TECNO SAVIOR

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Matoshri College of Engineering & Research Centre, Nashik

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Vision

"To Establish Omnipotent Learning Centre Meeting the Standards to Evolve as a Lighthouse for the Society."

Mission

- Setting up state-of-the-art infrastructure
- Instilling strong ethical practices and values
- Empowering through quality technical education
- Tuning the faculty to modern technology and establishing strong liaison with industry
- Developing the institute as a prominent center for Research and Development
- Establishing the institute to serve a Lighthouse for the society

Quality Statement

"We, Matoshri College of Engineering & Research Center are committed to practice a system of Quality Assurance that inculcates quality culture, aiming at quality initiation, sustenance and enhancement of quality comprehensively ultimately leading the institute as Center of Excellence."

Techno savior

Innovation in construction — *Chintaman Bari*

Innovation in construction plays an important role in making building construction faster and sustainable. New Innovation In the Civil Engineering industry emerges continuously with time to increase the efficiency, quality, and sustainability of a construction project.

New emerging new technology in civil engineering is influencing the construction industry like never before. It may be considered from cloud-based collaboration and artificial intelligence-based robots, super-materials, wearable tech, pollution-eating buildings, all contributing to improving the efficiency of the construction industry. So, here are some latest technologies in civil engineering and new ideas in civil engineering to watch in 2015 and beyond.

1. Self-healing Concrete
2. Thermal Bridging
3. Photovoltaic Glaze
4. Kinetic Footfall
5. Kinetic Roads
6. 3D Modelling
7. Modular Construction
8. Asset Mapping
9. Internet of Things
10. Drones

1. Self-healing Concrete

Cement is the most widely used material in construction, but also one of the biggest contributors to harmful carbon emissions, said to be responsible for around 7 percent of annual global emissions.

One major problem is cracking in construction, usually caused by exposure to water and chemicals.

Bath University researchers are looking to develop a self-healing concrete, using a mix containing bacteria within microcapsules, which will germinate when water enters a crack in the concrete, which exact limestone, plugging the crack before water and oxygen has a chance to corrode the steel reinforcement.

2. Thermal Bridging

The demand for efficient insulation material is becoming crucially important throughout the construction industry.The heat through walls tends to be cross directly through the building envelope, be it masonry, block, or stud frame, to the internal fascia such as drywall.This process is called “thermal bridging”. Aerogel, the Nasa technology developed for cryogenic insulation, is considered one of the most effective

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thermal insulation materials, and US spin-off Thermablok has adapted it using a proprietary aerogel in a fiberglass matrix.This can be used to insulate studs, which can considerably increase the overall wall R-value (an industry measure of thermal resistance) by more than 40 percent.

3. Photovoltaic Glaze

Glazing integrated photovoltaic (BIPV) can help buildings generate their own electricity, by turning the whole building envelope into a solar panel.

Polysolar is a company is to provide transparent photovoltaic glass as a structural building material, forming windows, façades, and roofs.The grazing material of Polysolar's is efficient at producing energy even on north-facing, vertical walls, and its high performance at raised temperatures means it can be double glazed or insulated directly.Similarly, provide the saving on energy bills and earning feed-in tariff revenues, its cost is only marginal over the traditional glass, since construction and framework costs remain, while cladding and shading system costs are replaced.

4. Kinetic Footfall

Another technology is kinetic energy which is under development that is Pavegen provides a technology that enables the flooring to harness the energy of footsteps.It may be utilized indoors or outdoors in high traffic areas and generates electricity from pedestrian footfall using an electromagnetic induction process and flywheel energy storage.The Kinetic footfall is most efficient to transport hubs where a large flow of people will pass over it.

5. Kinetic Roads

The utility of kinetic energy potential in roadways is exploring by Italian startup Underground Power.

The company has developed a technology called Lybra, a tire-like rubber paving that converts the kinetic energy produced by moving vehicles into electrical energy.This technology is developed in collaboration with the Polytechnic University of Milan, Lybra operates on the principle that a braking car dissipates kinetic energy.

6. 3D Modelling

Innovative planning concepts have been driven by the growth of smart cities. For that purpose, the software developed CyberCity3D is geospatial modeling that specializes in the production of smart 3D building models.It helps in creating smart digital 3D buildings to help the architectural, engineering, and construction sectors visualize and communicate design and data with CC3D proprietary software.

These models can be integrated with 3D geographic information system platforms, such as Autodesk and ESRI, and can stream 3D urban building data to Cesium's open architecture virtual 3D globe.

It delivers data information for urban, energy, sustainability, and design planning, and works in conjunction with many smart city SaaS platforms such as Cityzenith.

7. Modular Construction

It includes the building constructed off-site using the same materials and designed of the same standards as conventional on-site construction.It also helps in limiting environmental disruption, delivering components as and when needed, and turning construction into a logistics exercise.It also offers strong sustainability benefits, from fewer vehicle movements to less waste. By using this method with up to 70 percent of a building produced as components, it allows a move towards “just in time” manufacturing and delivery.This method is currently popular in the United States and the UK, Chinese developer Broad Sustainable Building recently completed a 57-story skyscraper.

8. Asset Mapping

This technique focuses on operational equipment, including heating and air conditioning, lighting, and security systems, collecting data from serial numbers, firmware, engineering notes of when it was installed and by whom, and combines the data in one place.It shows engineers in real-time on a map where the equipment needs to be installed and, once the assets are connected to the real-time system using the internet.These can be operated via the web, app, and other remote devices and systems.
Asset mapping helps customers build databases of asset performance, which can assist in proactive building maintenance, and also reduce building procurement and insurance costs.

9. Internet of Things

Internet of Things, abbreviated as IoT, indicates a lot of devices connected to each other so that they can transfer the data. This can help in inducing smart technologies even in the construction field.With the application of this technology, smart machines can be invented that can run and maintain on their own-especially for repetitive tasks.Improved accuracy and functionality of Geo-Location can help in tracking the dangerous areas and thus helps in avoiding accidents. Moreover, smart technologies can also be employed to reduce the carbon footprint.

10. Drones

Earlier on, smart technologies were not quite used in the construction field. However, the scenario is changing and with the advent of new technologies, construction is also becoming smarter and less tedious.

Techno savior

Construction Challenges for Bridges in Hilly Areas *U.P.Naik*

Source : https://usharama.edu.in/blogDetail/construction-challenges-for-bridges-in-hilly-areas

Himalayas have been considered as a vast repository of valuable medicinal herbs, minerals, forest resources etc since the Vedic times. While the Vedic literature followed by the writings of Susruta, Charaks, Nagarjuna, Dhanwantri, Balmiki, Parashar and various other saints, bear statement to it. "Alexander, The Great", who was much influenced because of its scenic beauty, healthy climate and agro climatic conditions, made a great publicity of the Himalayan Herb Science in Yunan and Rome during middle ages. This potential, however, remained unexploited especially in higher reaches due to insufficient means of communication. While after independence, Govt. of India, gave a unique emphasis on road construction in order to bring socio-economic up-liftment of tribal inhabitants. But due to lack of proper planning it resulted in serious ecological imbalances.

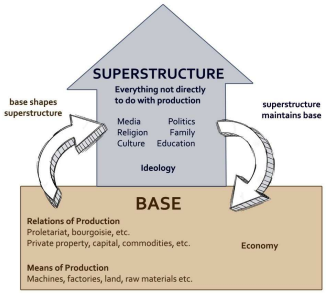
Bridge Foundation and Substructure

Foundation construction for any large bridge takes time and the problems that encounter during the construction of foundation depend upon type of foundation you select, soil strata encountered, equipments and plant deployed and even logistic problems play vital role. While the construction difficulties anticipated during the execution can be kept in view while as planning works for a period for the job. However, foundation can be opened foundation, well foundation, pile foundation, or any other types of foundation.

