be aware of the dangers of working near or underneath overhead power lines. Electricity can flash over from them, even though machinery or equipment may not touch them

Don't work under them when equipment (e.g. ladders, a crane jib, a tipper-lorry body or a scaffold pole) could come within a minimum of six meters of a power line without getting advice. Speak to the line owner, eg the electricity company, railway company or tram operator, before any work begins

Underground Cables

Always assume cables will be present when digging in the street, pavement and/or near buildings

Consult local electricity companies and service plans to identify where cables are located

Prof. Chitralekha Vangala

RENEWABLE ENERGY TRENDS FOR SUSTAINABLE ENVIRONMENT

The world is gradually shifting toward renewable energy sources to power up homes and businesses. The reason is evident – to save the environment from the harmful effects of carbon emissions. Solar, water, wind, and geothermal are some of the popular renewable energy sources that are helping people go green.

Need Of Sustainable Environment

There is a need for a sustainable environment and this can be achieved through renewable energy sources. The use of renewable energy can help to preserve the environment. It is important to find ways to use energy efficiently and to reduce waste. There are many ways to generate renewable energy, including solar, wind, biomass, and hydro power.

Latest Trend In Solar Pv Array

The latest trend in solar PV array is the development of bifacial solar cells. Bifacial solar cells are able to absorb light from both the front and back sides of the cell, which increases the efficiency of the cell. This technology is still in its early stages of development, but it has the potential to revolutionize the solar PV industry.

Latest Trend In Wind Energy

Wind energy is one of the most promising renewable energy sources available today. It's clean, efficient, and increasingly affordable. And as the demand for renewable energy grows, so does the demand for wind energy.

According to the latest data from the U.S. Department of Energy, wind power capacity in the United States has more than tripled over the past decade. In 2018, wind power generated about 6 percent of all electricity produced in the country.

There are many reasons for this rapid growth. One is that wind turbines are getting larger and more efficient. Today's turbines can generate twice as much electricity as those built just a few years ago. Another reason is that the cost of wind energy has fallen dramatically. The price of wind turbines has dropped by

more than 90 percent since the early 1980s. And as wind energy becomes more popular, economies of scale are helping to drive down costs even further.

In many parts of the country, wind energy is now cheaper than coal-fired power. That's good news for the environment, because burning coal releases harmful pollutants into the air. As the cost of renewable energy continues to fall, it's likely that even.

Prof. Rahul Abhyankar

CLOUD ADOPTION IN ELECTRICITY TRANSMISSION

Power utilities are the backbone of a country's infrastructure that fuel economic progress in all domains. With changing dynamics including regulations, disruptive technologies and consumer expectations, utilities are evolving continuously to cater to these dynamics, and are placing emphasis in customer engagement, information technology (IT) transformation, operational technology (OT) and work and asset value management. While power generation utilities focus on meeting the supply commitments and distribution utilities strive to provide uninterrupted power supply to end consumers, electricity transmission utilities provide the infrastructure required to deliver electricity from generation sources to distribution utilities. This article give an overview of how to utilize cloud based services to support electricity transmission utilities in achieving business priorities and key performance indicators.

Different customers choose different paths to migrate to the cloud. While there are customers who were entitled in the cloud, there are customers who moved their workloads from on premise data center to cloud. Migration to the cloud can be taken up as a three-phase process. While each phase is a common component of a successful migration, they are not discrete phases, but an iterative process.

Multiple tools are available on cloud which can be leveraged by customers – such as migration evaluation, total cost of ownership calculator, architectural best practices, database migration services, hardware based data migration tools etc.

Assess

Assess the organization's current readiness for operating in the cloud. Most importantly, identify the desired business outcomes and develop the business case for migration. Once a business case is established, review the migration and modernization strategies, guides, and patterns to plan next steps.

