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ELECTRIQUE

- The Technical Magazine

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Aditya College of Engineering

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VISION

To be a leading department of Electrical Engineering Education and Research

MISSION

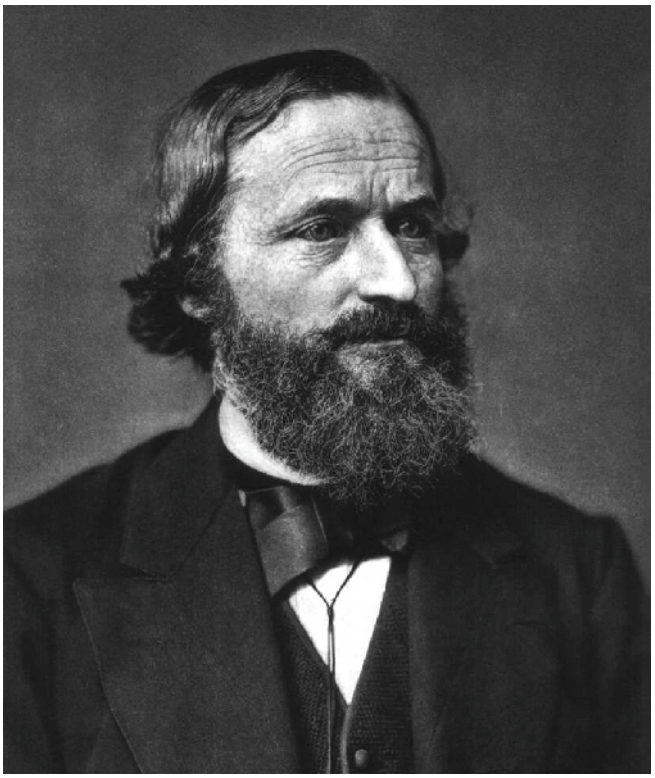
To produce quality engineers by providing state of the art engineering facilities

To impart skill based education and enhance knowledge on electric vehicles

To organize professional, cultural and social activities with collaborations

To promote training with institution and industry collaborations

SCINTIST WHO CHANGED THE WORLD



Gustav Robert Kirchhoff

Gustav Robert Kirchhoff (b. Konigsberg, Germany, 12th March 1824, d. Berlin, Germany, 17th October 1887) was a physicist. His father was a law councillor. Kirchhoff easily derived Kirchhoff's voltage law for electrical network analysis between 1845-1846, while he was still a student at Konigsberg. In 1849, following the experiments of Kohlrausch, he introduced Kirchhoff's current law for electrical network analysis. He graduated in 1847 and married Clara Richelot, the daughter of one of his teachers, the same year. Three years later, he was appointed professor at Breslau. In 1854, he moved to Heidelberg, where Robert Bunsen was a professor of chemistry. In 1869, Clara died, leaving him two sons and two daughters. In 1872, he married Luise Brommel.

In 1859, he published an explanation of the dark lines in the sun's spectrum, discovered by Josef von Fraunhofer. In the course of investigating the optical spectra of chemical elements, Kirchhoff made his major contribution to science which was his experimental discovery and theoretical analysis of a fundamental law of electromagnetic radiation which states that for all material bodies, the ratio of absorptive and emissive power of radiation is a universal function of wavelength and temperature. In 1860, Bunsen and Kirchhoff discovered that each chemical substance emits light that has its own unique pattern of spectral lines.

A Few months later, they discovered a new metal, cesium and the next year, they found rubidium. They also constructed an improved form of the spectroscope. Kirchhoff once told his bank manager of the discovery of terrestrial metals of the sun. The bank manager said, "Of what use is gold on the sun if I cannot get it down to earth?" later, after Queen Victoria of England had presented Kirchhoff with a medal and a prize in gold sovereigns for work on the sun's spectrum, he took them to the bank manager and said, "Here is some gold from the sun!"

Kirchhoff was crippled by an accident in mid-life which compelled him to use crutches and wheelchair. But, he remained in good spirit. On two occasions he turned down calls to other universities. Only when his failing health hindered his experimental work did he accept a chair of theoretical physics offered to him in Berlin. He worked there with great devotion, until illness forced him to give up his teaching activity in 1886. He bore with patience the long illness of his last years. He died peacefully, presumably of a cerebral congestion.

FACULTY ARTICLES

State Estimation in Electric Power Grids

Meeting new challenges presented by the requirements of the future grid

Dr.M.Ravindra
Associate Professor, EEE

State Estimation(SE) at the transmission level has a long history, further research and development of innovative SE schemes, including those for distribution systems, are needed to meet the new challenges presented by the requirements of the future grid. This article presents some example topics that signal processing (SP) research can contribute to help meet those challenges. SE has become a key function in supervisory control and planning of electric power grids. It serves to monitor the state of the grid and enables energy management systems (EMS) to perform various important control and planning tasks such as establishing near real-time network models for the grid, optimizing power flows, and bad data detection/analysis. Another example of the utility of SE is the SE-based reliability/security assessment deployed to analyze contingencies and determine necessary corrective actions against possible failures in the power systems. In view of the ongoing development of a smarter grid, more research on SE is needed to meet the challenges that the envisioned smart grid functionalities present. Among others, environmental compliance, energy conservation, and improved dependability, reliability, and security will impose additional constraints on SE and require improved performance in terms of response time and robustness.

Have you ever heard of a synchrophasor?

It may sound like a word out of science fiction, but these devices are already changing the electrical grid as we know it.The grid was born over a century ago, at a time when our needs were simpler and our demand much lower. More complex needs are putting a heavy strain onthe aging infrastructure, which is why we need to innovate and update our grid so it's ready for the demands of today.A synchrophasor or PMU (phasor Measurement Unit) is a sophisticated monitoring device that can measure the instantaneous phasorvoltage, current and frequency at specific locations on the grid which is synchronized to Global positioning systems. This gives operators a near-real-time picture of what is happening on the system, and allows them to make decisions to prevent power outages. And not only will these synchrophasors help prevent outages, but they also save money. By providing more accurate and timely data on system limits, synchrophasors make the grid more reliable and efficient, thereby reducing planning and operations costs.