In case of well foundation, the various type of soil are encountered and it becomes difficult to give any clear time schedule about the sinking of wells unless the soil details are very clear and the anticipated profile matched with the actual encountered. In case of bouldery and clayey soil the rate of sinking schedule is likely to be slow when compared with the sandy soil. Also there may be requirement of pneumatic sinking technique subsequent to open grabbing due to difficulties in sinking of well.

As the cost of pneumatic sinking is very high, this should be deployed judiciously. In such cases, there is need to keep the details of all the sinking difficulties in a systematic order and this can be reviewed in consultation with decision making authority.

Superstructure



For particular site there are numerous structural arrangements which need to be look in. Whereas, the final proposal needs to be made based on the greater examination of site condition may be technical,

aesthetic and construction methodology. However, there should be special care need to be taken in case of deep gorge where there is sizable difference between soffit level and bed level. This may pose difficulties for staging and shuttering. Proposal recommended for site should be well read in advance. After the proposal has been finalized for particular bridge, the construction can be planned. The quantities of each items involved and execution method be listed. Basically method statement should be kept ready for overall execution including job estimate. This data will be kept to ensure smooth progress of project.

Management of Construction Activities

Management of bridge construction demands that construction manager to reorient all the resources in such a way that the project is completed without any time/cost overrun. Output of the work depend upon how best the activities are managed which will vary from site to site based on many factors. Based on the experience, various aspects be identified for efficient construction management. Schedule of construction based Critical Path Method (CPM) be prepared along with major milestone and Bar Charts. Latest software management tool can be used for this in case of a major bridge project. Design of Bridge is a post sanction in case of departmental construction and after tendering action in case of bridges throughout contract. It is necessary that design must be preceded by at least six to eight months or say 50% ahead of execution of concerned event. It has to be ensured that this should be completed well in time. Revised design if any should be updated and clarified without delay. Observation on the approved design drawing if any be passed to design office immediately to make the changes. This is most important in case of foundation where design soil parameter needs to be adhered to. These may vary on actual execution and require review of design.

Electric Machines : *Dhanshree Mundhe*

Source: https://www.electrical4u.com/electric-machines/

The machines which are operated in relation with electrical energy are called **electric machines** or **electrical machines**. In **electrical machines**, either input or output or both can be electricity.

Types of Electrical Machines

The electric machines are of three main types, transformer, generator, and motor.

Electrical Transformer: In the transformer, both input and output are electrical power.

Electrical Generator: In a generator, the input is mechanical power and the output is electrical power.

Electrical Motor: In a motor, the input is electrical power and output is mechanical power.

Electrical Machines can also be categorized as static machine and dynamic machine.

The transformer is an example of static electrical machine.Motor and generator both are dynamic electrical machine

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Transformer: Transformer works on the principle mutual induction. There is an iron core which links windings of transformer. The flux in the core links both primary and secondary winding due to which voltage induced in the windings. The working principle of transformer can be described as follows. The alternating voltage is applied to the primary winding due to which magnetizing current flows through the primary winding and as a result magnetizing flux produced and concentrated in the closed low reluctance magnetic core path. This flux links with both primary and secondary winding. Voltage is self-induced in the primary winding and mutually induced in the secondary winding. Induced voltage per turn in both primary and secondary winding is the same. The voltage across the windings depends on the number of turns in the winding.

Depending on the voltage level there are two types of transformers, step up transformer and step down transformer. Step up transformers are for increasing the voltage level of electricity. Step down transformers are for decreasing voltage level of electricity.

Depending on the uses transformers are categorized as power transformer, distribution transformer and instrument transformer.

Depending on the design criteria the transformer are categorized as two winding transformer and auto transformer.

Depending on the insulation system the transformers can be categorized as oil immersed transformer and dry type transformer.

Depending on the operating phase a transformer can be either single phase transformer and three phase transformer.

Three Phase transformer can also be single unit three phase transformer and multi-unit three-phase transformer.When a conductor is moved in a magnetic field, emf is induced in the conductor. This is the principle of dynamically induced emf. Depending on that principle, all electrical generators work.

There are two types of generator – DC generator, AC generator or alternator.

DC Generator: In DC generator armature (assembly of conductors) is the rotor and electromagnetic poles are attached on the stator. When the rotor rotates in the stator alternating current is induced in the armature and collected through commutator segments attached to the shaft of the motor. The generated alternating current in the armature gets converted to direct current through commutator.

AC Generator: In an alternator, the armature is attached to the inner periphery of the stator. The electromagnet rotates in the stator. The electricity generated in the static armature is directly fed to the external circuit. The DC source supplies power to the rotor electromagnet through slip rings.

The electric motors can categorised as a DC motor or an AC motor.

DC Motor: these motors are fed by DC supply through commutator segments attached to the shaft of the motor. The motor rotates on basis of Fleming's left hand rule. DC motor can be categorised as separately excited DC motor, shunt wound DC motor, series wound DC motor, compound wound DC motor.

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There are two types of AC motor. Induction Motor and synchronous motor.

Induction Motors: These are further categorised as single phase induction motor and three phase induction motor. An induction motor can use a squirrel cage rotor or a wound type rotor. In an induction motor rotating magnetic field is produced when the motor is supplied by electricity. This rotating magnetic field interacts with the rotor conductors and due to which current gets induced the conductors. The induced current through the rotor conductors is caused due to relative motion between rotor and stator. To reduce the cause of induced current, the rotor tries to catch the rotation of the magnetic field. As a result, the rotor rotates.

Synchronous Motor: In a synchronous motor, a rotating magnetic field is produced in the stator. Here rotor of the motor is an electromagnet and it is magnetically locked with the rotating magnetic field and hence the rotor rotates.

How Electrical Engineers Are Helping Save Energy — *Pragati Bhpakar*

Source https://www.eeweb.com/how-electrical-engineers-are-helping-save-energy/

The potential for engineers to become power heroes is massive as electrical engineering will slowly but surely creep into the forefront of the global sustainability movement.Electrical engineers play an important role in saving energy. In this way, an electrical engineer's expertise is also crucial when it comes to climate change adaptation and mitigation.Today, electricity generation is one of the leading causes of carbon dioxide emissions. In this article on Born To Engineer, experts state that if nothing is done, emissions are expected to increase by at least 35% by 2035.Although there are many "green" professions that one can pursue to help reduce emissions, electrical engineers play an essential role in reducing the world's overall power consumption. They are the ones with the knowledge and skill to innovate new devices that conserve energy as well as improve current technologies to be more energy-efficient.Electronic devices today function only as a result of energy that is harnessed from natural resources. Unfortunately, we, as a race, are consuming energy from non-renewable sources at an alarmingly high rate. In fact, research from the article on Born to Engineer suggests that about 13 times more energy is being used today than was used in 1950..What is causing this massive increase in energy consumption? Consider the example of a standard automobile. Experts at Texas Instruments state, "Today's gas-powered vehicle uses a whopping 3.5 kilowatts to power the overall system, which includes an ever-growing number of entertainment systems and safety applications along with standard features and functionality." The numbers show that automobiles have increased their energy consumption by about 100 watts per year every year since the early 1980s.Automobiles are just one example among a multitude of different developments, such as the cloud, the internet of things (IoT), and more, that rely on proper energy management to keep functioning. That's why now, more than ever, electrical engineers are focusing on inventing ways to improve power system efficiency.

