TECNO SAVIOR

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Matoshri College of Engineering & Research Centre, Nashik

Eklahareshivar, Near Odhagaon, Opposite to Nashik-Aurangabad Highway, Nashik,
Maharashtra 422105Contact: 0253-2406600/1/2/3

Website: engg.matoshri.edu.in/Email: matoshricoe.hr@gmail.com

Toll free No.:1800 233 6602

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

Ferrocement Structure- "The strength Through Shape" *Mr. H. M. Pawar*

O'shell: In general, for a ferrocement structure, a standard of 150 mm spacing between reinforcements is to be maintained throughout. In this case, the students reached up to 750 mm in the top portion of the structure by simply utilizing their understanding of force lines. Devoid of any high-tech production systems, o'shell instead relied on the idea of human robots (the hands of students and unskilled laborers). The build was completed within 20 working days, from the conceptualization of the design, to construction of the structure and to final completion of the project. The students at the C.A.R.E school of architecture in Tiruchirappalli, India, have created the 'o'shell' prototype to explore the relationship between form and force. The experimental project sought to facilitate vital hands-on experience while establishing an understanding of tension based curved surface structures in an intuitive and playful way. Under the guidance of their mentor balaji rajasekaran (dmac group), the work formed part of the students' procedural design module.

The o'shell project was an on-site exercise and gave students the opportunity to create an architectural response based on the parameters of the site. This included deciding on the orientation of the structure, its base-grid and the initial framework. The experiment also gave the students the chance to see the whole work through, from the initial design development to the realization of the structure.

The first step in the construction process was to excavate the ground to form the plinth beam. After this, the students worked together to erect the steel structure. By utilizing the tensile property of steel, the project embraced a non-standard/non-linear process with on-site active bending as a design driver without any formwork or shuttering to hold the concrete or guide the geometry. The base framework was derived using the site parameters, which was followed by weaving and bending of the steel based on the team's understanding of stress line methods to inform the conceptual structural design.

B] Ferrocement Reefs: The State government has accorded administrative sanction for project. To enhance fish production and provide livelihood support to the fishermen, 400 artificial reefs are to be installed off the coast of Thiruvananthapuram and the Poovar fishing village. The RS. 3.75-crore fish production enhancement programme is part of the Rs 475-crore Vizhinjam Rehabilitation project to rehabilitate and provide compensation to fishermen affected by the upcoming international deepwater seaport. Monolithic structures: Two hundred monolithic triangular-shaped Reinforced Cement Concrete (RCC) reef modules will soon be lowered into the sea off the coast near the fishing villages of Kollamcode, Paruthiyoor, Valiyathura, Kochuthura, Puthiyathura, Pallom and Adimalathura. **Another 200 ferro cement reef modules will be installed** off the coast of Poovar fishing village, further south in the district. Together, an artificial cluster of 400 reef modules will be created.

Artificial reefs are considered favourable habitats for periphyton, a colony of microscopic planktonic organisms that are the prime source of food for omnivorous and herbivorous fishes. Sting ray, electric ray, lobsters, carangids, scad, and scud are expected to reach these artificial reefs to feed on the small fishes Besides enhancing the overall fish availability off the coast, the artificial reef cluster will revitalise the aquatic environment, act as spawning and nursery ground, reduce fishing time for scouting, and provide livelihood to the catamaran fishermen who have been displaced due to the mega

Matoshri College of Engineering and Research Centre, Nashik
Eklahareshivar, Near Odhagaon, Opp Nashik-Aurangabad Highway, Nashik,
Pin-422105, www.engg.matoshri.edu.in
Contact: 0253 2406600,612

project. Kerala State Coastal Area Development Corporation (KSCADC) has been tasked by the Fisheries and Ports department to install the 400 artificial reefs.

Each RCC artificial reef module will cost Rs 47.79 lakh, which include casting, lowering and monitoring. Each ferro cement reef module will cost Rs 41.10 lakh. It is for the first time that ferro cement reef module is being used for casting artificial reef in a large scale, and the KSCADC has plans to make it popular by roping in more NGOs.

Climate Change and Its Impact on India Student, Tanta RushikeshT.E. Civil

Climate change is one of the main environmental challenges the world is facing. Climate change is associated with various adverse impacts on agriculture, water resources, forest and biodiversity, health, coastal management and increase in temperature. Decline in agricultural productivity is the main impact of climate change on India. A majority of population depends on agriculture directly or indirectly. Climate change would represent additional stress on the ecological and socioeconomic systems that are already facing tremendous pressure due to rapid industrialization, urbanization and economic development. This paper analyzes the impact of climate change and its various aspects in the Indian context. Accumulation of trace gases such as carbon dioxide (CO2) and methane (CH4) in the atmosphere, caused mainly due to anthropogenic activities such as burning of fossil fuels, is believed to be altering the earth's climate system.

