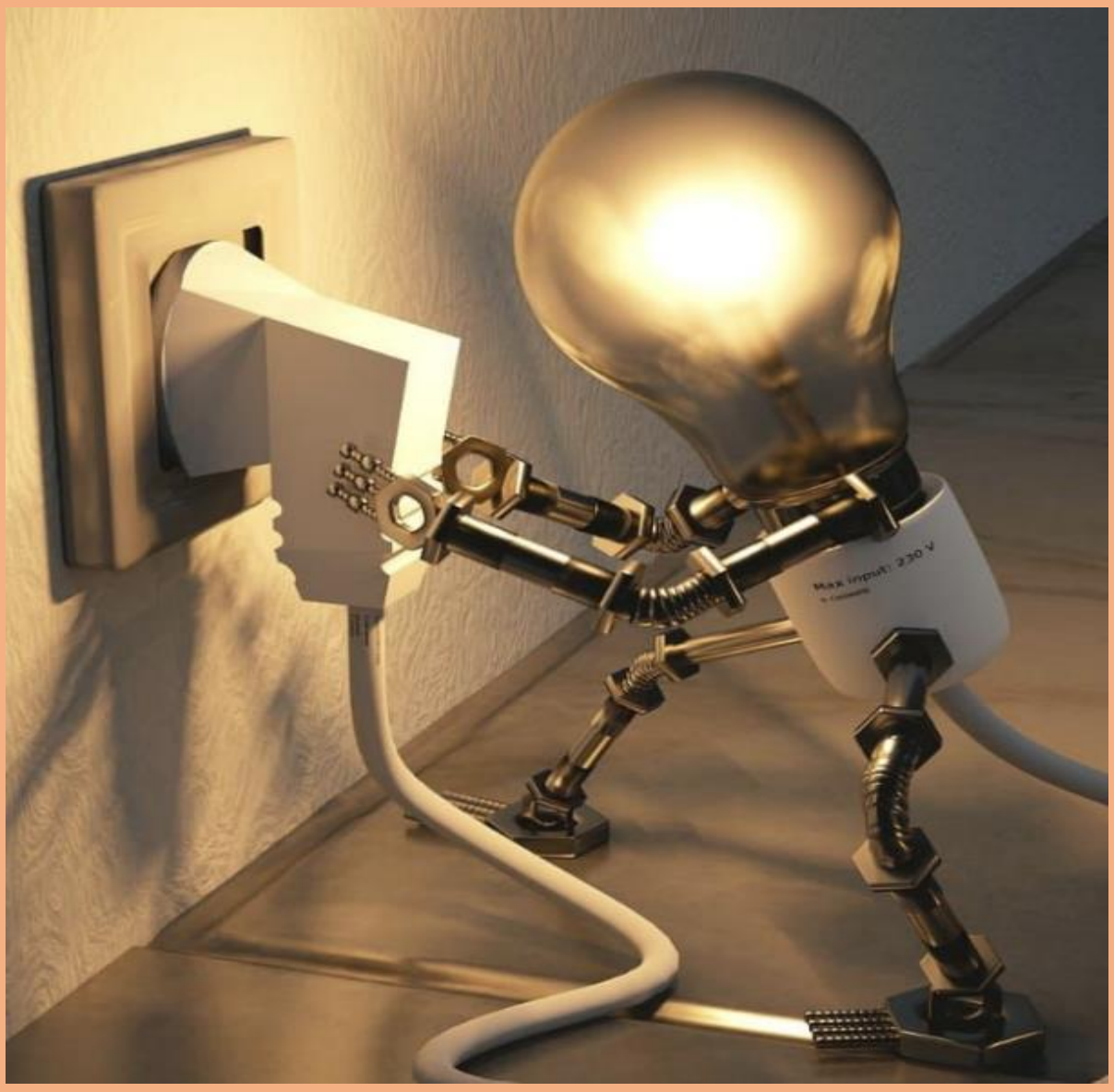
Magaz“EEE”ne

VOLUME-3, 2022-2023.