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In these ways and many others, electrical engineers are vital to energy consumption and conservation. Unfortunately, while green engineering continues to evolve, the part played by electrical engineers specifically is often overlooked. This lack of awareness with regard to the role that electrical engineers have in securing a more energy-efficient future begs the question: Why aren't more engineers pursuing a career in power consumption? According to the experts at Texas Instruments, the answer lies in the fact that students aren't aware of the "societal implications [that] a role in power plays until they are well into their education and have likely decided on a different career path." Additionally, students are often unaware of what it means to be a power electric engineer in today's environmentally fragile world.

How to save electrical energy at home — *N.C.Ghuge*

Source : https://electrical-engineering-portal.com/how-to-save-electrical-energy-at-home

In our home we use lot of like TV, Freeze, Washing machine, Mp3 player, music system, computer laptop. But we have not adequate knowledge for how to use this electrical equipment in proper way.

Lighting

- Get into the habit of off when you leave a room. —-Saving Energy 0.5 %
- Use task lighting (table and desktop lamps) instead of room lighting.
- Take advantage of daylight
- De-dust lighting fixtures to maintain ——Saving Energy 1 %
- Compact fluorescent bulbs (CFL):
- CFL use 75% less energy than Normal bulbs.
- CFL are four times more energy efficient than Normal bulbs.
- CFL can last up to ten times longer than a normal bulb.
- Use electronic chokes. in place of conventional copper chokes.—-Saving Energy 2 %
- Get into the habit of turning lights off when you leave a room.
- Use only one bulb for light fittings with more than one light bulb, or replace additional bulbs with a lower wattage version.
- Use energy-saving light bulbs that can last up to ten times longer than a normal bulb and use significantly less energy. A single 20- to 25-watt energy-saving bulb provides as much light as a 100-watt ordinary bulb.
- Use tungsten halogen bulbs for spotlights—they last longer and are up to 100% more efficient.
- Fit external lights with a motion sensor.
- Use high frequency fittings for fluorescent tubes because they cut flicker and are even more efficient than energy-saving light bulbs. They are suitable for kitchens, halls, workshops and garages.

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Save on Your Fridge & Freezer:

- Defrost your fridge regularly.
- Check that the door seals are strong and intact.
- Don't stand Freezer's Back Side too near the Wall.
- Avoid putting warm or hot food in the fridge or freezer—it requires more energy to cool it down.
- Clean condenser coils twice a year.
- Get rid of old refrigerators! They use twice the energy as new Energy Star® models.
- Keep refrigerators full but not overcrowded.
- Defrost your fridge regularly. When ice builds up, your freezer uses more electricity. If it frosts up again quickly, check that the door seals are strong and intact.
- Do not stand the fridge next to the oven or other hot appliances if you can help it. Also ensure there is plenty of ventilation space behind and above it.
- Keep the fridge at 40°F and the freezer at 0°F. Empty and then turn your fridge off if you go on a long vacation (but make sure you leave the door open).
- Aim to keep your fridge at least three-quarters full to maintain maximum efficiency. A full fridge is a healthy fridge.
- Avoid putting warm or hot food in the fridge or freezer—it requires more energy to cool it down.

Air Condition Unit

- For Home Purpose use Window unit Instead Of Split Unit.
- For Office and Commercial Purpose Use Split AC instead of Window unit.
- Consider installing a programmable t. Just set the times and temperatures to match your schedule and you will save money and be comfortably cool when you return home.
- Get air conditioner maintenance each year.
- Checks the condenser coils, the evaporator coils, the blower wheel, the filter, the lubrication and the electrical contacts.
- Replace worn and dirty equipment for maximum efficiency.
- Replace air conditioner filters every month.
- Turn off central air conditioning 30 minutes before leaving your home.
- Consider using ceiling or portable fans to circulate and cool the air.
- Try increasing your air conditioner temperature. Even 1 degree higher could mean significant savings, and you will probably not notice the difference.
- Keep central air conditioner usage to a minimum—or even turn the unit off – if you plan to go away.
- Consider installing a programmable thermostat. Just set the times and temperatures to match your schedule, and you will save money and be comfortably cool when you return home.

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- Get air conditioner maintenance each year – ensure your service person checks the condenser coils, the evaporator coils, the blower wheel, the filter, the lubrication and the electrical contacts. Replace worn and dirty equipment for maximum efficiency.
- Replace air conditioner filters every month.
- Buy the proper size equipment to meet your family's needs – an oversized air conditioner unit will waste energy.
- If you have a furnace, replace it at the same time as your air conditioner system. Why? Because it is your furnace fan that blows cool air around your home, and a newer furnace fan provides improved air circulation all year round, plus saves energy costs.

Water Heater

- Check your hot water temperature. It does not need to be any higher than 140°F for washing purposes.
- Plug the basin or bath when you run any hot water.
- Use a timer to make sure the heating and hot water are only on when needed.
- Insulate your hot water pipes to prevent heat loss, and your water will stay hotter for longer. Plus, you will also use less energy to heat it. And simply fitting a jacket onto your hot water tank can cut waste by up to three quarters.
- Take showers—a bath consumes 5 times more hot water. Buy a low-flow showerhead for more efficiency and it will pay for itself in no time.
- Avoid washing dishes under hot running water, and do not pre-rinse before using the dishwasher.
- Repair dripping hot water taps immediately
- Make sure hot water taps are always turned off properly.

Washing Machine

- Wash full loads of Washing Machine—you will use your machine less often, saving time, and it is more energy-efficient.
- Wash at a lower temperature or the economy setting to save even more.
- Use the spin cycle, and then hang washing out rather than tumble drying—your clothes and linens will smell fresher!
- If you need to tumble dry, try a lower temperature setting.
- Use your dryer for consecutive loads, because the built-up heat between loads will use less energy.

Oven/Electrical Cooker

- Make sure your oven door closes tightly.
- Use a microwave rather than conventional oven, when possible.

- Keep the center of the pan over the element, and keep the lid on when cooking on the stovetop.
- Only boil the amount of water that you need—just ensure there is enough water to cover the heating element. Turn the element or electric kettle down as soon as it reaches the boiling point.

Computer / Laptop

- Buy a laptop instead of a desktop, if practical. —-Saving Energy 5 %.
- If you buy a desktop, get an LCD screen instead of an outdated CRT.
- Use sleep-mode when not in use helps cut energy costs by approx 40%.
- Turn off the monitor; this device alone uses more than half the system's energy.
- Screen savers save computer screens, not energy.
- Use separate On/Off switch Socket Instead of One.
- Laser printers use more electricity than inkjet printers.

Fan

- A ceiling fan in operation through out night will gobble up 22 units in a month.
- There is a wrong notion that fan at more speed would consume more current.
- Fan running at slow speed would waste energy as heat in the regulator.
- The ordinary regulator would take 20 watts extra at low speed.
- The energy loss can be compensated by using electronic regulator

Buy efficient electric appliances:

- They use two to 10 times less electricity for the same functionality, and are mostly higher quality products that last longer than the less efficient ones. In short, efficient appliances save you lots of energy and money.
- In many countries, efficiency rating labels are mandatory on most appliances. Look Energy Star label is used.
- The label gives you information on the annual electricity consumption. In the paragraphs below, we provide some indication of the consumption of the most efficient appliances to use as a rough guide when shopping. Lists of brands and models and where to find them are country-specific and so cannot be listed here, but check the links on this page for more detailed information.
- Average consumption of electric appliances in different regions in the world, compared with the high efficient models on the market.