The Intergovernmental Panel on Climate Change (IPCC) in its fourth assessment report observed that "warming of climate system is now unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global seal level" (Soloman et al., 2007). India has a reason to be concerned about climate change, as a vast population depends on climate-sensitive sectors like agriculture, forestry and fishery for their livelihood. The adverse impact of climate change in the form of decline in rainfall and rise in temperature has resulted in increased severity of livelihood issues in the country. Climate change would represent additional stress on the ecological and socioeconomic systems that are already under tremendous pressure due to rapid industrialization, urbanization and economic development. The Intergovernmental Panel on Climate Change projects that the global mean temperature may increase between 1.4 and 5.8 o C by 2100. This unprecedented increase is expected to have severe impact on the global hydrological system, ecosystem, sea level, crop production and related processes. The impact would be particularly severe in the tropical areas, which mainly consist of developing countries, including India (Jayant et al., 2006).

India is a large developing country with nearly 700 million rural population directly depending on climate-sensitive sectors and natural resources such as water, biodiversity, mangroves, coastal zones, and grasslands for their subsistence and livelihood. Further, the adaptive capacity of dry land farmers, forest-dwellers and nomadic shepherds is very low. Despite being symbolically important, Kyoto Protocol is now widely considered as a 'failure' because it neither has initiated emission reduction globally nor it has promised required further cuts in greenhouse gas emissions. Scientists have long

warned that even 100% adherence to Kyoto Protocol will do little to limit the change in climate, yet almost 15 long years are spent globally in creating this policy failure. Almost exclusive focus on mitigation in Kyoto Protocol acts against the interest of the developing countries. Unsustainable consumption patterns of the rich industrialized nations are responsible for the threat of climate; only 25% of the global population lives in these countries, but they emit Climate Change and Its Impact on India 33 more than 70% of the total global CO2 emissions and consume 75 to 80% of many of the other resources of the world (Parikh et al., 1991). India should be concerned about the climate change because it might have adverse impact on the country. Not all possible consequences of climate change are yet fully understood, but the main 'categories' of impacts are those on agriculture, rise in sea level leading to submersion of coastal areas and increased frequency of extreme events which pose serious threats to India. The paper discusses elaborately the impact of climate change on India, especially in agriculture, water, health, forest, sea level and risk events. Greenhouse Gas Emission from India Climate change arising due to the increasing concentration of greenhouse gases

Impact of Climate Change on Forest Types

A comparison of the extent of area that is likely to occur in each of the forest type under the present climate regime and that under the two future climate scenarios reveals the magnitude of changes that are expected to take place in each of the forest types. The BIOME42 model was run for a total of 10,864 grid points (10 min x 10 min) located in the Indian region, using the CRU3 10-min climatology. Due to gaps in data related to soil parameter values, the model could assign vegetation types to only 10,429 of these grid points. As mentioned earlier, a comparison with the FSI database (available at a much finer resolution of 2.5 min x 2.5 min) allowed us to use the information from 35,190 FSI grids. There was a reasonable match between the forests types predicted by BIOME4 and the forest types assigned by FSI. Thus, tropical evergreen forests were seen in the southern Western Ghats and in the northeastern region, while the temperate forests were seen to occur in regions corresponding to fir/spruce/deodar forests (Ravindranath et al. 2006). Thus, climate change could cause irreversible damage to unique forest ecosystems and biodiversity, rendering several species extinct locally and globally (IPCC, 2001a and 2001b). Forest ecosystems require the longest response time to adapt, say through migration and re growth (Leemans and Eickhout, 2004). Further, a long gestation period is involved in developing and implementing adaptation strategies in the forest sector. A review of studies by IPCC and Gitay et al. (2002) have shown that forest biodiversity or the species assemblage is projected to undergo changes due to the projected climate change. Biodiversity is likely to be impacted under the projected climate scenarios due to the changes or shifts in forest or vegetation types (in 57 to 60% of forested grids), forest dieback during the transient phase, and different species responding differently to climate changes even when there is no change will be an additional pressure and will exacerbate the declines in biodiversity resulting from socioeconomic pressures.