ANDHRA LOYOLA INSTITUTE OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

(Accredited by NAAC & NBA, Affiliated to JNTU Kakinada)

MESSAGE FROM THE HOD

I am gratified to know that the department of Electrical and Electronics Engineering is bringing the technical magazine of this academic year. This is a productive technical material and subsidiary skill developing tool for the students. I wish this Magaz“EEE”ne a very big success in all their ventures. I also applaud the coordination and efforts made by the editorial team.

Dr. G. Naveen Kumar, Professor

EDITORIAL MESSAGE

It is an occasion of immense pleasure for the Department of Electrical and Electronics Engineering to publish the first volume of magazine for the academic year 2022-23. The Editorial board of department of EEE wants to thanks all the faculty members and students who have made this issue a success by providing an article for the first volume.

This magazine focuses on the recent trends evolved in the field of Electrical and Electronics engineering & wants to provide advanced knowledge and awareness among the students about the same. The Editorial board also wants to thanks the Management of the Institute and Head of the department for inspiring us to go forward in publishing this magazine.

Editors:

Dr. G. Naveen Kumar, Professor

Dr. M.Ajay kumar

Mr M. Rama Krishna

Student Coordinator:

Mr G Yaswanth
Ms. B Divya

Department Vision:

To prepare competent and knowledgeable Electrical and Electronics Engineers by ensuring quality education with skills and character to serve the society.

Department Mission:

M1- To provide quality teaching and services that render students a supportive environment.
M2- Making the effort to mould the students to be the problem-solvers, to be able to apply engineering principles to electrical systems.

INDEX

Sl. No.	CONTENT	Page No
1	Fault over-ride and Minimization of Losses in a PV Integrated Transmission Network using STATCOM	**1**
2	Oscillating Water Column as Clean Energy Source for sustainable Power Generation	**2**
3	Economically Viable Solar-Wind Hybrid Power Generation System for small and medium scale applications	**3**
4	Solar Backpack	**4**
5	Thyristor Based Fault Current Limiter to Control Magnitudes of Fault Currents	**5**
6	Benefits of Electric Vehicles	**6**
7	Ten Biggest Challenges Facing the EV Industry Today	**8**
8	Power Quality Challenges and causes in Microgrids	**11**
9	Current Trends in Electric Vehicle Software Engineering	**12**
10	Red Tacton	**13**
11	Solar Grass Cutter	**14**

Fault over-ride and Minimization of Losses in a PV Integrated Transmission Network using STATCOM

Gutha Naveen Kumar, A Sindhuri

The operating characteristics of power system in transient conditions are different from those of normal operating conditions. Grid code majority stipulate to ride-through of faults during operation be enabled during the intense contingencies in transmission networks, thus prioritizing the reactive power delivery necessary in a power system for supporting voltage stability. Integration of clean energy sources to grid have increased in past few years. As more and new systems are being integrated with renewables like solar, wind etc., power system stability support has become an essential area of research. Supporting power system stability under faulty circumstances always look out for new strategies to be adopted to restore system back to pre-perturbance values. In the proposed work, power transmission system integrated with Solar Photo Voltaic is tested for fault over-ride and minimization of losses through a support of Flexible AC Transmission System scheme. In the proposed work, deployment of Power Electronics based converter namely Static Compensator in short, STATCOM is adopted which can successfully maintain voltage stability and minimize losses even under adverse voltage operating conditions. The proposed scheme is verified using a simulation test on a standard IEEE bus network. The simulation results show the improvement of the voltage stability margin through determination of optimal size and location of STATCOM. Simulation results are established in MATLAB integrated with Power Systems Analysis Toolbox.

Keywords:

Flexible AC Transmission System, Losses, Solar Photo Voltaic, Static Compensator, Voltage Stability.

Article by

A Sindhuri

Guided by

Dr Gutha Naveen Kumar

Above article was published in Department of EEE under IEI Student Chapter

Oscillating Water Column as Clean Energy Source for sustainable Power Generation

Gutha Naveen Kumar, P Manoj Venkat

Renewable energy based power generation is on rising peak as people are looking for clean energy systems for sustainable energy growth. Utilization of ocean and sea water waves to produce green power is of interest in the proposed work. Uneven heating of earth's surface generates wind and waves are produced using the energy from wind. The energy in waves can be captured to do useful work. A machine capable of exploiting wave power is generally known as wave energy converter. Here we are proposing an oscillating wave column (OWC) which can be used to produce electricity from ocean and sea waves near shores to cater underprivileged who don't have access to electricity. This model is proposed to work with two different Wells turbine models to be suitable for different geographical locations.