Ghost consumers:

- Identify the "ghost consumers" which consume power – not because they are in use, but because they are plugged in and are in stand-by mode.
- The TV consumes 10 watt power When It's is in Stand by Mode.

Techno savior

Electrical safety tips homeowners should know *S.S.Khule*

Electric maintenance is an important requisite in our household, but can be very dangerous if handled callously. Most of the electricity-related accidents that occur in homes are due to lack of knowledge on electrical safety & knowhow. Here are some tips to prevent accidents & electrical oversights:

1. All electrical equipment should be in proper working condition
One of the primary causes for short circuits in the electrical system is equipment that is not working or plugged in properly. Hence, all the electrical equipment in the house should be checked for malfunctions.

2. Main Power Off
Power switched on during any work on the home's electrical system can be a major reason for shocks & accidents. Always switch off the main power during major electrical maintenance activities. In case of small power outlet related maintenance, always switch off the plug point and work.

3. Warm & Cold Power Outlets
At times, warm power outlets can signal a variety of problems, from overloaded electrical circuit to shot up wiring. Hence, check all the outlets in the house once every month by placing your hand on the outlets in your home. Warm or hot outlets signal trouble.

4. Fire Extinguisher
Always have a fire extinguisher handy in the house. Water is a good conductor of electricity & hence should never be used to put out any electric fire, big or small.

5. Ground Older Appliances
Your old appliances might develop grounding issues as a result of normal wear & tear. This can put you at a risk of shock. Ensure all of your appliances have three-pronged plugs that can properly connect to a grounded outlet. Any kitchen appliances with just two-pronged plugs should be replaced.

6. Expert Intervention
In case of any doubt, one should consider the help of an expert. Always reach out to a well-trained electrician if an issue seems out of hand and needs more intervention.

7. Rooms with running water need to be equipped with Ground Fault Circuit Interrupters
GFCI's shut off the electrical current from a circuit whenever it detects that the circuit has become a shock hazard. It is imperative that they are installed in the bathroom, kitchen and laundry room to avoid any mishaps.

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8. Do not use extension cords for longer durations time

Extension cords should never be considered as a permanent source of power. Though they are great for temporary usage, but if you end up using an extension cord all the time, then you should think of getting an outlet installed instead.

9. Overloading

Always avoid overloading a single outlet. Outlets are made to put out a certain amount of energy. Multiple high-wattage appliances plugged into the same outlet can be very unsafe. If you can't rearrange your appliances to different outlets, consider installing a new outlet to relieve some of the stress on the original outlet.

Difference between Computer Hardware Engineer and Computer Software Engineer — *Shital Wagh*

Source: https://www.geeksforgeeks.org/difference-between-computer-hardware-engineer-and-computer-software-engineer/

Computer hardware engineers research, develop and test hardware or computer equipment/components. They works in lab and develop new hardware components. they troubleshoots hardware problems. They have extensive knowledge of the physical components of computers, like circuit boards, processors, chips, and other electronic components. They typically works in lab.

HP, Samsung, Intel, AMD, IBM, Toshiba, Sony etc companies take computer hardware engineers for hardware product development. Computer software engineers design, develop, test software, maintains computer network and programs. They just work with a computer and perform their tasks by writing programs. They solves complex problems of real life by bringing any software solution for that. They have extensive knowledge of designing architecture, writing code by using programming languages, performing testing and deploying the product. They typically works in office.

1. Computer hardware engineers research, develop and test hardware or computer equipment/components. Computer software engineers design, develop, test software, maintains computer network and programs.
2. Hardware engineers need electrical and computer engineering degree. Software engineers need software engineering or computer science degree.
3. Computer hardware engineers troubleshoots hardware problems. Computer software engineers solves complex problems of real life by bringing any software solution for that.
4. Computer hardware engineers works in lab and develop new hardware components.Computer software engineers just with a computer performs their work by writing programs.
5. They have extensive knowledge of the physical components of computers, like circuit boards, processors, chips, and other electronic components. They have extensive knowledge of

designing architecture, writing code by using programming languages, performing testing and deploying the product.

6. Computer hardware engineers typically works in lab. Computer software engineers typically works in office.
7. High analytical, Initiative, Creative, Persistence, Innovation, Integrity, Independence, Cooperation, Self Control, Dependability, Adaptable, Attention to Detail etc are the personality of computer hardware engineer. Analytical Thinking, Initiative, Focus, Independence, Innovation, Leadership, Self Control, Persistence, Dependability, Reasoning, Information Ordering, Deductive, Originality etc. are the personality of computer software engineer.
8. In general computer hardware engineers get more salary than computer software engineers.In general computer software engineers get less salary than computer hardware engineers.
9. 09HP, Samsung, Intel, AMD, IBM, Toshiba, Sony etc. companies take computer hardware engineers for hardware product developmentApple, eBay, Facebook, Google, IBM, Infosys, TCS, Wipro etc companies take computer software engineers for software product development.

What is a CPU Die Shrink and What Does it Mean for the Future?

Chandan Wagh

https://www.exxactcorp.com/blog/HPC/what-is-a-cpu-die-shrink-and-what-does-it-mean-for-the-future-

Central processing units (CPUs) are constantly becoming smaller and denser, resulting in more power and efficiency. Ever since Intel's first Pentium CPU was released using a 0.8 micrometer (µm) manufacturing process, CPUs have drastically decreased in overall size. Fractions of a micrometer were the standard die size for a decade. Then with the release of the second iteration of the Intel Pentium III processor, the switch was made to nanometer (nm), which is 1/1000 the size of a micrometer. The processor itself ended up using a mere 180 nm die shrink.

The term die shrink, also called optical shrink or process shrink, refers to semiconductor scaling of semiconductor devices, specifically transistors. "Shrinking a die" is to create an identical circuit using advanced fabrication processes that typically involve an advance lithographic node. Since the release of the Intel Pentium III processor, nanometers continues to be the current size for any and all CPU transistors.

Current Die Sizes

To provide a concrete example, we'll compare CPU transistors to a human hair strand using the above image. The thicker strand in the image is a piece of human hair and the smaller strand is 6 µm carbon filament. We mentioned previously that Intel's first Pentium processor utilized 0.8 µm transistors, which is smaller than the 6 µm carbon filament and is considered large in today's CPU microarchitecture standards. The current mainstream standard offered by both Intel and AMD is 14

nanometers (nm). Remember, one nanometer is 1/1000 the size of a micrometer, making it substantially smaller than the carbon filament. Intel's 14 nm microarchitecture is called Kaby Lake and includes the "7th Gen" 7000 series of processors. Kaby Lake was originally meant to be a die shrink, but due to the growing amount of hurdles that comes with dealing with continually decreasing sizes, Kaby Lake was instead optimized at the 14 nm level.

The Future of CPU Microarchitectures

Despite the struggles faced by Intel and AMD to keep up the pace of doubling the transistor count every two years, progress continues to be made, albeit at a slightly slower pace than was previously possible. Intel was known for creating the "tick-tock" release schedule for their CPU microarchitecture. The "tick" part of the schedule was a die shrink and the "tock" was a brand new microarchitecture design. Intel has now switched to "process-architecture-optimization" model which essentially introduces a second optimization release to allow for more time to further shrink the processor die.

Thanks to improvements in lithography techniques, 10nm CPUs are on the way. To truly appreciate how small 10 nm is, it is comparable to the size as a single protein chain. Intel's 10nm Cannonlake microarchitecture is expected to be released Q4 of this year, assuming there are no more unforeseen delays. According to Intel, Cannonlake brings with it a 15% performance increase over the previous microarchitecture, Kaby Lake. Benchmark numbers have yet to be released, but there is little doubt that the switch to 10 nm will be both a monumental and beneficial step forward for CPU architecture and the consumers waiting so patiently for it.