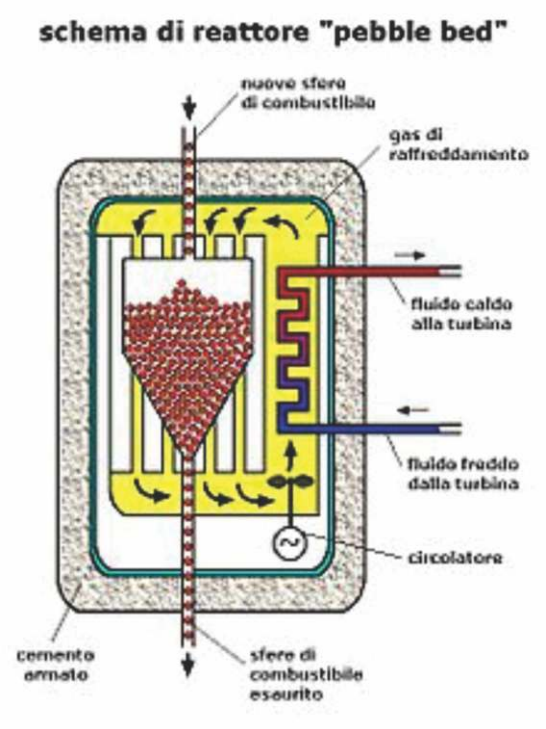
> STATE ESTIMATION HAS BECOME A KEY FUNCTION IN SUPERVISORY CONTROL AND PLANNING OF ELECTRIC POWER GRIDS.

There are at least three major aspects in the future power grid that will directly impact SE research. First, more advanced measurement technologies like phasor measurement units (PMUs) have offered hope for near real-time monitoring of the power grid. Typically, a PMU takes 30 measurements/s, thereby offering the possibility of a much more timely view of the power system dynamics than conventional measurements. More importantly, all PMU measurements are synchronized, as they are time stamped by the global positioning system's (GPS's) universal clock. However, PMUs with their higher measurement frequency put enormous strain on the communication and data processing infrastructure of the grid. This drives the need for resource-efficient, event-triggered SE solutions that employ on-demand (event-triggered) sensing, estimation, and communication. Second, new regulations and market pricing competition may require utility companies to share more information and monitor the grid over large geographical areas. This calls for distributed control, and hence, distributed SE to facilitate interconnection-wide coordinated monitoring. Recent advances made by the SP and automatic control communities in the field of distributed estimation would be particularly beneficial in achieving this. Finally, to facilitate smart grid features such as demand response (DR) and two-way power flow, utility companies will need to have more timely and accurate models for their distribution systems. This calls for SE at the distribution level, which places more stringent requirements on SE algorithms. So far, utility companies have done little in implementing SE in distribution systems, even though SE has been deployed extensively in transmission systems for decades. However, as the electric power grid becomes smarter, more distribution automation (DA) will be needed and SE at the distribution level will become more important. The control mechanism in the distribution system will most likely be distributed and active in nature, so will be the corresponding SE functions. This necessitates the development of new distributed SE algorithms that avail themselves of the substantially increased number of real-time measurements.

Conventional SCADA measurements are obtained too infrequently to fully capture the dynamics of the power system. Practically, when faults occur, there is usually little time for the controller to respond, and this presents a serious challenge to operators. Integration of renewable energy sources in distributed generation (DG) may also increase the chance of sudden unpredictable changes in the system. Consequently, it is necessary to track these changes in a timely manner to ensure the dependability and reliability of the power system. Thus, SE schemes that are capable of capturing and tracking the near real-time dynamics of the power system are needed. Recently, synchronized phasor measurement units (PMUs) have been increasingly deployed in power systems. These devices can directly measure bus voltage magnitudes and phase angles, because they are synchronized by the GPS universal clock. The PMUs also sample at a much higher frequency (roughly two orders of magnitudefaster) compared to the traditional sensors in the SCADA system. In essence, PMUs provide more accurate and more timely measurements with many more samples. The main challenges faced by engineers today include 1) combining those PMU measurements with conventional measurements to obtain an optimal state estimate, and 2) dealing with the large number of data rendered by PMUs.

STUDENT ARTICLES

Pebble-Bed Reactor:



The development of the nuclear power industry has been nearly stagnant in the past few decades. In fact there has been no new nuclear power plant construction in the United States since the late 1970s. What many thought was a promising technology during the "Cold War" days of this nation; they now frown upon, despite the fact that nuclear power currently provides the world with 17% of its energy needs. Nuclear technology's lack of popularity is not difficult to understand since the fear of it has been promoted by the entertainment industry, news media, and extremists. There is public fear because movies portray radiation as the cause of every biological mutation and now; terrorist threats against nuclear installations have been hypothesized. Also, the lack of understanding of nuclear science has kept news media and extremists on the offensive. The accidents at Three Mile Island (TMI) and Chernobyl were real and their effects were dangerous and, in the latter case, lethal. However, many prefer to give up the technology rather than learn from these mistakes.