Keywords:

Green power, Oscillating Wave Column, Sustainable, Wells Turbine, Wave energy, Wind.

Article by

P Manoj Venkat

Guided by

Dr Gutha Naveen Kumar

Above article was published in Department of EEE under IEI Student Chapter

Economically Viable Solar-Wind Hybrid Power Generation System for small and medium scale applications

Gutha Naveen Kumar, Narsipuram Maharshi

Renewable energy experts have now and every time explained that the combined technologies always work in favor. Hybrid energy system as we know is a combination of minimum two or otherwise more than two renewable based source either or non-renewable energy schemes combined together to generate necessary energy for load utilization. A small hybrid unit that has combination of wind technology and solar power technology offers several advantages to domestic applications. The dwindling nature of fossil fuels is leading many a country to search for new as well as alternative sources of energy for power production. India itself is not an exception to this. Solar energy is a green, clean, eco-friendly and abundantly available energy resource and so is the case with the wind energy. The idea of working with hybrid solar-wind power generation is to increase the net output power through a combination of these. Clean energy sources are being used increasingly and also being integrated with grid from domestic entities to contribute energy supply when not driving a load locally. This work realizes a hybrid energy system for multiple domestic and commercial applications. The objective of the work presented here is an idea of pollution free, economically feasible power generation affordable to mid-range economies. Combination of solar PV with vertical axis wind turbine is realized here. The energy that is generated by solar panel and wind turbine is connected to a battery storage unit through a charge controller. The battery is connected to an inverter which steps up and converts the DC voltage into an AC voltage for either domestic or commercial usage.

Keywords:

Economy, Efficiency, Hybrid, Solar, Wind

Article by

,Narsipuram Maharshi

Guided by

Dr Gutha Naveen Kumar

Above article was published in Department of EEE under IEI Student Chapter

Solar Backpack

M Raja Sekhar Reddy, D Ravi Kiran

A backpack also called book-bag, kitbag, knapsack, rucksack, rucksack, pack, backpack or backpack is, in its simplest form, a cloth sack carried on one's back and secured with two straps that go over the shoulders, but there can be variations to this basic design. Backpacks are commonly used by hikers and students and are often preferred to handbags for carrying heavy loads or carrying any sort of equipment, because of the limited capacity to carry heavy weights for long periods of time in the hands.

It's a combination of backpack + solar panel + Battery. It’s quite simple to make our normal bag as a solar power backpack. And we work as normal bag and containing an additional power source so that you don't have to carry as separate devices to carry just to charge your electronic devices. Indirectly we can save the world one charge at a time.

Keywords:

Backpack, Solar.

Article by

M Raja Sekhar Reddy

Guided by

D Ravi Kiran

Above article was published in Department of EEE under IEI Student Chapter

Thyristor Based Fault Current Limiter to Control Magnitudes of Fault Currents

L.Karunakar, G Amulya

The most common ways to limit fault currents are the costly replacement of substation equipment or imposition of changes in the configuration splitting power system that may lead to decreased operational flexibility and lower reliability. A novel idea is to use Fault Current Limiters (FCLs) to reduce the fault current to lower, acceptable level so that the existing switchgear can still be used to protect the power grid. This paper presents controlling the magnitude of fault current by using non super conducting fault current limiter with the help of controlled rectifier. Non superconducting fault current limiter consists of a rectifier and DC reactor. The diode rectifiers are uncontrollable, to make it as a controllable by replacing the thyristor in place of diode. By providing the suitable gate triggering to the thyristor circuit we can control the magnitude of current in DC reactor. By reduce the magnitude of fault current in a power system, which improve the voltage profile at faulted phase. The proposed NSFCL was simulated and studied with the help of MATLAB(Simulink).