How do I fix high CPU usage? — *Kaveri Gaidhani*

If you've looked at the Processes tab and found that the issue can't be attributed to uniquely demanding apps, it very well could be the result of a bug in an otherwise inconspicuous process. While any number of different issues could be plaguing your computer, let's explore a few of the most common causes, and how to diagnose and troubleshoot high CPU usage:

The WMI Provider Host process

The WMI Provider Host process—which typically appears as Service Host: Windows Management Instrumentation in your Processes tab—is an important part of Windows that often runs in the background. The process is used to monitor a large number of systems on a given network, and if its CPU usage is any higher than a few percentage points, that may be a sign your system is struggling with a pernicious bug.The quickest solution to this problem is the oldest one in the IT troubleshooting book: turn off the process and then turn it back on again. Use Windows Search to find Services.msc, find Windows Management Instrumentation in the window that appears, right click it, then select Restart. That should restart the service, but if you prefer, you can also simply restart your computer.If this doesn't work, the WMI Provider host may simply be dealing with another process that is the real

source of the problem. Open the Windows Event Viewer and select Applications and Service Logs, then Microsoft, then Windows, WMI-Activity, and Operational. Look for recent error entries and take down the ClientProcessID for every error you suspect is contributing to the problem. Go back to the Task Manager, click the Services tab, and sort the list by order of process ID. You can run your list of suspect processes against this list to identify the source of your malfunction.

Too many background processes

Any computer is bound to have background processes—which are run without the user opening them in a window—taking up a percentage of CPU. But as time goes on and more applications are downloaded, those background processes can accumulate and begin to take up a nontrivial amount of resources. These processes can be stopped by unchecking them in the Startup tab, then restarting your computer, which will prevent them from being started again automatically when you turn on your device.

A virus or an antivirus

The causes of high CPU usage are wide-ranging—and in some cases, surprising. Slower processing speeds could easily be the result of either the antivirus program you are running, or a virus that the software was designed to stop.Constantly scanning your hard drive for potential threats can take up a surprising amount of CPU power, especially if you're using an older device or OS. If the device starts lagging at random times, it might be the result of an antivirus that's eating into your processor load. To stop it, use your antivirus's scheduling function to make sure it only scans your device during times that you aren't likely to use it.Alternatively, you may have a piece of malware running on your computer that is sucking up all the processing power from your CPU, whether by running several background processes or attempting to spread itself via your email and social media. Identifying a virus on your computer isn't easy—even scanning your device with an antivirus may not work, as many forms of malware run something called "anti-forensics" that prevents them from running if they detect security software installed on your device. Try either scanning with multiple antivirus tools or performing a manual virus removal.

Applications of Java with Real-world Examples — *Aboli Patil*

We know that Java is the "King of all programming languages". Since its foundation, this language has become a backbone for billions of devices and applications.

This language is continually ranked first in the rankings of software developers as the best choice of programming languages. Java is used in the majority of applications, from mobile phones to enterprise servers and computing platforms.

Below is the Java applications list:

- Desktop GUI Applications
- Mobile Applications

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- Enterprise Applications
- Scientific Applications
- Web-based Applications
- Embedded Systems
- Big Data Technologies
- Distributed Applications
- Cloud-based Applications
- Web servers and Application servers
- Software Tools
- Gaming Applications

We come to know that Java is a **"blue-collared" language**, touching every field of software development. It can be used according to business needs. With these applications, we realize the need for Java in the real-world.

When we need to develop a **secure** and **scalable** application, we should definitely opt to go with Java as it has dominant security features. This is the reason why many banking applications that require lots of security concerns are preferably developed in Java.

Telecommunication, science and practice — *M.N.Navale*

Source : https://www.britannica.com/technology/telecommunication/Multiple-access

Telecommunication, science and practice of transmitting information by electromagnetic means. Modern telecommunication centres on the problems involved in transmitting large volumes of information over long distances without damaging loss due to noise and interference. The basic components of a modern digital telecommunications system must be capable of transmitting voice, data, radio, and television signals. Digital transmission is employed in order to achieve high reliability and because the cost of digital switching systems is much lower than the cost of analog systems. In order to use digital transmission, however, the analog signals that make up most voice, radio, and television communication must be subjected to a process of analog-to-digital conversion. (In data transmission this step is bypassed because the signals are already in digital form; most television, radio, and voice communication, however, use the analog system and must be digitized.) In many cases, the digitized signal is passed through a source encoder, which employs a number of formulas to reduce redundant binary information. After source encoding, the digitized signal is processed in a channel encoder, which introduces redundant information that allows errors to be detected and corrected. The encoded signal is made suitable for transmission by modulation onto a carrier wave and may be made part of a larger signal in a process known as multiplexing. The multiplexed signal is then sent into a multiple-access transmission channel. After transmission, the above process is reversed at the receiving end, and the information is extracted.

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Analog-to-digital conversion

In transmission of speech, audio, or video information, the object is high fidelity—that is, the best possible reproduction of the original message without the degradations imposed by signal distortion and noise. The basis of relatively noise-free and distortion-free telecommunication is the binary signal. The simplest possible signal of any kind that can be employed to transmit messages, the binary signal consists of only two possible values. These values are represented by the binary digits, or bits, 1 and 0. Unless the noise and distortion picked up during transmission are great enough to change the binary signal from one value to another, the correct value can be determined by the receiver so that perfect reception can occur.

Sampling

Analog-to-digital conversion begins with sampling, or measuring the amplitude of the analog waveform at equally spaced discrete instants of time. The fact that samples of a continually varying wave may be used to represent that wave relies on the assumption that the wave is constrained in its rate of variation. Because a communications signal is actually a complex wave—essentially the sum of a number of component sine waves, all of which have their own precise amplitudes and phases—the rate of variation of the complex wave can be measured by the frequencies of oscillation of all its components. The difference between the maximum rate of oscillation (or highest frequency) and the minimum rate of oscillation (or lowest frequency) of the sine waves making up the signal is known as the bandwidth (B) of the signal. Bandwidth thus represents the maximum frequency range occupied by a signal. In the case of a voice signal having a minimum frequency of 300 hertz and a maximum frequency of 3,300 hertz, the bandwidth is 3,000 hertz, or 3 kilohertz. Audio signals generally occupy about 20 kilohertz of bandwidth, and standard video signals occupy approximately 6 million hertz, or 6 megahertz.

Quantization

In order for a sampled signal to be stored or transmitted in digital form, each sampled amplitude must be converted to one of a finite number of possible values, or levels. For ease in conversion to binary form, the number of levels is usually a power of 2—that is, 8, 16, 32, 64, 128, 256, and so on, depending on the degree of precision required. In digital transmission of voice, 256 levels are commonly used because tests have shown that this provides adequate fidelity for the average telephone listener.

Bit mapping

In the next step in the digitization process, the output of the quantizer is mapped into a binary sequence. .It is apparent that 8 levels require three binary digits, or bits; 16 levels require four bits; and 256 levels require eight bits. In general 2n levels require n bits.

Source encoding

As is pointed out in analog-to-digital conversion, any available telecommunications medium has a limited capacity for data transmission. This capacity is commonly measured by the parameter called bandwidth. Since the bandwidth of a signal increases with the number of bits to be transmitted each second, an important function of a digital communications system is to represent the digitized signal by

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as few bits as possible—that is, to reduce redundancy. Redundancy reduction is accomplished by a source encoder, which often operates in conjunction with the analog-to-digital converter.