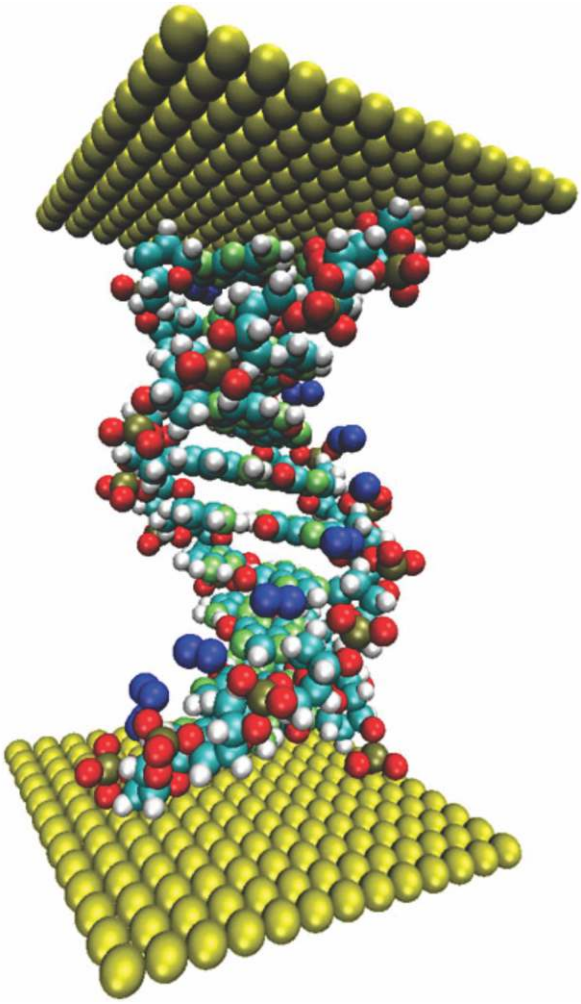
Recently, there has been a resurgence of interest in nuclear power development by several governments, despite the resistance. The value of nuclear power as an alternative fuel source is still present and public fears have only served to make the process of obtaining approval more difficult. This resurgence is due to the real threat that global warming, caused by the burning of fossil fuels, is destroying the environment. Moreover, these limited resources are quickly being depleted because of their increased usage from a growing population.

The estimation is that developing countries will expand their energy consumption to 3.9 times that of today by the mid-21st century and global consumption is expected to grow by 2.2 times. Development has been slow since deregulation of the power industry has forced companies to look for short term return, inexpensive solutions to our energy needs rather than investment in long term return, expensive solutions. Short-term solutions, such as the burning of natural gas in combined cycle gas turbines (CCGT), have been the most cost effective but remain resource limited. Therefore, a few companies and universities, subsidized by governments, are examining new ways to provide nuclear power.

An acceptable nuclear power solution for energy producers and consumers would depend upon safety and cost effectiveness. Many solutions have been proposed including the retrofit of the current light water reactors (LWR). At present, it seems the most popular solution is a High Temperature Gas Cooled Reactor (HTGR) called the Pebble Bed Modular Reactor (PBMR).

K.HARI DATTA
19MH5A0231

Molecular Electronics:



Will silicon technology become obsolete in future like the value technology done about 50 years ago? Scientists and technologists working in a new field of electronics, known as molecular electronics is a relatively new field, which emerged as an important area of research only in the 1980's. It was through the efforts of late professor Carter of the U.S.A that the field was born.

Conventional electronics technology is much indebted to the integrated circuit (IC) technology. IC technology is one of the important aspects that brought about a revolution in electronics. With the gradual increased scale of integration, electronics age has passed through SSI (small scale integration), MSI (medium scale integration), LSI (large scale integration), and ULSI (ultra large scale integration). These may be respectively classified as integration technology with 1-12 gates, 12-30 gates, 30-300 gates, 300-10000 gates, and beyond 10000 gates on a single chip.

The density of IC technology is increasing in pace with Famous Moore's law of 1965. Till date Moore's law about the doubling of the number of components in an I.C every year holds good. He wrote in his original paper entitled 'Cramming More Components Onto Integrated Circuit ', that, "the complexity for minimum component costs has increased at the rate of roughly a factor of 2 per year. Certainly, over the short term, this rate can be expected to continue, if not to increase. Over the longer term, the rate of increase is a bit more uncertain, although there is no reason to believe that it will not remain constant for at least ten more years.

It is now over 30 years since Moore talked of this so called technology-mantra. It is found that I.C's are following his law and there is a prediction that Moore's law shall remain valid till 2010.the prediction was based on a survey of industries and is believed to be correct with research of properties of semiconductors and production processes. But beyond ULSI, a new technology may become competitive to semiconductor technology.

This new technology is known as Molecular electronics. Semiconductor integration beyond ULSI, through conventional electronic technology is facing problems with fundamental physical limitations like quantum effects etc. Molecular based electronics can overcome the fundamental physical and economic issues limiting Silicon Technology.

For a scaling technology beyond ULSI, prof. Forest Carter put forward a novel idea. In digital electronics, 'YES' and 'NO' states are usually and respectively implemented and/or defined by 'ON' and 'OFF' conditions of a switching transistor. Prof. Carter postulated that instead using a transistor; a molecule (a single molecule or a small aggregate of molecule) might be used to represent the two states, namely YES & NO of digital electronics.

For e.g. one can use positive spin & negative spin of a molecule to represent respectively 'YES' & 'NO' states of binary logic. As in the new concept a molecule rather than a transistor is proposed to be used, the scaling technology may go to molecular scale. It is therefore defined as MSE (molecular scale electronics). MSE is far beyond the ULSI technology in terms of scaling. In order to augment his postulation Prof. Carter conducted a number of international conferences on the subject. The outcome of these conferences has been to establish the field of molecular electronics.

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19MH1A0204

HOW TO GET PLACED IN A COMPANY

T.Neelima
18MH1A0204

Hi, Each and every one of you have an unique dream, some want to get placed in a core company, some in an IT industry. Some of you want to pursue higher studies,some want to become an entrepreneur. Some want to do family business. The desire of each person's life may vary. Those who want to start their carrier as an employee in an industry this article will definitely help you to attain your goal. Generally, the companies are categorized in two ways,

1. Product or service based Company.
2. Core Company.

To get into Core Company:

Getting offer in a core company is simple than getting in an IT industry. Need to have a complete knowledge about our core subjects what we have learn so far. Simple mantra is "Stop Studying the subjects and start Learning". Current world is a competitive world, we all have to equip ourselves so that we can sustain in that. There is no mercy and no frees, one who can adopt to the new technologies can able to get and survive in this corporate world. So start to equip you all now itself.