Key Words: fault current limiter, fault currents, non super conductor, and thyristor controlled rectifier

Article by

G Amulya

Guided by

L.Karunakar

Above article was published in Department of EEE under IEI Student Chapter

Benefits of Electric Vehicles

Mastan shaik

Transport is a fundamental requirement of modern life, but the traditional combustion engine is quickly becoming outdated. Petrol or diesel vehicles are highly polluting and are being quickly replaced by fully electric vehicles. Fully electric vehicles (EV) have zero tailpipe emissions and are much better for the environment. The electric vehicle revolution is here, and you can be part of it. Will your next vehicle be an electric one? If yes you have to know the benefits:

Lower running costs: The running cost of an electric vehicle is much lower than an equivalent petrol or diesel vehicle. They use electricity to charge their batteries instead of using fossil fuels like petrol or diesel. They are more efficient, and that combined with the electricity cost means that charging an electric vehicle is cheaper than filling petrol or diesel for your travel requirements, if you use renewable energy sources, then you made it more eco-friendly. The electricity cost can be reduced further if charging is done with the help of renewable energy sources installed at home, such as solar panels.

Low maintenance cost: Electric vehicles have very low maintenance costs because they don't have as many moving parts as an internal combustion vehicle. The servicing requirements for electric vehicles are lesser than the conventional petrol or diesel vehicles. Therefore, the yearly cost of running an electric vehicle is significantly low.

Zero Emissions: Driving an electric vehicle can help you reduce your carbon footprint because there will be zero tailpipe emissions. You can reduce the environmental impact of charging your vehicle further by choosing renewable energy options for home electricity.

Tax and financial benefits: Registration fees and road tax on purchasing electric vehicles are lesser than petrol or diesel vehicles. There are multiple policies and incentives offered by the government depending on which state you are in.

Petrol and diesel use is destroying our planet: The availability of fossil fuels is limited, and their use is destroying our planet. Toxic emissions from petrol and diesel vehicles lead to long-term, adverse effects on public health. The emissions impact of electric vehicles is much lower than petrol or diesel vehicles. From an efficiency perspective, electric vehicles can covert around 60% of the electrical energy from the grid to power the wheels, but petrol or diesel cars can only convert 17%-21% of the energy stored in the fuel to the wheels. To reduce the impact of charging electric vehicles, India is ambitious to achieve about 40 percent cumulative electric power installed capacity from non-fossil fuel-based energy resources by the year 2030. Therefore, electric vehicles are the way forward for Indian transport, and we must switch to them now.

No noise pollution: Electric vehicles have the silent functioning capability as there is no engine under the hood. No engine means no noise. The electric motor functions so silently that you need to peek into your instrument panel to check if it is ON. Electric vehicles are so silent that manufacturers have to add false sounds in order to make them safe for pedestrians.

Article by

Mastan shaik,

Above article was published in Department of EEE under IEI Student Chapter

Ten Biggest Challenges Facing the EV Industry Today

Ms. Nishi Agarwal

1. Purchase Cost

The EV industry's biggest challenge is vehicle purchase cost. Electric vehicles are more expensive to build than gasoline-powered ones, primarily because of battery technology. EV batteries must hold a massive charge to provide the minimum range for most owners, requiring expensive raw materials to manufacture.

2. Range Anxiety

People are worried about how far they can travel in an EV before finding a charging station and then having to wait through a long charging session. This challenge is particularly a concern during the winter when there can be a significant reduction in an EV's regular battery range due to below-freezing temperatures. Most EVs are ranging between 200-300 miles on a single charge in normal weather conditions. And 80% of public charging stations are being Level 2, the amount of time to charge up their EV for the next 3-4 hours of driving can take 4-6 hours or longer.

3. Limited Selection

Ten years ago, EV models in the U.S. were limited to the Nissan Leaf 24kWh, Tesla Roadster 1.0, and the Mitsubishi iMIEV. Selection is rapidly increasing now as manufacturers ramp up. As of 2022, there were 28 EV models available in America from 18 manufacturers.