Mobilize

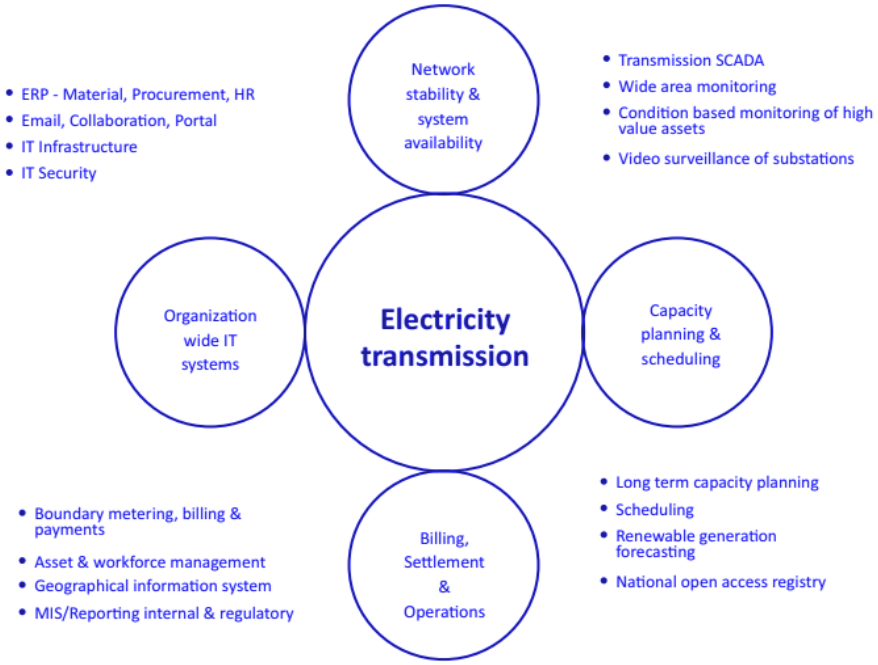
Create a migration plan and refine the business case. The address gaps in the organization's readiness that were uncovered in the assess phase, with a focus on building a baseline environment (the “landing zone”), driving operational readiness, and developing cloud skills. To maximize the benefits of moving to the cloud, freedom and agility to innovate should be given to the teams, but also enforce controls to protect the organization from risk.

Migrate and Modernize

During the migrate and modernize phase, each application is designed, migrated,

and validated. For many applications, the best approach is to rapidly move to cloud and then re-architect using cloud services. These cloud services can be used to quickly lift and shift (rehost) a large number of servers from physical, virtual, or cloud infrastructure to cloud.

In addition to migration of applications from on-premise to cloud or building application on cloud using cloud services, utilities can also opt for packaged solutions from cloud marketplace. Cloud solution providers maintain a digital catalog with thousands of software listings from categories like security, data and analytics and other areas for different industries. This reduces the time to implement and increases the speed and agility to move from idea to implementation.



Prof. Ritesh Chavan

SMART GRID

Reference

COURTNEY WON

Article Summary

In its current state, the power grid is mostly non-automated and has little communication between the technology and the power provider. This can prove to be a problem both in terms of safety and also sustainability. Combining knowledge of electrical systems and control technology, the power grid can be updated and greater communication can be established between the various components and controllers. Updating the technology currently used in the power grid can help make electricity production, distribution and consumption safer and more effective. Current technology can also be updated and new technology can be implemented to solve the communication problem and create a better and more interconnected power grid that is robust and efficient.

Introduction

When most people hear the words, 'Smart Grid', what comes to mind? A 'smart grid' of what? In this case, the phrase, 'smart grid' refers to a 'smart' electrical grid. First, lets define what an electrical grid is. An electrical grid is what allows electricity to be delivered from a power plant in the area to a residential or commercial building. The electrical grid powers pretty much everything, from the lights in a house to the charging stations for electrical cars like the Tesla. The electrical grid is an interconnected network that takes large amounts of power generated in power plants and spreads it across the area to the many homes and businesses that rely on electricity. In the United States, the electrical grid spreads from coast to coast. Power generated in Oregon and Seattle can travel down the west coast to southern California. A recent statistic from the Edison Electric Institute, states that there are more than 450,000 miles of high power transmission lines in use (Edison Electric Institute).

The smart grid is the future of the current power grid. At present, the power grid in the US is quite old. The different components and parts have been around for decades. Technology has advanced quite far since then so the next step is to update the grid. This means allowing the different components in the smart grid to 'communicate' with each other via a two-way communication channel. This way the grid can monitor itself for problems and sense when something happens anywhere in the connected smart grid (US Dept. of Energy). This is why it is called a 'smart grid'. It also allows humans to accurately monitor and respond to problems. There will be more information on the smart grid later in this article, but first, a little history about the power grid currently in place.

History of the Grid

In 1879, Thomas Edison created the first electric light bulb. From 1880 to 1882, the Edison Electric Illuminating Company and also the first power plant, the Pearl Street Station, were created. The Pearl Street Station was tiny compared to the scale at which power is generated now. It generated enough electricity to power 800 of Edison's light bulbs using DC (direct current) power. However, DC had a problem, as more light bulbs were connected into the system, the power would fluctuate. Therefore, in 1884, AC (alternating current) was invented. The first AC power station and connected power grid was created in 1886. This system allowed many different devices to be connected at the same time without any large fluctuations to the power.

Over time, the size of the power generation stations grew to handle a larger amount of electrically powered devices. The power grids expanded from a few neighborhood blocks to the size of cities, then from cities to states and from states to the whole of the continental US. In the 1930's, the electrical system that we see today had been established. Currently, the US power grid is split into three different grids: the Western Interconnection, the Eastern Interconnection, and the Texas Interconnection. Despite being three separate grids in name, these three grids are still very much interconnected with each other (US Dept. of Energy).