The rounds in the core company:

• Aptitude plus technical MCQ's
• Face to Face interview (Technical and General HR rounds)For first round, go through RS Aggarwal book, India Bix, 2braces, Exam Veda websites and know some basic concepts in all subjects to clear this round. For second round, main thing to clear these rounds is to have more faith and confidence upon yourself. Communicating language is secondary, have to deliver the content which you are coming to say clearly and boldly though you are not sure about that.To get into IT industry: Have to learn many things apart from your curriculum, this shows how much interest you are having in learning new things. As an EEE student if you are well versed in programing equal to CSE student, preference will always been given to us.

Rounds in an IT industry:

1. General and Technical Aptitudes
2.Programming round
3. Group Discussion
4. General and Technical HR

First Round: As I said above go through all the sites which is enough to clear this round.

Second Round: Have to write a program for the given scenario more effectively. I will tell you all secret or mantra which I always use to solve a particular program. First go through the given scenario and see the sample test cases. If you can able to understand the sample input and output then it is easy to solve the code. See, The Computer is a senseless machine, we need to tell everything clearly so that it can do. Just back track your mind, while you read the input and output samples how your mind have understood that. If you found that way, that is nothing but an algorithm. Once algorithm is framed writing program is so simple. So for all the problems, you will definitely have the solution in your mind, the only thing you need to do is search for it without getting panic.

Third Round: To clear this round, a simple quality you should have that is having a faith and confidence upon you and you should possess a sound listening skill. You need to believe that you can do!!

Fourth Round: As I said previously, you have to speak clearly and boldly and instead of speaking unnecessarily have to strict to the point.Mostly all the companies will have the same interview process like I mentioned above. Don't get worried if you don't know anything till now…"Never it is too late to start a thing" so start working towards your dream by today itself…Because no one knows what tomorrow will bring. Whatever the situation may be never let you to hate yourself. If everyone demotivates you, never let your heart to accept that. Those who all are achieved big, loved themselves more than anyone. If you had a faith upon you, though you don't know how to solve a particular problem in your life your mind and heart will surf it for you. "World is full of Opportunities" for those who searched for it. Always keep in this in your mind, "Whenever there is a problem there will be a solution for that particular problem". For every problem the solution will always be simple. The only thing we need to do is surf for it. This is applicable to life as well as for the program…

ALL THE VERY BEST to all and wish you all to have a wonderful life and future.....

PROJECT IDEA

Design Your Own Electric Vehicle Battery Charging Solutions

The popularity of electric vehicles (EVs) is increasing rapidly in India. According to a survey, the EV market in India is estimated to increase from 3 million units in 2019 to 29 million units by 2027 with a CAGR of 21.1 per cent. As a result, demand for AC/DC chargers, the smart chargers for EVs, will also increase.

At present, three EV charger designs suitable for Indian market—with specifications of 48V/4A, 48V/12A and 48V/15A—are available for rapid development of the product. This semiconductor-based smart charging system can support both lithium-ion as well as lead-acid battery types.

Block diagram

Here, battery charger ASSP flash MCU HT45F5Q-X is the heart of EV charger circuitry, with in-built operational amplifiers (OPAs) and digital-to-analogue converters (DACs) that are necessary for battery charging function.

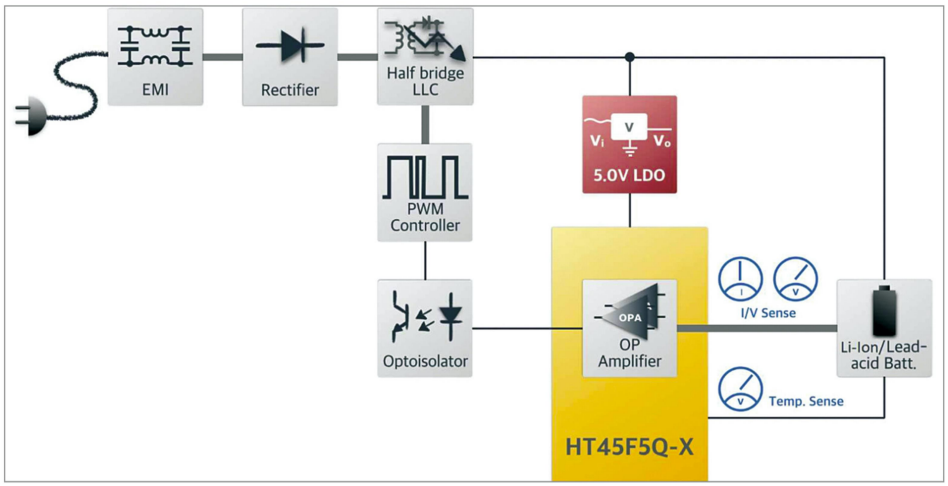


Fig. 1: EV charger block diagram

This EV charger design utilises HT45F5Q-2 MCU for implementing battery charging control function.

Working of EV charger

Input power to the EV charger is an AC voltage in the range of 170V to 300V. The EV charger uses a half-bridge LLC resonant converter design, because of its high-power and high-efficiency characteristics, to obtain DC power for charging the battery.

The design utilises a rectifier circuit for converting input AC voltage to high-voltage DC output, and it also has an electromagnetic interference (EMI) filter to eliminate high-

frequency noise from input power source. A pulse-width modulation (PWM) controller IC, like UC3525, can be used for driving the MOSFETs of half-bridge LLC converter.

The battery charging process is supervised by the MCU HT45F5Q-2. It monitors the battery voltage and charging current levels and gives feedback to the PWM controller IC. Based on the feedback, the PWM controller varies the duty cycle of its PWM signal and drives the MOSFET circuit to obtain variable output voltage and current for charging the battery.

The voltage, current and temperature control process in this EV charger are explained below.

(a) Voltage control

The charging voltage is decided based on the initial voltage of battery when it is connected for charging. As the charging progresses, charging voltage changes accordingly and, finally, when battery is fully charged, the final voltage is set. The charging-voltage decision levels for 48V/12A battery charger are explained below.