There is still a limited selection of EVs compared to gasoline-powered cars, and most auto manufacturers offer only a few models. Sedans, hatchbacks, and SUVs are becoming more available. However, people looking for a truck or minivan still need more choices.

Ford introduced the F-150 Lightning in 2022, their EV version of America's best-selling passenger truck. It has proven so popular that scheduled production is already pre-sold for an entire year in advance.

4. Difficulty in Finding a Technician

Most car owners find that having their vehicle serviced by a dealer can be significantly more expensive than using a qualified independent maintenance and repair shop.

With the EV industry still comparatively small, there are relatively few trained EV repair technicians and even fewer qualified independent shops. Working on an EV beyond tires, brakes, light bulbs, and audio components can be dangerous for an untrained technician, which means most EV owners rely on their EV dealer for service.

Fortunately, EVs need less maintenance than gasoline-powered cars. But if an expensive component needs replacing (such as the battery pack, which typically runs $5,000 and up depending on the EV model), there is currently little competition to help keep costs down.

5. Charging Infrastructure

The scarcity of charging stations in many areas of the country is increasing the incidence of range anxiety. Individual charging ports, of which about 80% are Level 2, 8% are fast-charging DC units, and the remaining 2% are Level 1 ports. Despite all the public charging resources, most EV charging still happens at home, presenting a challenge to those who live in shared housing (multi-unit dwellings, or MUDs) and those who have to park on the street.

6. Charging Speeds:

Charging electric cars can be a problem for drivers who have trouble adjusting to the EV lifestyle, which can dictate a slower pace of life.

There are three primary levels of EV chargers:

Level 1: Uses a standard 120V plug and can charge most vehicles overnight. Extra-large batteries can take 20 hours or more to charge fully. Most residential chargers are Level 1.

Level 2: Uses 240V plugs and SAEJ1772 connectors. Most public charging stations are Level 2 or a combination of Level 2 and Level 3.

Level 3: Uses 480V direct current (DC) fast chargers to provide the quickest possible charge.

7. Charger Compatibility:

Level 2 chargers are mostly coordinated, with all automakers except Tesla using the same type of charging port (Tesla drivers need an adapter).

However, there are three different types of DC fast chargers:

SAE Combined Charging System (CCS): used by most manufacturers

CHAdeMO: used by Nissan and Mitsubishi

Tesla Supercharger: used solely by Tesla vehicles

If only because it is different than the universal access to fuel stations enjoyed by gasoline-powered vehicles, these compatibility differences can be an obstacle to widespread EV adoption.

8. Grid Capacity

Changing to EVs means millions of people will rely on the electric grid in new ways, and grid capacity will need to increase to avoid strain. Experts vary on how much additional power we'll need, but the U.S. Department of Energy has predicted a 38 percent increase in electricity consumption by 2050, primarily due to EVs.

9. Charging Station Financing and Ownership

Public EV charging stations can be expensive to install, with components ranging in cost from $2,500 for a Level 2 charger to as high as $36,000 for a DC fast charger. That doesn't include installation or "soft expenses" such as obtaining permits and connecting with utilities.Automakers, power companies, and business owners (parking lots, garages, shopping centers, etc.) usually pay for charging station construction to attract EV users. Tesla's supercharger network and Volkswagen's Electrify America program are among the nation's largest commercial networks, with each company spending about $2 billion on its network.

10. Charging Price Structures

EV charging includes several different pricing structures, unlike gasoline which is always priced by the gallon. This difference can result in inconsistent pricing and inflated charging costs, which can create barriers to adoption due to consumer frustration and negative experiences.

Utility regulators set consistent rates per kWh for home charging. Public charging stations may include per-session fees, per-minute fees, or tiered pricing based on charging speed. EV drivers typically favor the per-kWh pricing structure, which seems closest to the per-gallon pricing structure they're used to. Some states combine per-kWh pricing models with tiers based on charging speeds.