The electric grid draws its strength from being so interconnected. Like a web of interconnecting roads, if a power outage occurs in one path, another path can be chosen to divert the power and contain the outage to the smallest area necessary. This allows the US power grid to have 99.97% reliability.

Most power grids today around the world follow the same format. The general equation for a standard power grid starts first with the generating power plant. Here, electricity is generated through a variety of ways such as coal, oil, and nuclear, as well as cleaner options such as wind, water, and solar power. The power plants generate very high amounts of electricity that run down through long 'transmission lines' usually across many miles. There are both AC (alternating current) and DC (direct current) transmission lines. In general, AC is the more common method of transmitting power and DC transmission lines require a DC-to-AC converter before they are transitioned into distribution power lines. Before the power can get to the residential and commercial buildings, it has to be 'diluted' and distributed. This dilution takes place because the power in the transmission lines is way too large to be used by normal household appliances. Therefore, a piece of equipment called a 'transformer' is used to step the power down to a voltage that regular appliances can use. These transformers are held in a 'substation', which takes in many different high voltage lines and splits them up into a larger number of lower voltage lines. There are many different voltages that the substations 'step down'. The higher the voltage, the longer it can travel.

Therefore, there are multiple 'step down's that the power must take as it goes from a transmission line, to the distribution lines. From the substation, the lines then go to the various houses and buildings that are connected to the power grid each with their own voltage meter to measure their power usage.

However, the current power grid is old. The technology that supports the grid has been around for decades and some parts have never been replaced, just constantly patched up. As the population in the US grows and cities expand further and further, there are larger demands on the power grid. Everyone needs electricity in this current age, and the dependence is only growing. Many power outages that occur can be prevented if the different service providers communicated between each other to balance the electrical load and prevent overloading of certain areas. This is where the smart grid can help!

Benefits of the Smart Grid

There are many benefits to using and developing smart grid technology. By implementing newer and more sophisticated technology, the current power grid can be updated and streamlined. There are a couple of ways that smart grid technology can help!

Many of the technologies that exist today are not computerized or automated. When the grid was first installed in the beginning of the 20th century, not many people were thinking about a long-term plan. Many of the electrical lines were installed as the need for power grew, but there wasn't much planning concerning the placement of power lines or distribution stations. This resulted in a wide web of power lines that are sometimes not the most efficient or coordinated. The scale at which the power grid has grown is enormous and each day more and more users are being added on. By comparison, the amount of new infrastructure that is being built is lessening. This creates a huge load on the existing power grid. Many of the current power components are old and as the power in the lines is increased to a larger and larger load, these older components cannot handle the increased power. This overload of power consumption can lead to an increased number of blackouts and power outages in certain areas with weak or old infrastructure.

This is where the new smart grid technology can be helpful. If components are equipped to communicate with each other and also with a central control center, the electric load can be maintained and balanced. Therefore, if a piece of equipment fails or a transmission line has a fault (where the flow of current is disrupted), sensing equipment can send a message to the central control center. The central control center can then communicate with other transmission lines and equipment around the area to reroute power to the affected area. This will help isolate and shrink the areas that are affected by power outages. It also helps to accurately locate and detect the exact location of the problem in the system (US Dept. of Energy). That means faster response times to fix the equipment or repair the power line.

This communication between components is an up and coming idea that has spread throughout the technological world. Advances in wired and wireless technology are common now and it feels like every other day, there is a newer, faster and easier way to communicate. With the advent of the world wide web and smartphones, regular people can now talk with each other halfway across the world, while also setting the temperature in their home, driving in their Bluetooth enabled car. Smart communication between objects is expected in the present day. If there is communication between the consumer and the electrical grid, this would allow people to be more sustainable as they watch the electrical consumption of their house while their away, or turn off certain appliances that are using too much energy. This could lead to better and more efficient energy consumption by the consumer and businesses, which will lead to less of a strain on the electrical grid, and also less consumption of coal and gas power.

Communication between components in a power grid is very important, but another very important aspect of the smart grid is automation. Automation works together with communication to create a more reliable system. "Traditionally, the operation of the power transmission and distribution grids [is] performed mainly manually" (Strasser, Kastner, 2013). Workers are required to look for meters, breaks in the transmission line and power outages. There are even certain areas where the power companies don't know about an outage until someone calls it in. This is a very slow system as it takes time to locate the power outage and then determine the cause of it. Automation would allow devices attached to the grid to constantly update and report their conditions. They would also be able to be controlled by a central control center. This means that to reroute power from one area to another, ground workers do not have to physically be there to switch the distribution of power. Instead, a central control room or center could flip the switches from wherever they are, almost immediately fixing the outage rather than having to wait for the ground workers to arrive at the scene.