- If Battery Voltage <36V, TC(0.6A) Charging, Voltage Setting FV(56V)
- If Battery Voltage <40V, TC(0.6A) Charging, Voltage Setting CV(58V)
- If Battery Voltage >40V, CC(12.0A) Charging, Voltage Setting CV(58V)
- When fully charged, voltage is set to FV(56V). If battery voltage is lower than FV, the charging current will be reset to CC (12.0A).

(b) Current control

Charging current is set depending on the battery voltage. Initially, if the battery voltage is too less, trickle-charge current would be set for charging the battery. Once battery voltage reaches certain level, constant current is supplied for charging, until battery is charged fully. The charging-current decision levels for 48V/12A battery charger are listed below.

- Recharging Current <1.2A, determine the end of charging
- Recharging Current >0.2A, determine the start of charging

(c) Over-temperature protection

The EV charger has a negative temperature coefficient (NTC) thermistor to monitor the temperature and a fan to regulate the heat. When temperature increases, the fan is automatically switched on to dissipate the heat; it gets switched off when the temperature is reduced to the lower set threshold. Also, the fan turns on when charging current is high and turns off when charging current is low.

When NTC temperature >110°C, the charging current will be reduced to 50 per cent of charging current and will be monitored periodically

(d) LED indications for charging status

These are listed below.

- TC charge, red light flashes slowly (0.3 sec on, 0.3 sec off)
- CC, CV charge, red light flashes quickly (0.1 sec on, 0.1 sec off)
- When not charging, green light is on
- When charging time exceeds eight hours, red and green lights are bright

(e) Charging duration

When charging duration is exceeded (duration depends on battery capacity), the voltage drops to FV, the current is reduced to TC, and charger repeatedly monitors the battery voltage.

For better protection, HT45F5Q-2 is isolated from rest of the circuit (i.e., high-voltage components) using a photo-coupler. Battery-level LED indicators are provided for knowing the charging status.

Schematic assembly

The schematic of Holtek EV charger design for 48V/12A type is shown in Fig. 5

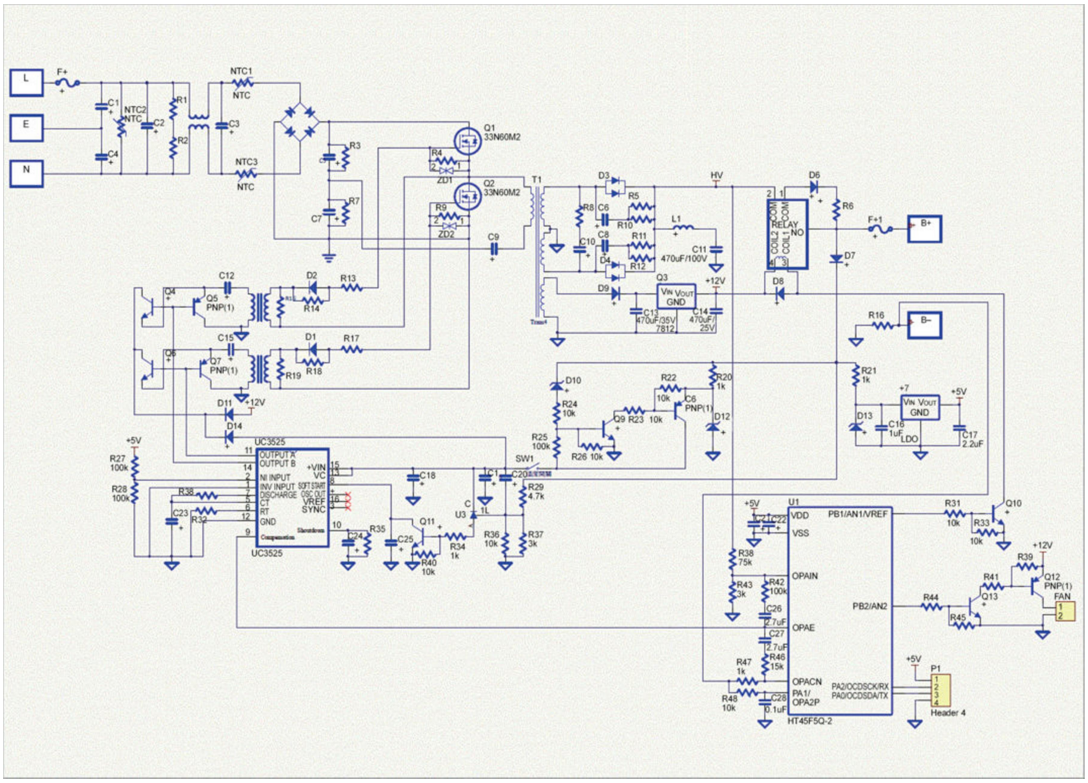


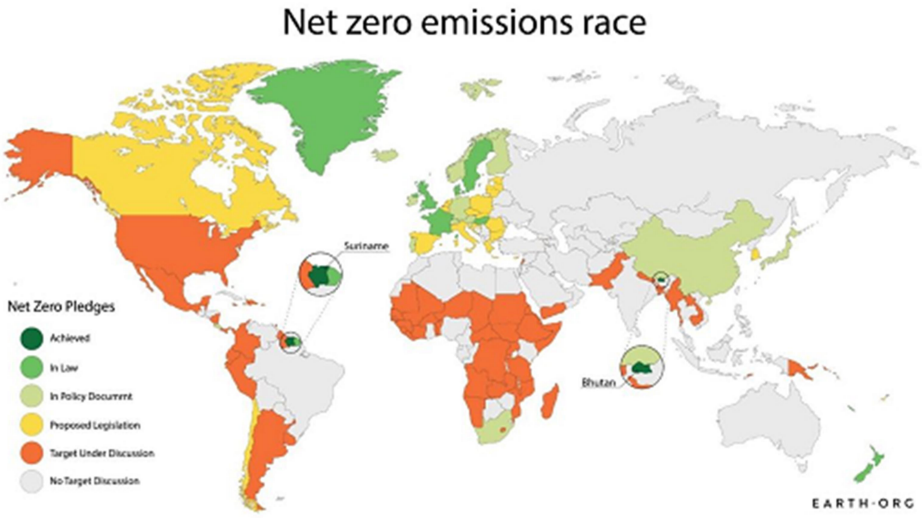
Fig. 5: EV charger schematic for 48V/12A