Sea-Level Rise

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Coastal ecosystem will be affected by sea-level rise and temperature increases. Heavily populated mega delta regions, in particular, will be at the greatest risk due to increased flooding. The changes in the Godavari, Indus, Mahanadi and Krishna coastal deltas will potentially displace millions of people. Projected sea level rise could damage aquaculture industries, and exacerbate already declining fish productivity. There will also be higher risks of increased frequency and intensity of coastal surges and cycles (GoI, 2005). If a one-meter sea level rise were to take place today, it would displace 7 million persons in India (ADB, 1995). In future, many more may be displaced. Around 35% of the land in Bangladesh would be submerged by a one-meter rise. The estimates of costs to build walls along the zones vulnerable to sea-level rise for the US is $107 bn as per the 1989 prices (Yohe, 1990). That may be a small share of the GDP of the developed countries, but such measures, even scaling for their coastlines, for say Bangladesh, could require a very large share of its GDP. Who shall pay Bangladesh or India for such a wall? Given that these countries are unlikely to be able to pay for protective measures, millions of people will be displaced in Bangladesh and many of them could spill over to India (Parikh and Parikh 2002). Sea level changes can be of two types: (i) changes in the mean sea level; and (ii) changes in the extreme sea level. An analysis of the past sea level measurement, recorded by tide gauges located at various ports in different parts of the world, indicated a mean sea level rise of 1 to 2 mm/year during the last century. These changes are generally attributed to global warming. Various consequences of global warming such as melting of sea ice, volume expansion due to temperature increase in the ocean, etc., can contribute to global sea-level rise (Church et al., 2001). Recent studies on the occurrences of cyclones in the Bay of Bengal have not shown any trends during the last century (Bhaskar Rao et al., 2001). In coastal regions, wind stress plays an important role than the inverse barometric effects. In India, most of the earlier studies on storm surges were based on numerical modeling on particular events based on the track of the cyclone and pressure drop in the cyclone as input. The wind fields computed using the cyclone parameters, are used to drive the storm surge model (Unnikrishnan et al., 2006). The estimates of sea-level rise along the coast of India were made by analyzing the past tide gauge data. Among the stations considered for the analysis, Mumbai, Visakhapatnam and Kochi showed a sea-level rise of slightly less than 1 mm/year; however, the analysis for Chennai showed a rate of decrease. These estimates need to be corrected by subtracting the measurements on vertical land movements, which are not available at present, in order to get the net sea-level rise (Unnikrishnan et al., 2006).

Health

The health status of millions of people is projected to be affected through, for example, increases in malnutrition, increased deaths, diseases and injury due to extreme weather events, increased burden of diarrheal diseases, increased frequency of cardio respiratory

Diseases due to higher concentrations of ground-level ozone in urban areas related to climate change, and the altered spatial distribution of some infectious diseases (IPCC, 2007). In its Third Assessment Report, the United Nations IPCC concluded that “climate change is projected to increase threats to human health”. Climate change can affect human health directly (e.g., impacts of thermal

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stress, death/injury in floods and storms) and indirectly through changes in the ranges of disease vectors (e.g., mosquitoes), waterborne pathogens, water quality, air quality, and food availability and quality. Global climate change is, therefore, a newer challenge to ongoing efforts to protect human health (IPCC, 2001a and 2001b). In India, almost half of the children under age five and more than one-third of the adults are undernourished. In Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, and Orissa, more than two out of five women are undernourished. Anemia is another major nutritional health problem in India, especially among women and children. Among children between the ages of 6 and 59 months, a majority (70%) are anemic. More than half of the women (55%) and one-fourth of the men are anemic in India. Anemia can result in maternal mortality, weakness, diminished physical and mental capacity, increased morbidity from infectious diseases, perinatal mortality, premature delivery, low birth weight, and (in children) impaired cognitive performance, motor development, and scholastic achievement (IIPS, 2007). Changes in climate are likely to change frequency, lengthen the transmission seasons, and alter the geographic range of important vectorborne diseases, malaria and dengue being the most important. There is historical evidence of associations between climatic conditions and vector-borne diseases. Malaria is of great public health concern and seems likely to be the vector-borne disease most sensitive to long-term climate change. Malaria varies seasonally in highly endemic areas. The link between malaria and extreme climatic events has long been studied in India. Early last century, the river-irrigated Punjab region experienced periodic malaria epidemics. Excessive monsoon rainfall and high humidity were identified early on as a major influence, enhancing mosquito breeding and survival. Recent analyses have shown that the malaria epidemic risk increases around fivefold in the year after an El Nino event (Bouma and van der Kaay, 1996). Increasing global temperature affect levels and seasonal patterns of both man-made and natural airborne particles, such as plant pollen, which can trigger asthma. About 6% of children suffer from respiratory tract infection and 2% of adults suffer from asthma (IPCC, 2001a and 2001b). Asthma deaths are expected to increase by almost 20% in the next 10 years if urgent actions to curb climate change and prepare for its consequences are not taken (WHO, 2008).