Who does the smart grid impact?

The smart grid will have a huge impact for many people and companies. First and most importantly, it will help the consumers, the people and businesses who rely on the distribution of electrical power to run their lights, heating, computers etc. The extra reliability of the new smart grid and also the fast response time to power disruptions will mean less and shorter power outages. Power suppliers will also be affected. The current technology that is in place relies heavily on manual labor to manually switch and divert power. Complete automation and communication of the grid would allow companies to save costs of manual work and also provide a safer work environment to their current workers. This would allow power companies to potentially lower costs for their customers.

Smart Grid Implementation: A Case Study

One company that is leading the way in the implementation of the smart grid technology is Southern California Edison, which is based in Los Angeles, California. In 2007, the company started the 'Smart Grid Roadmap' to switch their ageing power grid over to a newer, better and smarter one (SCE, 2010). They outline their definition of the goal, "SCE defines the smart grid as an increasingly intelligent and highly automated electric power system that utilizes technology advancements in telecommunications, information, computing, sensing, controls, materials, in addition to other grid technologies" (SCE, 2010). A link the outline of the plan is provided in the bibliography. SCE planned to have new technologies installed such as advanced sensors and controllers, transformers with superconducting material, and 4G wireless broadband communication to many of their sites.

This plan is to be implemented in five stages that covers the transmission of power, distribution of power and customer related technologies (SCE, 2010). The five stages are: foundation, inform and automate, interactive, and intuitive and trans-active grid. The first stage was mostly an instrument driven stage without much automation or communication. The second stage is focused on the customer. As of the beginning of 2013, SCE has distributed 'smart' power meters to every one of its customers. These smart meters are connected to the internet and can communicate back and forth with the customer. Therefore, users get real time updates of their energy usage through the internet. This is especially helpful in California where the heat in the summer leads to huge amounts of power needed to power AC units and other temperature controlling devices. Customers can now track how much energy their home is using throughout the day and can work to reduce their power consumption to help cut costs and save energy. This is an important step in the communication process as it has connected one part of the smart grid to the internet and therefore allowed for real time dialogue (GreentechGrid). For more information, look at the article related to the 'Internet of Things'. The third stage of the plan will be the full automation of the smart grid. This "Grid 2.0" will consist of better hardware and software technology. Therefore, better power grid components as well as high functioning algorithms and programs that will decide how to react to certain events.

One of the other considerations that SCE has to make is the integration of new 'clean energy' power sources.

Clean Energy and the Smart Grid

There are many types of 'clean' or renewable energy technologies that exist today. One of the most popular is solar power. Many homes and businesses are installing solar panels on their roofs to generate power. These are small-scale energy providers that can usually power part of a building's energy needs. There are also larger scale power generation sites that are called 'intermittent

renewables'. This is because they don't generate a constant stream of power. Renewable energy sources, such as solar and wind, are not predictable or constant. Some days might have no wind and be cloudy, while other days might have a lot of sun and wind. This means that there is no way to predict when a surge in power will come. Therefore, it is very important to have smart grid technologies that can update and communicate in real-time. If a power surge spikes, the smart grid has to be ready to distribute that power throughout the system. There are currently many plans that have been proposed to help design a smart grid system that has renewable energy sources. For more information about renewable energy sources, look at the related articles.

In Denmark, there is a large focus on renewable energy source such as solar and wind turbines. These sources of energy are weather dependent, which, as explained above, do not give out a constant stream of power. This can be an issue, because power consumers and customers have a certain set of energy use patterns, which pulls a lot of power out of the grid (Blaabjerg, Guerrero, 2011). At the same time, the wind and solar energy production might not have the same timing to give increased amounts of power to the grid when the customers demand it. Therefore, it is crucial to find a way to create a balance between the two.

A new technology that was just announced is the Tesla Home Battery, the Powerwall. This product is currently not being produced but proposes to allow a home to be smarter in its energy usage. This battery keeps track of the power load on the power grid as well as the power of the sun. By monitoring the power grid, it can track electricity rates and when the load on the electrical grid is high (usually morning and evening), the battery will power the home using energy from its stored power (Tesla Motors, 2015). This will help consumers reduce their energy rates and also help the power grid from becoming too overloaded, which could result in a power outage. At the same time, the battery also monitors the sun's energy and during periods of peak solar power, it will draw clean energy from solar panels to supplement its stored power. This is helpful because the sun usually has the most power at midday, but most families are at work or school, so the solar energy generated isn't used. This battery can store the unused power to then power the house during the morning and the evening when a home's energy consumption is the greatest.

Smart Grid and Developing Countries

For much of this article, the focus has been on the US and how to go forward to upgrade the current power grid to a smart grid. There are also other areas where smart grids can make a large impact. Developing countries have a huge need for better technologies to help to prevent problems such as voltage sags, blackouts, power overloads as well as old equipment. There are many ways that a smart grid implementation can help the current infrastructure have a higher reliability.