CURRENT ISSUE

MAKING PEACE WITH OUR PLANET

Pandemic and poverty aside, we are facing a broader ecological crisis as ecosystems are collapsing, biodiversity is disappearing, and oceans are acidifying. Even though the slowdown in economic activity due to the pandemic created a brief drop in global carbon emissions, we cannot escape the cumulative effect of generations of unchecked human activity or ever afford to return to our pre-pandemic emission trajectory. This past year was on track to be one of the three warmest years on record globally, with record-breaking wildfires, hurricanes, floods, and droughts around the world. 2021 will be a decisive year for determining the health of our planet for centuries to come.

There will be a steady drumbeat of calls to action throughout the next year, culminating with landmark UN climate and biodiversity summits at the end of the year in Glasgow, Scotland, and Kunming, China. 2021 will be the time to press the world's major emitters, responsible for the vast majority of greenhouse gas pollution, to submit enhanced 2030 climate targets. A flurry of climate activity and commitments in 2020 — including net-zero commitments from the world's largest emitter, China, and aggressive medium-term targets from the likes of the European Union and the U.K. — will be a foundation to build on in the year ahead.



In fact, more than 110 countries have now committed to carbon neutrality by 2050 and China by 2060. Countries representing more than 65% of global carbon dioxide emissions and more than 70% of the world economy will have made ambitious commitments to carbon neutrality. Indeed, a recent Climate Action Tracker update finds that global warming by 2100 could be as low as a 2.1°C increase over preindustrial levels if all the net-zero pledges announced as of November are achieved. And there is hope for renewed, vigorous action from the U.S., where

the new administration has pledged to join the ranks of these 110-plus countries with its own carbon neutrality target.

If we did this, banks and investors would stop financing fossil fuels. Governments would shift trillions of dollars in subsidies to nature-positive farming and clean energy and water. People everywhere would prioritize health and well-being over consumption and shrink their environmental footprint.

There are signs of progress, but the problems are escalating faster than our responses. We all need to not step up, but leap up, in 2021.

The number of countries promising to work towards net-zero emissions stands at 126. The ask is for all countries to deliver stretched nationally determined contributions ahead of the climate COP and immediately kickstart the transitions to net-zero. At the climate COP, governments must also finally agree on the rules for a global carbon trading market. As we also seek to agree an ambitious post-2020 biodiversity framework that ends fragmentation of our ecosystems, the ask is for us is to feed the world without destroying nature, felling forests and emptying our oceans.

Kenya is emerging as a leader in the fight against plastic pollution and is among the first countries in East Africa to limit single-use plastics and sign the Clean Seas initiative to rid waterways of plastic waste. UNEP/Florian Fussstetter

We can create an amazing economy by moving to circular economic systems that resuse resources, reduce emissions and weed out the chemicals and toxins that are causing millions of premature deaths – all while creating jobs.

Addressing our planetary emergency is a whole-of-society effort. But governments must take the lead, starting with a smart and sustainable recovery from the COVID-19 pandemic that invests in the right places. They must create opportunities for future industries that generate prosperity. They must ensure that transitions are fair and equitable, creating jobs for those who lose out.

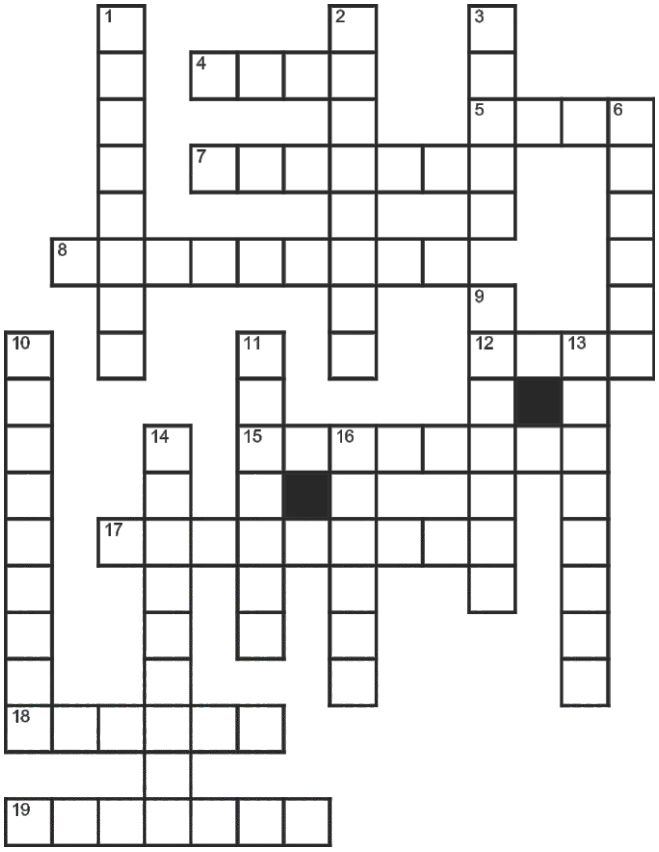
We can do it. The pandemic has shown humanity's incredible ability to innovate and respond to threats, guided by science. In the three planetary crises of climate change, nature loss and pollution, we face an even greater threat than COVID-19. This year, we must make peace with nature and, in every subsequent year, we must make sure that this peace lasts.

WE ALL NEED TO LIVE HERE.