Huffman codes

In general, fewer bits on the average will be needed if the source encoder takes into account the probabilities at which different quantization levels are likely to occur. A simple example will illustrate this concept. Assume a quantizing scale of only four levels: 1, 2, 3, and 4. Following the usual standard of binary encoding, each of the four levels would be mapped by a two-bit code word. But also assume that level 1 occurs 50 percent of the time, that level 2 occurs 25 percent of the time, and that levels 3 and 4 each occur 12.5 percent of the time. Using variable-bit code words might cause more efficient mapping of these levels to be achieved. The variable-bit encoding rule would use only one bit 50 percent of the time, two bits 25 percent of the time, and three bits 25 percent of the time. On average it would use 1.75 bits per sample rather than the 2 bits per sample used in the standard code.

The Lempel-Ziv algorithm

The design and performance of the Huffman code depends on the designers' knowing the probabilities of different levels and sequences of levels. In many cases, however, it is desirable to have an encoding system that can adapt to the unknown probabilities of a source. A very efficient technique for encoding sources without needing to know their probable occurrence was developed in the 1970s by the Israelis Abraham Lempel and Jacob Ziv. The Lempel-Ziv algorithm works by constructing a codebook out of sequences encountered previously. For example, the codebook might begin with a set of four 12-bit code words representing four possible signal levels.

Run-length codes

Certain signal sources are known to produce "runs," or long sequences of only 1s or 0s. In these cases it is more efficient to transmit a code for the length of the run rather than all the bits that represent the run itself. One source of long runs is the fax machine. A fax machine works by scanning a document and mapping very small areas of the document into either a black pixel (picture element) or a white pixel. The document is divided into a number of lines (approximately 100 per inch), with 1,728 pixels in each line (at standard resolution). If all black pixels were mapped into 1s and all white pixels into 0s, then the scanned document would be represented by 1,857,600 bits (for a standard American 11-inch page). At older modem transmission speeds of 4,800 bits per second, it would take 6 minutes 27 seconds to send a single page. If, however, the sequence of 0s and 1s were compressed using a run-length code, significant reductions in transmission time would be made.

Channel encoding

As described in Source encoding, one purpose of the source encoder is to eliminate redundant binary digits from the digitized signal. The strategy of the channel encoder, on the other hand, is to add redundancy to the transmitted signal—in this case so that errors caused by noise during transmission can be corrected at the receiver. The process of encoding for protection against channel errors is called error-control coding. Error-control codes are used in a variety of applications, including satellite communication, deep-space communication, mobile radio communication, and computer networking.

Repetition codes

One simple, but not usually implemented, FEC method is to send each data bit three times. The receiver examines the three transmissions and decides by majority vote whether a 0 or 1 represents a sample of the original signal. In this coded system, called a repetition code of block-length three and rate one-third, three times as many bits per second are used to transmit the same signal as are used by an uncoded system; hence, for a fixed available bandwidth only one-third as many signals can be conveyed with the coded system as compared with the uncoded system. The gain is that now at least two of the three coded bits must be in error before a reception error occurs.

The Hamming code

Another simple example of an FEC code is known as the Hamming code. This code is able to protect a four-bit information signal from a single error on the channel by adding three redundant bits to the signal. Each sequence of seven bits (four information bits plus three redundant bits) is called a code word. The first redundant bit is chosen so that the sum of ones in the first three information bits plus the first redundant bit amounts to an even number. (This calculation is called a parity check, and the redundant bit is called a parity bit.)

Convolutional encoding

The Hamming code is called a block code because information is blocked into bit sequences of finite length to which a number of redundant bits are added. When k information bits are provided to a block encoder, n – k redundancy bits are appended to the information bits to form a transmitted code word of n bits. The entire code word of length n is thus completely determined by one block of k information bits. In another channel-encoding scheme, known as convolutional encoding, the encoder output is not naturally segmented into blocks but is instead an unending stream of bits. In convolutional encoding, memory is incorporated into the encoding process, so that the preceding M blocks of k information bits, together with the current block of k information bits, determine the encoder output. The encoder accomplishes this by shifting among a finite number of “states,” or “nodes.”

Modulation

In many telecommunications systems, it is necessary to represent an information-bearing signal with a waveform that can pass accurately through a transmission medium. This assigning of a suitable waveform is accomplished by modulation, which is the process by which some characteristic of a carrier wave is varied in accordance with an information signal, or modulating wave. The modulated signal is then transmitted over a channel, after which the original information-bearing signal is recovered through a process of demodulation.

Techno savior

Multiplexing *Yogesh Shirsat*

https://www.britannica.com/technology/telecommunication/Multiple-access

Because of the installation cost of a communications channel, such as a microwave link or a coaxial cable link, it is desirable to share the channel among multiple users. Provided that the channel's data capacity exceeds that required to support a single user, the channel may be shared through the use of multiplexing methods. Multiplexing is the sharing of a communications channel through local combining of signals at a common point. Two types of multiplexing are commonly employed: frequency-division multiplexing and time-division multiplexing.

Frequency-division multiplexing

In frequency-division multiplexing (FDM), the available bandwidth of a communications channel is shared among multiple users by frequency translating, or modulating, each of the individual users onto a different carrier frequency. Assuming sufficient frequency separation of the carrier frequencies that the modulated signals do not overlap, recovery of each of the FDM signals is possible at the receiving end. In order to prevent overlap of the signals and to simplify filtering, each of the modulated signals is separated by a guard band, which consists of an unused portion of the available frequency spectrum. Each user is assigned a given frequency band for all time.

Time-division multiplexing

Multiplexing also may be conducted through the interleaving of time segments from different signals onto a single transmission path—a process known as time-division multiplexing (TDM). Time-division multiplexing of multiple signals is possible only when the available data rate of the channel exceeds the data rate of the total number of users. While TDM may be applied to either digital or analog signals, in practice it is applied almost always to digital signals. The resulting composite signal is thus also a digital signal.In a representative TDM system, data from multiple users are presented to a time-division multiplexer. A scanning switch then selects data from each of the users in sequence to form a composite TDM signal consisting of the interleaved data signals. Each user's data path is assumed to be time-aligned or synchronized to each of the other users' data paths and to the scanning mechanism. If only one bit were selected from each of the data sources, then the scanning mechanism would select the value of the arriving bit from each of the multiple data sources. In practice, however, the scanning mechanism usually selects a slot of data consisting of multiple bits of each user's data; the scanner switch is then advanced to the next user to select another slot, and so on. Each user is assigned a given time slot for all time.

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The Mobile Revolution: How Mobile Technologies Drive a Trillion-Dollar Impact

D.D.Ahire

https://www.bcg.com/en-in/publications/2015/telecommunications-technology-industries-the-mobile-revolution

Mobile network infrastructure costs have also fallen dramatically, while performance has soared—a 95 percent cost reduction (per megabyte transmitted) from second generation (2G) networks to third generation (3G) networks, and a further 67 percent drop from 3G to fourth generation (4G) networks.

Mobile data-transmission speeds have skyrocketed: 4G networks offer 12,000 times faster data-transmission speeds than 2G networks.

Consumer adoption of 3G and 4G standards has outpaced that of all other technologies, growing to nearly 3 billion connections in less than 15 years, and projected to exceed 8 billion connections by 2020.

Effective industry-driven collaborations to solve technical problems, set standards, and license intellectual property have been key enablers in this revolution.

Mobile Is Connecting And Empowering Consumers—Everywhere.