Conclusion

In conclusion, the smart grid is a necessary next step to the current US power grid. The many benefits that the new technology can bring are very important to keeping up with the energy demand that is only growing. Greater communication between components and more automation of the power grid system can only be accomplished with innovations in electrical and computer engineering knowledge.

Bibliography

- Andren, F.; Strasser, T.; Kastner, W., (2013) "Towards a common modeling approach for Smart Grid automation," Industrial Electronics Society, IECON 2013 – 39th Annual Conference of the IEEE , vol., no., pp.5340,5346, 10-13 Nov. 2013. DOI: 10.1109/IECON.2013.6700004
- Blaabjerg, F.; Guerrero, J.M., (2011) "Smart grid and renewable energy systems," Electrical Machines and Systems (ICEMS), 2011 International Conference on , vol., no., pp.1,10, 20-23 Aug. 2011. DOI: 10.1109/ICEMS.2011.6073290
- Edison Electric Institute, "Electricity 101", Retrieved from http://www.eei.org/electricity101/pages/history.aspx
- IEEE. (n.d.) "Smart Grid Experts, Information, News & Conferences." [Web page] Retrieved from http://smartgrid.ieee.org/
- Klaassen, E.A.M.; Asare-Bediako, B.; Kling, W.L.; Balkema, A.J., (2013) "Application of smart grid technologies in developing areas," Power and Energy Society General Meeting (PES), 2013 IEEE , vol., no., pp.1,5, 21-25 July 2013. DOI: 10.1109/PESMG.2013.6672988
- National Institute of Standards and Technology. (n.d.) "Smart Grid: A Beginner's Guide," Retrieved from http://www.nist.gov/smartgrid/
- Southern California Edison. (2010) "Southern California Edison Smart Grid Strategy & Roadmap". Retrieved from https://www.smartgrid.gov/sites/default/files/doc/files/Southern_California_Edison_Smart_Grid_Strategy_Roadmap_201012.pdf
- Tesla Motors. (n.d.) "Powerwall | Tesla Home Battery." Retrieved from http://www.teslamotors.com/powerwll

Prof. Sangita Kamble

IMPORTANCE OF SIMULATION IN ELECTRICAL ENGINEERING

As technology advances, so does the need for accuracy and precision in electrical engineering. That's where simulation comes in. By using software to simulate real-world scenarios, engineers can test out designs and see how they perform under various conditions.

Simulation is an important tool for electrical engineers, and with the right software, it can be used to great effect. In this article, we'll take a look at the importance of simulation in electrical engineering and some of the best software options out there.

High Frequency Simulation

As an electrical engineer, you know that simulation is a powerful tool to help you design and test circuits. But what about high frequency simulation?

At high frequencies, traditional simulations can start to break down. That's why it's important to understand the limitations of your simulator and how to overcome them.

One challenge with high frequency simulation is that the wavelength of the signal becomes comparable to the size of the components in your circuit. This can cause problems with your simulation results not matching reality.

To overcome this, you need to use a simulator that can take into account the physical effects of these smaller dimensions. An example of such a simulator is HFSS from ANSYS.

HFSS uses the finite element method (FEM) to simulate electromagnetic fields. This makes it very accurate for predicting the behavior of circuits at high frequencies.

Another issue with simulating at high frequencies is that traditional simulations assume that all components are linear. But at RF and microwave frequencies, many components are nonlinear. This means that they don't follow Ohm's law anymore and their behavior cannot be predicted using linear simulation techniques.

Low Frequency Simulation

Simulation is important for electrical engineering because it allows engineers to test designs and see how they will perform in real-world conditions. Simulation can help engineers identify problems with a design before it is built, saving time and money.

One type of simulation that is particularly important for electrical engineering is low frequency simulation. This type of simulation can help engineers understand how a design will behave at low frequencies, which are common in many electrical applications. Low frequency simulation is essential for ensuring that a design will work as intended in the real world.

Multiphysics

Multiphysics simulation is an important tool for electrical engineers. It allows engineers to understand the behavior of systems that include multiple physical phenomena, and to design more efficient and reliable products.

Multiphysics simulation can help engineers optimize the performance of electrical systems by understanding the interactions between different physical phenomena. For example, in a power system, engineers need to consider the electrical, thermal, and mechanical behavior of the system. Multiphysics simulation can help engineers identify potential problems and optimize the design of the system.

In addition, multiphysics simulation can be used to study the reliability of electrical systems. By understanding how different physical phenomena can affect the behavior of a system, engineers can design more reliable products.

Overall, multiphysics simulation is a powerful tool that can help electrical engineers design more efficient and reliable products.