CLEAN UP YOUR MESS

CROSSWORD PUZZLES

Electric Circuits Crossword

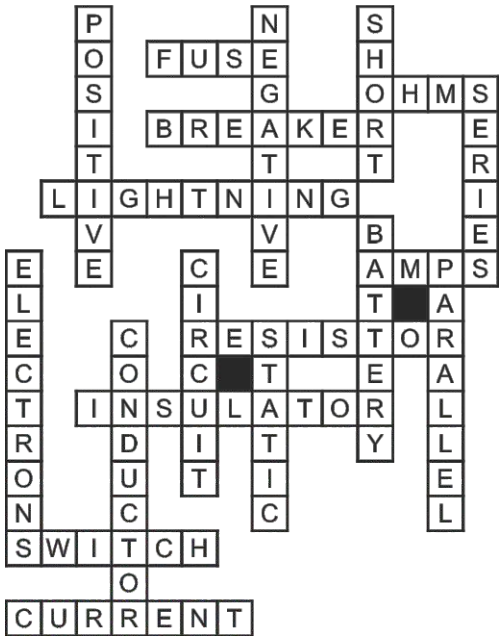


ACROSS

4 A safety device that break a circuit when too much current is flowing. (4)
5 The unit that resistance is measured in. (4)
7 A switch that open a circuit when too much current is flowing. (7)
8 An electric discharge from the sky to the ground during a storm. (9)
12 The unit that current is measured in (for short). (4)
15 A device that resists the flow of electricity in a circuit. (8)
17 A material that doesn't conduct electricity well. (9)
18 A device that will open or close a circuit. (6)
19 The flow of electrons through a material is called electric _____. (7)

DOWN

1 The charge on a proton. (8)
2 The charge on an electron. (8)
3 A type of circuit where current by passes most resistance and large, dangerous currents flow. (5)
6 A circuit with only one path through which electrons flow. (6)
9 A voltage supply used in flashlights and many toys. (7)
10 Electricity is the movement of _____ through a conductor. (9)
11 A path through which electric current flows. (7)
13 A circuit with more than one path through which electrons can flow. (8)
14 A material that conducts electricity will. (9)
16 Kind of electricity resulting from a build up of charged particles. (6)



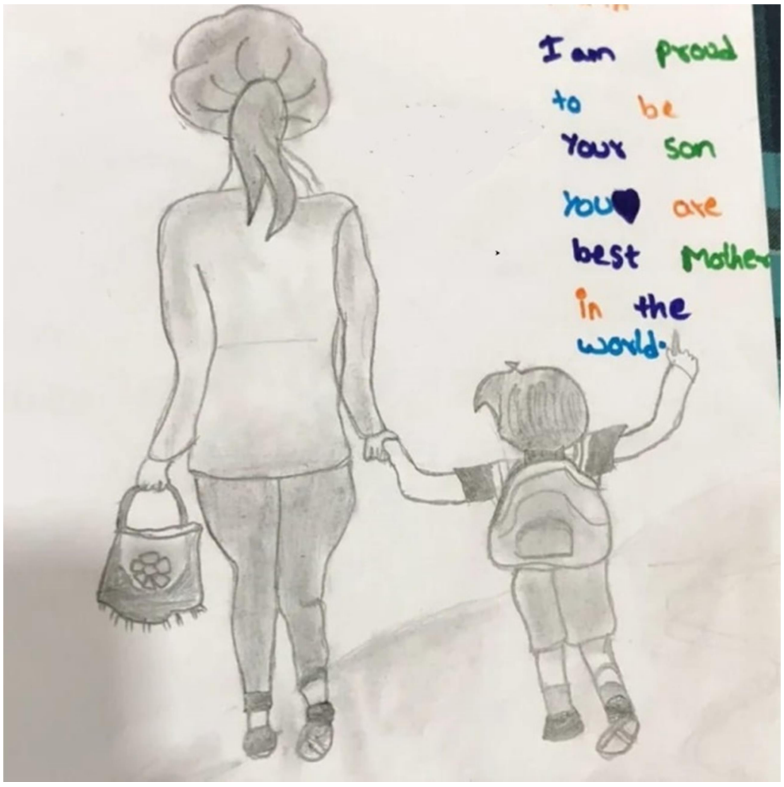
RIDDLES

1). You are in a house with no electricity. you go through the red door, then you go through the black door, then you go through the orange door, then you go through the white door, then you go through the purple door, then you go through the yellow door, then you go through the green door, then you go through the brown door, then you go through the special door. there is an alligator and an electric chair. which would you rather die?
2). A rooster is on top of a house. It lays an egg. What side does the egg row down?
3). you walk into a room with a match, a karosene lamp, a candle, and a fireplace. Which do you light first?
4). what kind of tree can you carry in your hand?
5). you draw a line. Without touching it, how do you make the line longer?
6). what has one eye but cannot see?
7). what can travel around the world while staying in a corner?
8). What is always coming but never arrives?
9). The day before yesterday I was 25 and the next year I will be 28.This is true only one day in a year. What day is my birthday?
10). What mathematical symbol can be placed between 5 and 9 to get a number greater than 5 and smaller than 9?