Consumers derive enormous value from mobile. Our research across six countries—the U.S., Germany, South Korea, Brazil, China, and India—reveals that the value consumers place on mobile technologies ranges from $700 to $6,000 per user. The data show an aggregate annual consumer value for mobile technologies of $6.4 trillion across the six countries, above the cost of the devices and services.

This aggregate consumer surplus from mobile technologies exceeds the GDP of every country in the world except for the U.S. and China.

Mobile is especially valuable to emerging market consumers. In China and India, the consumer-reported value of mobile exceeds 40 percent of average income.

The market demand for continued innovation and investment is clear: 90 percent of 3G and 4G consumers report they want even faster data speeds, more coverage, more battery life, and many other improvements. With global data usage doubling every year, if this trend continues, data traffic will be 1,000 times greater within a decade. New technologies will be required to accommodate this expanding demand.

Consumers expect that mobile will continue to improve and transform their lives, delivering a broader range of services that will connect them with everything, everywhere.

Small And Medium-Sized Enterprises (Smes) That Adopt Advanced Mobile Technologies Are The Fastest Growing.

SMEs that are mobile leaders are winning. Typically, the 25 percent of SMEs that use mobile services more intensively see their revenues growing up to two times faster and add jobs up to eight times faster than their peers.

The mobile laggards among SMEs have revenue growth and job creation that substantially lag behind the leaders. With fewer plans to invest in mobile, these SMEs are at risk of being left further behind.

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SME mobile leaders in emerging markets are leapfrogging older generations of technology still widely used in developed markets. The share of mobile leaders in Brazil, China, and India exceeds that in the developed countries examined.

Greater mobile adoption by SMEs can create jobs. If more SMEs expand their businesses at the rate of the mobile leaders, 7 million more jobs could be added in the six countries evaluated.

Mobile Technologies Are Fueling Economic Growth, Driving Recovery From The Global Recession.

The mobile value chain generated almost $3.3 trillion in revenue globally in 2014 and is directly responsible for 11 million jobs.

Mobile is an engine of economic prosperity. In the six countries evaluated, mobile contributes more than $1.2 trillion in GDP. This equates to between 2 and 4 percent of each country's GDP, and 11 percent in the case of South Korea.

The rapid growth of mobile is poised to continue. Across the countries evaluated, mobile's share of GDP is growing at a 10 to 20 percent annual rate and can continue or even accelerate as consumers and businesses continually discover new applications for ever more advanced mobile technologies.

The Mobile Industry Has Made Massive Investment In New Infrastructure And R&D.

Companies in the mobile value chain invested $1.8 trillion in infrastructure and R&D from 2009 through 2013, relying almost exclusively on private-sector funding.

Core technology (2G, 3G, and 4G) innovators take enormous risks by spending heavily on research and development with no guarantee of return on investment. Companies focused on mobile's core technologies invest a larger share of revenue (21 percent) in R&D than those in any other industry except biotechnology—and more than companies in all other R&D-heavy industries, such as pharmaceuticals (14 percent).

Licensing of core technologies within the mobile industry is essential to its rapid and cost-effective advancement. Clear and cooperative licensing arrangements make it possible for companies across the value chain—and thus consumers and businesses—to access the most advanced technologies.

Many new and start-up companies are entering the mobile sector. In the past five years, venture capital (VC) investments in mobile have doubled as a percentage of total VC investments, reaching almost 8 percent ($37 billion) in 2014.

Refrigerants and Environmental Concerns — *D.D.Palande*

https://americanbiotechsupply.com/blogs/american-biotech-supply/2020/10/08/environmentally-friendly-refrigerants

The chemical nature of hydrochlorofluorocarbons and hydrofluorocarbons that makes them excellent candidates for refrigeration purposes is also their greatest drawback. Unfortunately in the 1970s and 1980s, it became clear that the chlorine in CFCs and HCFCs was critically damaging Earth's ozone

layer and contributing to global warming by retaining additional heat in the Earth's atmosphere. In response, the Montreal Protocol of 1987 and subsequent agreements set a schedule to phase out these chlorine-based refrigerants. The Global Warming Potential (GWP) tool was developed to measure and compare the impact of refrigerants and other chemicals on the atmosphere and subsequent global warming. Rating refrigerants for their GWP values allows offending gases with high GWP values to be phased out and those with lower GWP values to be encouraged as substitutes. The system is based on carbon dioxide (CO2) which has a GWP value of 1, indicating the amount of heat 1 unit of CO2 would add to the atmosphere over a set amount of time (typically 100 years). Other chemicals and compounds are compared to CO2 over the same time period, so, for example, a compound with a GWP of 12 would heat the atmosphere 12 times as much as CO2 would over that 100-year period.

Refrigeration's Next Generation -- R134A and R404A

Arriving as plans were put in place to ban HCFCs for refrigeration needs, and specifically designed as a replacement for R12, R134A, also known as 1,1,1,2-Tetrafluoroethane or norflurane, is a hydrofluorocarbon compound that lacks chlorine, one of the most damaging compounds in HCFC refrigerants. With a GWP of 1,430, it's a definite improvement over R12 (GWP 10,200) and R22 (GWP 1,760). It rapidly became a popular substitute in refrigerators and vehicle air conditioners, as well as finding applications in manufacturing, pharmaceuticals, and a variety of consumer compressed air products. Developed around the same time as R134A, R404A (GWP 3,922) is a blended HFC mixture, widely adopted for use in commercial and industrial refrigeration, despite its relatively high GWP.

R290 and R600A -- Environmentally Friendly Refrigerants

Poor energy efficiency, high GWP values, and an increased concern for environmental impacts, including awareness that fluorines are nearly as damaging to the atmosphere as chlorines, has encouraged the development of new refrigerants. Striving for GWP values of zero, two hydrocarbon refrigerants have come to the forefront as effective, safe, relatively inexpensive compounds that can be used in many existing refrigeration systems with minimal modifications.

Isobutane (R600A)

Stable and performing similarly to its predecessors, R600A is a massive improvement on environmental impacts with a very low GWP value of only 3. It has become one of the most popular refrigerants used today for domestic, commercial, and industrial refrigeration. Because it is flammable, it isn't necessarily suitable for retrofitting older refrigeration systems, but it's an excellent choice for systems designed specifically to use R600A, and is comparable to R12.

Isopropane (R290)

A combination of Isobutane and familiar, inexpensive, and readily available propane, isopropane (GWP 3) is becoming a standard refrigerant for use in commercial and industrial refrigeration as well as

specialty applications for camping, recreational vehicles, and laboratory and medical refrigeration. In general, R290 is a good replacement for R22.

Benefits of Using Environmentally Friendly Refrigerants

Not only do these newer, hydrocarbon refrigerants have lower environmental impacts, they offer a variety of other benefits and savings.

Faster Temperature Recovery

Increased thermodynamic efficiency means that hydrocarbon refrigerants enable refrigerators and freezers to recover temperatures more quickly, making it easier to maintain crucial steady temperatures.

Lower Energy Consumption

Hydrocarbons provide cooling with nearly twice the efficiency of CFC refrigerants, and can perform well with a much lower charge than earlier, chemical refrigerants. These efficiencies allow for smaller compressors running with less power. All combined, these features can result in dramatically lower energy consumption.

Readily Available

Already extracted along with oil and readily available, hydrocarbons offer a relatively easily obtained replacement for less-desirable chemical refrigerants.