Prof. Tejas Sankpal

BRUSHLESS DC MOTOR

A Brushless Direct Current Motor or commonly known as a BLDC Motor is powered by DC voltage and commutated electronically and not by brushes as in traditional DC motors. Although these are in trend nowadays, they were invented in the 1960s when semiconducting devices were developed.

As the name suggests, it does not require brushes for commutation. Commutation is nothing but the act of changing motor phase current at the appropriate times to produce rotational torque. A conventional DC motor uses carbon brushes that wear out over time and may cause sparking. A BLDC motor uses a sensor and commutator as it is needed to know the position of the rotor to produce rotational torque. This is achieved by the use of hall sensors. BLDC motors can be single phases, two phases, or three phases. Out of this 3-phase, BLDC motors are most widely used. On the basis of construction, BLDC motors can also be designed in two types: inner rotor and outer rotor.

Torque Speed Characteristics

For a BLDC motor, the torque is constant for a range of speed up to the rated speed. The BLDC motor can be loaded up to the rated torque. The rotor can be rotated at a higher speed than the rated speed but the torque starts to drop. Peak Torque (Tp) and Rated Torque (Tr) are the two torque parameters considered for torque speed characteristics of BLDC motor.

It works on a similar principle to that of the traditional DC motor. When the stator winding is switched by a DC supply it acts as an electromagnet that produces a uniform field. Though the supply is DC, the switching makes it a square ware or a trapezoidal shape wave. The permanent magnet on the rotor experiences a force due to which it starts to rotate. The hall sensor on the stator senses the poles of magnets.

Advantages of BLDC motors

A) Due to the absence of brushes, losses and other problems related to it are not present in this motor.
B) Maintenance is less because there are no brushes as a commutator.
C) They have high dynamic responses.
D) High efficiency, as the magnets are the rotor.
E) High torque and high speed even when loaded.
F) Compared to conventional DC or AC motors they are lightweight, small, and have quiet operation. A major drawback of these motors is their cost. The electronic circuitry to control the BLDC motor is complex and expensive.

Applications

Nowadays many new applications are available for BLDC motors, the most common known application is of BLDC Fans. Along with that, they are also used in pumps and blowers. Where there is a constant load. Other applications are where there is varying load, where the

motor varies over a range of speed, with high dynamic response and high-speed control. Eg, electric vehicles, dryers, washers, compressors, electric steering, robotics, and gyroscopes. These have a feedback control or close loop control.

There is a trend in HVAC and refrigeration industries where BLDC motors are used rather than AC motors. The reason is the power required to run DC is dramatically less. BLDC motors also have higher efficiency as compared to AC motors.

Shubh Arekar

Student

BE Electrical

EMERGING TRENDS IN RENEWABLE RESOURCES IN INDIA

INTRODUCTION

Fossil fuels are declining and creating more pollution due to which global warming is a major concern and furthermore power demand is increasing day by day. There is a critical need to find alternative sources for generating electricity. Energy production from renewable energy resources becomes the best resolution in the present condition. As renewable energy resources are clean, green and not exhaustible energy. The world will have a rapid and global changeover to renewable energy technologies to attain sustainable growth and avoid catastrophic climate change. India has set an ambitious target of 450 GW of renewable energy by 2030.This is one of the world's largest expansion plans in renewable energy.

METHODS OF RENEWABLE RESOURCES

SOLAR ENERGY

Solar energy has emerged as the most eco-friendly and reliable option for India to cater to the energy requirements of one and all— including the 50% of its rural inhabitants who still live without electricity. One can easily install a Solar PV System with proper tools and basic knowledge of Solar Photovoltaic application. Quite a few people were already aware of its benefits and were really quick at setting their properties up with solar systems; in fact, the utilization of solar energy in India is nothing new and has existed in select locations for quite some time now. However, it has yet to pick up steady momentum.

The Future of Solar Energy considers only the two widely recognized classes of technologies for converting solar energy into electricity — photovoltaics (PV) and concentrated solar power (CSP), sometimes called solar thermal) — in their current and plausible future forms. Because energy supply facilities typically last several decades,technologies in these classes will dominate solar- powered generation between now and 2050.

WIND ENERGY

Wind Energy can help produce highly affordable green hydrogen and green ammonia which are touted as future fuels. Wind Energy along with hybrid and storage systems in sync with other renewable sources will be key in producing enough green electricity to power India’s e-mobility revolution. By the end of 2020 global wind energy installations stood at 743GW and are slated to grow to over 1212 GW by 2025. That is a nearly 63% capacity addition in just five years. That is nothing short of a revolution. This would mean that annually, more than 700 million homes will be powered and 3000 million tonnes of CO2 emissions will be reduced by Wind Energy generations alone by 2025.