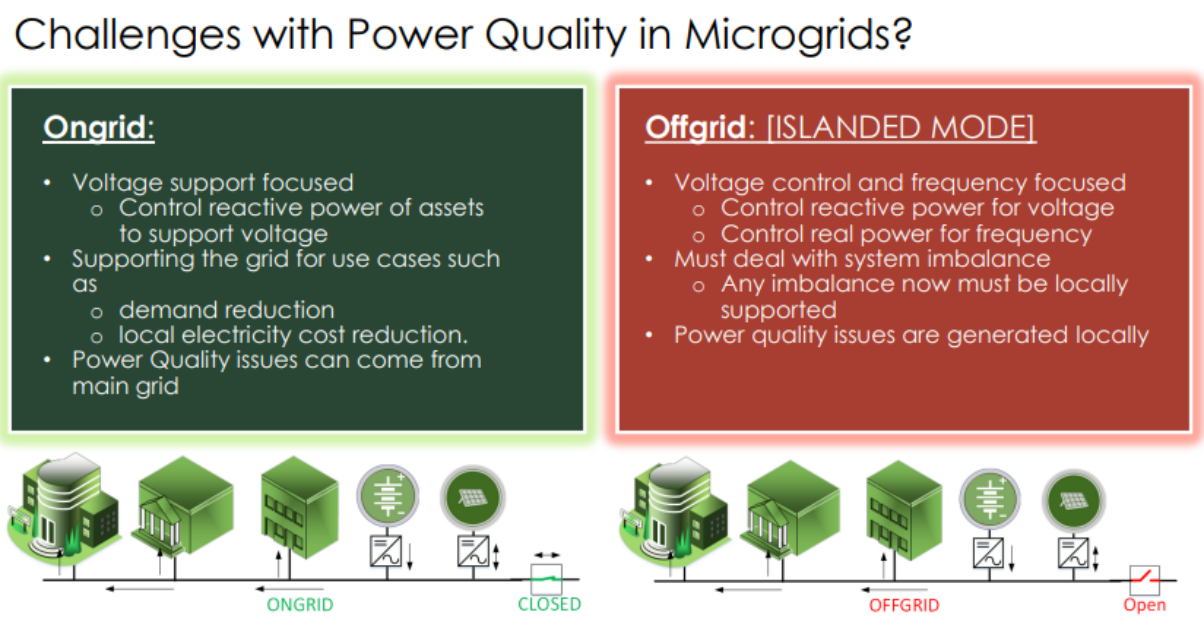
Article by

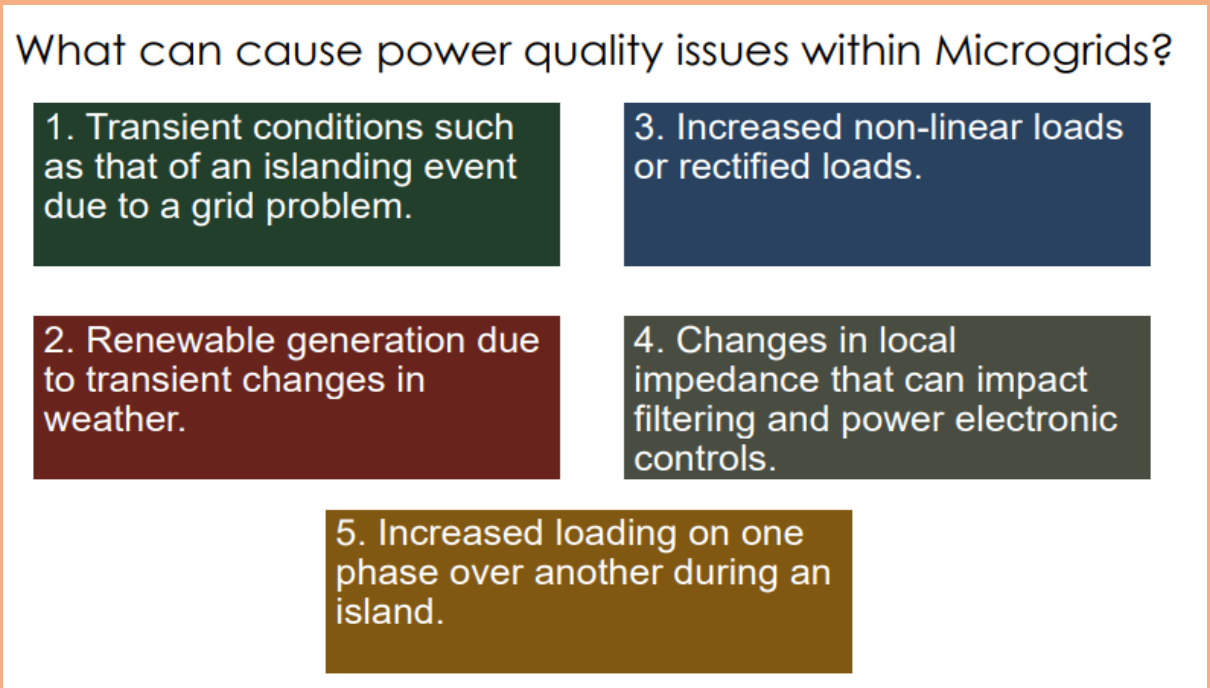
Ms. Nishi Agarwal,

Above article was published in Department of EEE under IEI Student Chapter

Power Quality Challenges and Causes in Microgrids

Ms.K.Sneha





Article by

Ms.K.Sneha

,

Above article was published in Department of EEE under IEI Student Chapter

Current Trends in Electric Vehicle Software Engineering

Ms.K Amrutha valli

Despite all the economic and industrial disruptions, electric vehicle sales have reached another record high in 2022. According to IEA, EV sales exceeded 10 million last year, up 55% from 2021. This naturally means increased demand for EV software, too.

AI & Machine Learning

Software-defined vehicles that can be improved via OTA updates are quickly becoming the new industry standard. And they are constantly growing more advanced.

Today, the integration of artificial intelligence and machine learning is crucial to achieving higher levels of autonomous driving, customization, real-time environmental analysis, and driver behavior analysis. The technology can also be used for more efficient route planning and battery management, resulting in less emission and spending.

Big data

The analytics gathered by smart automotive systems can be used in a variety of different ways. To begin with, big data companies and governments can use it to improve driving conditions and infrastructure. On the other end, manufacturers will deliver more satisfying and personalized experiences to EV drivers. Though, this is a contentious point for many. The Deloitte 2023 Global Automotive Consumer Study did show that most consumers would consent to sharing personal data to get access to updates, alerts, and the features mentioned above. But the industry needs to thread carefully, as data privacy concerns remain a prominent issue worldwide.

V2G connectivity