7ideas about the car of the future — *Ravi Patil*

https://www.allianz.com/en/press/news/studies/150929-car-of-the-future.html

1. Everybody will “drive”

The very young and the very old, the sick and the blind – they all will be able to command the car of the future. Also, sleeping while the car is on auto pilot should not be a problem in the future. To school, from the doctor’s and so on. Google claims that its automated cars’ software equals a driver with 75 years of driving experience. Meaning that being driven should be safer and less complicated for most people than driving.

2. No more search for parking spots

106 days of your average life of a driver are spent by looking for parking spots – at least this is what a British survey recently found out. You will be able to use this time for nicer things in the future. The connected car will find a parking lot by itself.

3. Your car’s your ambulance

Infrared cameras checking your eyelids’ movements; seats supervising your heart beat and your skin temperature: cars are collecting more and more physical data about their drivers. And they might be able

to call an ambulance or even drive you to a hospital if they recognize alarming data. Which they will be able to transmit to the doctor as well.

4. Your car might be hacked – again

They had worked on this for more than a year – but finally, two hackers managed to remotely hijack a Jeep Cherokee wirelessly in July 2015. Not only were they able to turn the fan on and off, pump up the volume of the radio, but they eventually managed to kill the car and take over brakes and steering wheels by digitally breaking into the car's entertainment system. Consequently, Fiat Chrysler recalled 1.4 million cars and had owners install a supposedly secure software update. The more cars get connected to the internet, the more vulnerable they might get to virtual attacks, cybersecurity advocates argue.

5. Less but more complicated accidents

Around 1.2 million people are killed in road accidents every year worldwide. Over 90 per cent of all these accidents, research has shown, are due to driving mistakes. This means that the fully automated inter-connected vehicles will guide and warn each other. And thus cause probably much less accidents – but more complicated ones. Who will be responsible, for example, if a self-driving car parks itself and hits a pedestrian? The "driver"? The company that built the car? Or the one who built the data transmission system? Or the one who programmed the software? Insurance companies will have to reconsider their insurance rate calculations, lawmakers will have to adopt new regulations.

Nothing is impossible for the car of the future. Solutions are being found for both hacker attacks and insurance coverage.

Nothing is impossible for the car of the future. Solutions are being found for both hacker attacks and insurance coverage.

6. The scariest part of driving will stay: You and me!

The state of California allows Google to have its autonomous cars tested on public roads – but insists on steering wheels and brakes. Since, presumably, the robo chauffeur will not make us completely obsolete for the time being. Stanford University professor Clifford Nass says: "There are going to be times where the driver has to take over. And that turns out to be by far the most dangerous and totally understudied issue." Snow, heavy rainfalls, dense fog and even sunlight from certain angles might inhibit the car's sensors. Once people get used to being driven for most of the time, however, their driving skills might deteriorate. And somebody who hast just been reading a book or writing an email obviously has a much slower reaction time than a constant driver.

7. More energy needed

Yes, the self driving car will most likely drive more efficiently than the traditional automobile. Yes, it will supposedly be powered by electricity, hydrogen or other non-fossile energy sources. And yes, things like the 60 mile traffic jam in China from 2010 that lasted two weeks and burnt an incalculable amount of fuel will be a thing of the past. But no, the general energy consumption of the car might not go down – it might actually rise. A study by researchers at the University of Michigan in Ann Arbor claims that autonomous autos could reverse a years-long trend of declining fuel consumption since the

self-driving car will allow for much more trips for much more people. The average car usage per vehicle in the US, they calculated, will rise from 11.661 to 20.406 miles per year.

Quality Circle — *Nilesh Shelar*

A quality circle is a participatory management technique that enlists the help of employees in solving problems related to their own jobs. Circles are formed of employees working together in an operation who meet at intervals to discuss problems of quality and to devise solutions for improvements. Quality circles have an autonomous character, are usually small, and are led by a supervisor or a senior worker. Employees who participate in quality circles usually receive training in formal problem-solving methods—such as brain-storming, pareto analysis, and cause-and-effect diagrams—and are then encouraged to apply these methods either to specific or general company problems. After completing an analysis, they often present their findings to management and then handle implementation of approved solutions. Pareto analysis, by the way, is named after the Italian economist, Vilfredo Pareto, who observed that 20 percent of Italians received 80 percent of the income—thus the principle that most results are determined by a few causes.

Quality circles were originally associated with Japanese management and manufacturing techniques. The introduction of quality circles in Japan in the postwar years was inspired by the lectures of W. Edwards Deming (1900—1993), a statistician for the U.S. government. Deming based his proposals on the experience of U.S. firms operating under wartime industrial standards. Noting that American management had typically given line managers and engineers about 85 percent of the responsibility for quality control and line workers only about 15 percent, Deming argued that these shares should be reversed. He suggested redesigning production processes to account more fully for quality control, and continuously educating all employees in a firm—from the top down—in quality control techniques and statistical control technologies. Quality circles were the means by which this continuous education was to take place for production workers.

Deming predicted that if Japanese firms adopted the system of quality controls he advocated, nations around the world would be imposing import quotas on Japanese products within five years. His prediction was vindicated. Deming's ideas became very influential in Japan, and he received several prestigious awards for his contributions to the Japanese economy.

The principles of Deming's quality circles simply moved quality control to an earlier position in the production process. Rather than relying upon post-production inspections to catch errors and defects, quality circles attempted to prevent defects from occurring in the first place. As an added bonus, machine downtime and scrap materials that formerly occurred due to product defects were minimized. Deming's idea that improving quality could increase productivity led to the development in Japan of the Total Quality Control (TQC) concept, in which quality and productivity are viewed as two sides of a coin. TQC also required that a manufacturer's suppliers make use of quality circles.

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Quality circles in Japan were part of a system of relatively cooperative labor-management relations, involving company unions and lifetime employment guarantees for many full-time permanent employees. Consistent with this decentralized, enterprise-oriented system, quality circles provided a means by which production workers were encouraged to participate in company matters and by which management could benefit from production workers' intimate knowledge of the production process. In 1980 alone, changes resulting from employee suggestions resulted in savings of $10 billion for Japanese firms and bonuses of $4 billion for Japanese employees.

WHAT IS KAIZEN?

Kaizen (Continuous Improvement) is a strategy where employees at all levels of a company work together proactively to achieve regular, incremental improvements to the manufacturing process. In a sense, it combines the collective talents within a company to create a powerful engine for improvement.

THE DUAL NATURE OF KAIZEN

Kaizen is part action plan and part philosophy.

As an action plan, Kaizen is about organizing events focused on improving specific areas within the company. These events involve teams of employees at all levels, with an especially strong emphasis on involving plant floor employees

As a philosophy, Kaizen is about building a culture where all employees are actively engaged in suggesting and implementing improvements to the company. In truly lean companies, it becomes a natural way of thinking for both managers and plant floor employees.

KAIZEN EVENTS

A typical Kaizen event goes something like this:

Set goals and provide any necessary background.
Review the current state and develop a plan for improvements.
Implement improvements.
Review and fix what doesn’t work.
Report results and determine any follow-up items.
This type of cycle is frequently referred to as PDCA (Plan, Do, Check, and Act). PDCA brings a scientific approach to making improvements:

Plan (develop a hypothesis)
Do (run experiment)
Check (evaluate results)
Act (refine your experiment; then start a new cycle)

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KAIZEN PHILOSOPHY

Interestingly, Kaizen as an action plan is exactly what develops Kaizen as a philosophy. When Kaizen is applied as an action plan through a consistent and sustained program of successful Kaizen events, it teaches employees to think differently about their work. In other words, consistent application of Kaizen as an action plan creates tremendous long-term value by developing the culture that is needed for truly effective continuous improvement.

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