Considered much cheaper than solar, wind energy is globally emerging as a favorite option, especially when energy is a major expense. This change is purely driven by improved economics of wind energy and a shift from dependence on fiscal benefits. National concerns and leadership thrust on energy security, emissions reduction and cost-effective generation also makes wind energy the preferred choice.

HYDRO ENERGY

India has an estimated hydropower potential of 1,45,320 MW, excluding small hydro projects. At the end of February 2020, installed capacity was about 45,700 MW. Several hydroelectric projects (HEPs) in India are languishing due to contractual conflicts, environmental litigations, local disturbances, financial stress and unwilling purchasers. Hydropower potential is located mainly in northern and north-eastern regions. Arunachal Pradesh has the largest unexploited hydropower potential of 47 GW, followed by Uttarakhand with 12 GW. As water and water power are State subjects, the construction of HEPs is often delayed due to conflicts among riparian States — the Subansiri HEP is a prime example of this. Unexploited potential is mainly along three river systems — the Indus, Ganges and Brahmaputra. India has several international issues across these river systems. Like electricity, hydropower should also be brought on the concurrent list to formulate uniform policy and process for faster development.

With huge hydro potential in the country, especially in the Northern States, hydropower generation may be emphasized and pressed in to augment ever increasing energy demand. The emphasis should be on small hydropower (SHP) as construction of large hydropower involves huge capital cost and they are associated with various techno-economic and social issues.

BIO ENERGY

According to a study sponsored by the MNRE, biomass availability in India could translate to a potential of about 28 GW. In addition, about 14 GW additional power could be generated through bagasse-based cogeneration in the country's 550 sugar mills, if they adopt technically and economically optimal levels of cogeneration for extracting power from the bagasse produced by them. However, India has not scaled its ambition in the biomass sector, despite its potential and even as India is eyeing more from solar and wind power sectors. From the target of having 100 GW from solar and 60 GW from wind in 2022, India has an ambitious plan of 280 GW of solar and 140 GW from wind to reach 450 GW installed capacity of renewable energy by 2030. The share of biomass power by 2030, however, remains at 10 GW only due to factors such as seasonal fuel availability.

The developments listed below have opened new avenues for biomass energy in India to cope-up the energy security as well as environment concern.

(1) Improvement of technologies in traditional biomass applications such as for cooking and rural industries,

(2) Process development for conversion of raw biomass to superior fuels (such as liquid fuels, gas and briquettes)

(3) Penetration of biomass-based electricity generation technologies.

ENERGY GENERATED BY WASTE (WTE)

The increasing industrialization, urbanization and changes in the pattern of life, which accompany the process of economic growth, give rise to generation of increasing quantities of wastes leading to increased threats to the environment. In recent years, technologies have been developed that not only help in generating a substantial quantity of decentralized energy but also in reducing the quantity of waste for its safe disposal. The Ministry is promoting all the technology options available for setting up projects for recovery of energy in the form of Biogas/Bio-CNG/Electricity from agricultural, Industrial and urban wastes of renewable nature such as municipal solid wastes, vegetable and other market wastes, slaughterhouse waste, agricultural residues and industrial/STP wastes & effluents.

Waste-to-Energy (WTE) technologies to recover the energy from the waste in the form of Electricity and Biogas/Syngas are given as below:

- Bio-methanation
- Incineration
- Gasification
- Pyrolysis

Additionally, these projects avoid the displacement of carbon dioxide emissions from carbon intensive sources to a renewable, otherwise wasted source. These credits, combined with revenue from the sale of electricity and the free source of raw material, give the plant a reliable revenue stream, making it simple to operate profitability at any point in time. Gasification of waste is considered by some to be among the most efficient of technologies for energy recovery and safe disposal of municipal solid waste in synchrony with environmental needs.

ENERGY GENERATED BY OCEAN

India is estimated to have a potential of around 54 gigawatts of ocean energy – tidal power (12.45 GW) and wave power (41.3 GW) – but it is yet to be of practical use as the Union Ministry of New and Renewable Energy said the estimated potential of tidal and wave power is "purely theoretical and does not necessarily constitute a practically exploitable potential" Oceans contain vast renewable energy potential – theoretically equivalent to more than double the world's current electricity demand. Nascent ocean energy technologies could cut carbon dioxide (CO2) emissions from power generation and help to ensure a sustainable, climate-safe energy future.

The government of India has approved a proposal to declare the use of tides and waves to generate electricity as renewable power. Wave energy can potentially add 40,000 MW of capacity, and ocean thermal energy conversion

(OTEC) is estimated to be 180,000 MW – subject to "technological evolution."

CONCLUSION

The role of renewable energy is a key factor and is gaining importance in the current era with the growing concern for energy conservation. Country develops the ideas and technology to generate power and fulfill the scarcity of fuels alternatives. Looking at the facts Govt. of India focuses to generate sustainable energy to supply all over regions of the country. It is about security and economic growth and environment protection.