V2G (vehicle to grid) technology connects EVs to the power grid. This allows cars to charge their batteries from different signals, including those coming from energy consumption nearby. Cars can also give a share of their charge to the grid to keep it running.This is a very effective way of conserving energy, since any unused electricity will continue to course through the grid, powering other nearby utilities. It’s a very environmentally-friendly practice that reduces operational costs for fleet owners and network operators. The latter can provide charging incentives for drivers to encourage the system’s growth.V2G software can be employed to help administrators distribute electricity across the grid, make charging sessions more efficient, and suggest the best charging times to users.

Article by

Ms.K Amrutha valli

Above article was published in Department of EEE under IEI Student Chapter

Red Tacton

Mr.A Sivaram teja

Red Tacton is a new Human Area Networking technology that uses the surface of the human body as a safe, high-speed network transmission path. Red Tacton is a break-through technology that, for the first time, enables reliable high-speed HAN. In the past, Bluetooth, infrared communications (IrDA), radio frequency ID systems (RFID), and other technologies have been proposed to solve the "last meter" connectivity problem. However, they each have various fundamental technical limitations that constrain their usage, such as the precipitous fall-off in transmission speed in multi-user environments producing network congestion.

Red Tacton was introduced by Nippon Telegraph and Telephone Corporation (NTT) who combined touch and action to coin the term Tacton, and then added the word Red, a warm colour, to emphasize warm and cordial communications, creating the name "Red Tacton". It is a technology that uses the surface of the human body as a safe, high-speed network transmission path. Red Tacton uses the minute electric field emitted on the surface of the human body. Technically, it is completely distinct from wireless and infrared. A transmission path is formed at the moment a part of the human body meets a Red Tacton transceiver. Physically separating ends the contact and thus ends communication.