ANSWERS

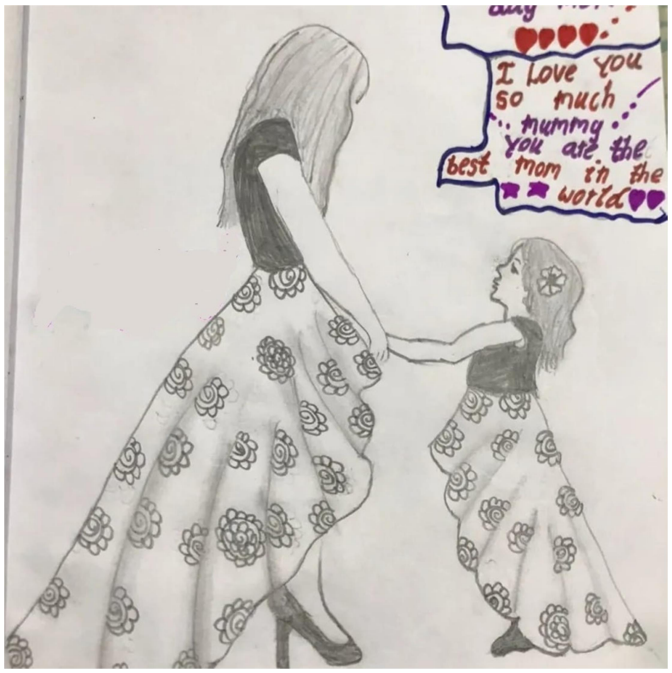
1) The electric chair because there is no electricity.
2) It doesn't. Roosters can't lay eggs!!!!
3) The match
4) A palm
5) You draw a shorter line next to it, and it becomes the longer line
6). A needle
7). Stamp
8). Tomorrow
9). Born on Dec31st and spoke about it on January 1st
10). Decimal – 5.9

FROM BOOKS TO CANVAS



G. Gayatri

-III EEE



P. SHANTI

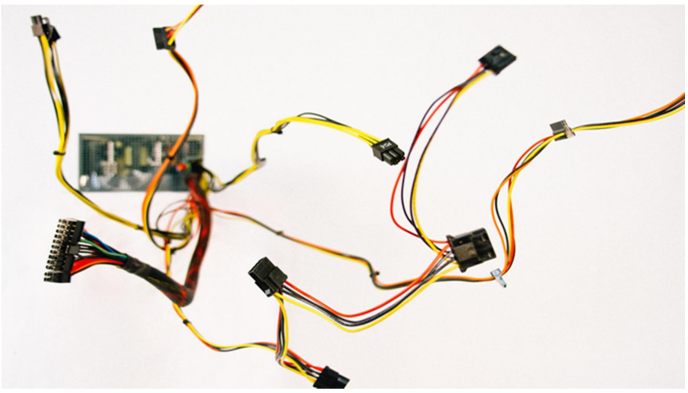
-IV EEE-B

WONDERFUL CLICKS

Notable Electrical Trends in 2022

1. The growth of prefabrication

Within the construction industry as a whole, prefabricated and modular methods constructed away from the job site are a growing trend. The electrical industry is no exception. Using standardised processes to assemble offsite can significantly reduce costs and lead times.



Prefabrication can produce cost savings in terms of materials, labour and estimating. It can mean less running around transporting materials from place to place on a job site and more efficient use of labour. Another advantage of prefabrication is that electrical companies can develop set procedures around it - there is the potential to become more and more efficient as people get used to the procedure.

It is expected that electrical will join other construction trades more with preparing prefabricated components. For example, prefabricated electrical components such as panel builds and lighting packages are being integrated into modular data centre skids, built by construction firms.

2. Increased use of sustainable materials

It is expected that the trend toward sustainable materials and building methods will continue to grow. Data indicates that the construction industry accounts for 40% of worldwide energy usage and 40% of CO2 emissions. There is demand not only for “greener” construction practices but for greener materials.

In the electrical industry, that means more demand for energy-saving features and sustainably-made components. Recycled and reclaimed materials form part of this strategy and can also help to reduce costs.

3. Use of augmented reality

Augmented reality (AR) and virtual reality (VR) are two areas which have been undergoing further development, creating new possibilities for electrical contractors. AR and VR can prove useful for different stages of electrical projects. At the planning stage, contractors might use AR to plan how to wire a building, or how to take the best approach to lighting. During the work phase, AR can be used to “show” someone who is not there what the person is seeing, allowing them to be guided through a task.AR and VR can show real-time interactive and 3D pictures of wiring, as demonstrated by engineers wiring Boeing aircraft. There are also programs to help electrical contractors determine if an area they are looking at is live or not, helping to improve safety.

4. Smart home trends

Technology growth, including the wider spread of 5G, is expected to impact smart home and IoT (Internet of Things) trends. Smart technology is becoming more prolific, cheaper and accessible to more people.

For electrical contractors, this means demand for "smart" installations, both for private residences and commercial buildings. For example:

- Inclusion of smart appliances. This could be almost anything. IoT has created a network of devices for every room in the house.
- "Decor gadgets" such as touch-reactive countertops. The installation of these gadgets will require rewiring in most cases.
- Voice control integrations for more areas of the home or business. Things like doors (including garages) will need to be wired for this.
- Smart lighting and controls for everything from the shower to the heating and cooling.
- Artificial intelligence evolving for smart technology. For example, what used to be hands-free and voice activated may now be hands-free and voice-free, operated by AI and based on personal preferences.

5. Cloud-based tools

Software that helps electrical contractors to manage their work is getting increasingly more advanced. For example, there are cloud-based project management tools and of course, cloud-based take-off software like Count fire.

Increasingly, electrical contractors are able to use these tools on the job site, meaning that updates can be made quickly and there is less need to go back and forth between the job and the office.

The spread of 5G data capabilities is expected to help encourage more usage of these cloud-based tools, as companies integrate them into their daily workflows for better efficiencies.

IMPORTANT WEBSITES

- http://www.electrical4u.com
- www.allaboutcircuits.com
- www.powerstream.com
- www.ciruitlab.com
- www.ieee.org
- www.falstad.com
- www.pcbheaven.com
- www.electrical-engineering-portal.com
- www.electronics.wisc-online.com
- www.allaboutcircuits.com
- www.gutenburg.com
- www.guruengineers.com
- www.electro-tech-online.com
- Http://www.infocobuild.com/education/audio-video-courses/electronics/electronics-and-electrical-engineering.html

SUGGESTED REFERENCES

- ELECTRICAL ENGINEERING BY JB GUPTHA
- ELECTRICAL ENGINEERING BY GALGOTIA
- ELECTRICAL INDIA
- POWER TODAY MAGAZINE
- ELECTRICITY TODAY (TRANSMISSION AND DISTRIBUTION) MAGAZINE

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