FUTURE SCOPE

India looks set to remain an attractive destination for investors with clean energy, with the government setting ambitious targets and pursuing several reforms to boost investor confidence. India will need to double its electricity output by 2030 to meet this large increase in demand, while also honoring its commitment to reduce its carbon footprint.

REFERNCES

- J. Bhagwan Reddey, D.N. Reddy —Probablistic Performance Assessment of a Roof Top Wind, Solar Photo Voltaic Hybrid Energy System‖, Engineering
- Science and Education Journal, Vol. 2, No. 4, pp. 281- 298, February 2008.
- Stanley R. Bull, —Renewable Energy Today and Tomorrow‖, Proceedings of the IEEE, vol. 89, no. 8, pp. 316-381, August 2001.
- R. Chedid & H. Akiki, —A decision Support Technique for the Design of Hybrid SolarWind Power System‖, IEEE Transaction of Energy Conversion Vol. 13, No.1, pp. 154- 176, March 1998.
- Nabil A. Ahmed & Masafumi Miyatake, —A Stand- Alone Hybrid Generation System Combining Solar Photovoltaic and Wind Turbine with Simple Maximum Power Point Tracking Control.
- Riad Chedid & Safur Rahman, —Unit Sizing and Control of Hybrid Wind Solar Power Systems‖, IEEE Transaction of Energy Conversion, Vol. 12, No. 1, pp. 181- 195, March 1997.
- Jozef Paska, Piot & Biczel, Mariusz Klos,—Experience with Hybrid Power Generating System.

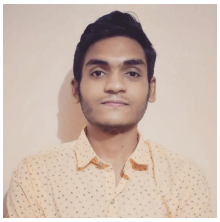
Raj Saroj and **Harsh Shukla**

Students

TE Electrical

ALUMNI CORNER

The environment at Viva Institute of Technology's electrical engineering department is quite stimulating. The faculties of this department are equipped with immense teaching experience in their respective domains. I had the opportunity to be taught by these faculties. The concepts taught in class have stayed with me. I had the opportunity to get in-depth insights into electrical machines and power systems from Prof. Piyali Mondal as well as control system concepts from Prof. Chitralekha. They not only taught me all the technical aspects of electrical engineering but also mentored me personally. I had indulged myself in several projects at the start of my engineering course. When I was proceeding with these projects, there were times when I got stuck with certain problems. In such cases, both the teaching and non-teaching staff helped me throughout the process. My last year's project was mentored by HOD Sir Prof. Bhushan Save. He helped me and my team with building our project as well as giving us guidance on research paper publishing. I am always grateful for all the teachings and the values that the department has inculcated in me. Though my time with the electrical department has come to an end, it will always be remembered as the best years of my academic career.



Sreetish Mundayat
Batch 2021-22

I would like to share some of my thoughts and experiences with the department that occurred in the span of 3 years of my study. I came in the year 2019 via direct second year admission with the intention to clear out my basics which I was not able to cover in my diploma studies. As soon as I entered the college there was an added pressure right from the first day as I had to go through Mathematics-III which is considered one of the toughest subjects to clear in engineering college but the staff made sure that maximum of us cleared it in the first attempt itself and indeed we all did it. But right after the 3rd semester in just 2 months into our 4th semester coronavirus broke down and we all students were forced to sit inside the four walls, it's difficult for a student to make a learning out of that four walled confined space but our teachers started giving us all their learnings via the online platforms and I can say those were the most difficult times for them as they had to manage two families, one at home and second with us online. They really did a fantastic job with that, they made sure we all stayed connected with the studies even when the times were difficult. All these online stuff went on till 7th semester and our last semester i.e. 8th semester was offline again. This was one of the best decisions of our department as choice was given to all the colleges individually to take the call to either go offline or online or keep it hybrid.

The last couple of months with the department were just too good, we did our projects physically, had our learnings, enjoyed our fest with the teachers and cleared our doubts one to one with them and I can say the teachers managed to clear them out with every way possible from their side and this was actually a very tragic time for our department as it was short of staff but even after that our HOD, class coordinator and each and every teacher (including the support staff) everyone came together and managed everything well which indeed paced a good way for our *fare-the-well.*

I would like to thank Bhushan Save sir for all the practical examples which he used to deliver during the lectures and along with it the movie learning tips which indeed connected so many dots for us, lastly a big thank to our teachers and all the support staff for all their vital contribution through which we cleared our difficulties with ease.

Thank you.

Mihir Nanjiani
Batch 2021-22

PUBLISHER

Department of Electrical Engineering
VIVA Institute of Technology
Shirgaon, Virar East

VISIT US

@vivatechelectrical

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