Its Features include:

1. Touch: Touching, gripping, sitting, walking, stepping and other human movements can be the triggers for unlocking or locking, starting or stopping equipment, or obtaining data.

2. Broadband & Interactive: Bandwidth does not deteriorate even with duplex operations and simultaneous access by many users! Duplex, interactive communication is possible at a maximum speed of 10Mbps. Because the transmission path is on the surface of the body, transmission speed does not deteriorate in congested areas where many people are communicating at the same time.

Article by

Mr.A Sivaram teja

Above article was published in Department of EEE under IEI Student Chapter

Solar Grass Cutter

Peethala George Babu

A Solar grass cutter is a machine that uses sliding blades to cut a lawn at an even length. Even more sophisticated devices are there in every field. Power consumption becomes essential for future. The solar grass cutter consists of the photovoltaic cell for the efficiency power from solar panel. It is an automated system for the purpose of grass cutting. The working principle of solar grass cutter is it has panels mounted in a particular arrangement at an in such a way that it can receive solar radiation with high intensity easily from the sun.

These solar panels convert solar energy into electrical energy. This machine consists of the photovoltaic, dc to dc converter, motor, controller, linear blades, and battery. It is an automated system for the purpose of grass cutting. The main components of the solar powered grass cutter include Solar panels, Batteries, Brush less DC motor, Solar charger, Circuit breaker and Blades.

Main advantage is no fuel consumption. The number of reciprocating parts are less so less noise. It has compact size and portable design. It is easy to move from one place to another place Its operating principle is simple. A non-skilled person can also operate this machine. Its limitations include large time required to remove the grass and manually operation during rainy seasons. The machine's capacity is adequate for its purpose. The machine can be a possible replacement for the gasoline powered lawn mowers.

Article by

Peethala George Babu

Above article was published in Department of EEE under IEI Student Chapter

Technology News – 2023

➢ AI Regulations Are Coming

Regulation is set to ramp up on artificial intelligence uses online, as the European Parliament and Council's Digital Services Act went into effect at the end of 2022. The bill requires the largest platforms to implement anti-disinformation measures and protect against discriminatory targeted advertising.

News Credits: IEEE Spectrum, 2023

➢ China's Big Hydro Plans

China is in the midst of a gigantic buildup of hydro-energy capabilities. The world's largest pumped-energy-storage station—a technique that stores energy by pumping it uphill to a reservoir—is set to complete phase two of its construction in 2023. The station, called Fengning and located about 200 kilometers north of Beijing, will store up to 40 gigawatts-hours of energy, and help keep the grid on clean energy when the wind isn't blowing or the sun's not shining.

News Credits: IEEE Spectrum, 2023

➢ India EV sales to rise 66% this year after nearly doubling in 2023

The report forecasts that by 2030, EVs are expected to represent nearly a third of India's personal vehicle market. India's EV market, small but growing, is dominated by domestic carmaker Tata Motors. Electric models made up 2% of total car sales in 2023 but the government is targeting 30% by 2030. The Indian government last month lowered EV import taxes on certain models if carmakers commit to invest at least $500 million and start domestic manufacturing within three years, a move seen as a win for foreign automakers including Tesla. Tesla has begun production of right-hand drive cars at its plant in Germany for export to India later this year. Vietnamese automaker VinFast also plans to invest $2 billion in the country and began constructing a factory in the southern state of Tamil Nadu. Tata Motors held more than two-thirds of the country's EV market last year, but lost ground to Mahindra & Mahindra and Chinese automaker BYD. Mahindra & Mahindra recorded EV sales growth of nearly 2,500% last year with just one model, the all-electric SUV XUV400. BYD also made a big splash in the region last year, reporting over 1,500% in EV sales growth in the country with just two models in its India line-up, the e6 MPV and Atto 3 SUV.

News Credits: msn.com

Alessandro Volta (1745-1827)

Alessandro Volta was a chemist and physicist who is best known for inventing one of the first electric batteries, the Voltaic Pile.

He also discovered methane—a gas that is commonly known for its presence in natural gas reserves and is used as a fuel source.