Increased Temperatures and Extreme Events

Climate change impacts will lead to an increased frequency of hot days, heat waves, droughts (declining water tables, crop failures, etc.) and natural disasters resulting from cyclones. Kothawale (2005) studied the temperature extremes in India by using the data of 40 stations well distributed over India for the period 1970-2002, and noted that heat wave conditions 42 The IUP Journal of Environmental Sciences, Vol. VI, No. 1, 2012 are relatively more frequent in May than in June, while very few heat waves occurred in the months of March and April. He also noted that the number of hot days is maximum over central part of India and minimum along the west coast of India during the pre-monsoon season. In the warming atmosphere, more summer rainfall is expected. Recent data have shown reduced snowfall over the Himalayas and also over the high mountain ranges of the Alps in a warming climate (Cyranoski, 2005). The monsoon cloudiness mostly seen in south India is also reduced by increased concentration of small dust particles in the lower troposphere and thus the summer

monsoon rainfall also reduces (Ramanathan et al., 2002). Analysis of meteorological measurement in India already indicates large difference in trends in the minimum temperature and cloud amounts between north and south India. Several severe examples of the consequences of climate change are available around the globe. Nine of the hottest years recorded in more than a century have occurred since 1988. Worldwide, July 1988 was the hottest month ever. In 1998, India experienced its worst hot spell in 50 years, which took a toll of over 3,000 lives. The tropical cyclone of Orissa in 1999 took a toll of about 10,000 lives. Himalayas and glaciers are retreating at the rate of 18 m per year in Gangotri. Under future scenarios of increased greenhouse gas concentrations, a marked increase in rainfall and temperature is projected in the 21st century. India's climate could become warmer by 2.33 to 4.78 o C under the condition of doubling of CO2 concentration (Longern 1998). An increase in the annual temperature of 0.7 to 1.0 o C by 2040 is predicted with respect to the 1980s (Lal et al., 1995). There is an overall decline in the number of rainy days over a major part of the country. This decline is more in the western and central parts (by more than 15 days) while near the foothills of Himalayas and in north-east India, the number of rainy days may increase by 5 to 10 days. The impact of climate variability and change, climate policy responses, and associated socioeconomic development will affect the opportunities for and success of climate policies. In particular, the socioeconomic and technological characteristics of different development paths will strongly affect missions, the rate and magnitude of climate change, climate change impacts, the capability to adapt and the capacity to mitigate.

Climate change is expected to affect the human well being in many different ways such as capital, ecosystem, disease and migration. Irrespective of the importance of the issue, it is not clear how to compute the value with the current state of the art of economics. A meaningful development involves at least transformation from agricultural to a nonagricultural economy reducing the dependence on agriculture. Since most of the labor force—about 70%—directly and indirectly depends on the sector for livelihood and employment, it is when this sector is more productive and ensures food self-sufficiency that it will release the necessary labor and capital for the manufacturing and service sectors. In the context of the current debate about climate change, it is necessary to show, far from being Climate Change and Its Impact on India 43 inactive in India, that considerable actions in terms of policies, programs and projects are being taken. Technology transfer can speed up the modernization process and additional funds can accelerate government in energy conservation. However, policies for poverty alleviation must be given priorit

Performance of Stone Column under Circular Storage Tanks

Puja Pawar,B. E. Civil

Soft clays are known to have high compressibility; low stiffness and low shear strength. Even though there are different ground improvements techniques, stone columns are considered to be the most versatile method. But in case of very soft clay, stone columns exhibit squeezing that results in excessive bulging of stone columns. When structures like storage tanks are to be constructed on such soft soils

they may undergo large settlement, both in terms of total settlement and differential settlement. Since stone columns acts as reinforcement in soils, it helps restricting the settlement of the ground. The recent development in stone columns is encasing individual stone columns by geosynthetics. Encasing stone columns with geosynthetics prevent excessive bulging and squeezing of stone into the surrounding soft soils and thus impart higher load carrying capacity with less settlement.

Installation of stone columns to the ground is one of the most effective ground improvement techniques to improve the engineering properties of soft soils. The process involves installation of vertical columns of aggregate into the ground so that the overall stiffness of the ground gets increased. Geosynthetic encased stone columns is the new technique that is used to overcome the limitations of ordinary stone columns. It gives extra confinement to the stone columns especially when the columns are constructed in soft soils. In this we can carry, finite element analyses using the software PLAXIS 3D to find the influence of geosynthetic encasement under storage tanks. And to study this we need to find the effect of encasement on settlement and lateral deformations with respect to encasement stiffness and also the behavior of stone columns under circular storage tanks.

Performance of Stone Column under Circular Storage Tanks

Mrs. P. G. Baviskar

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PERFORMANCE BASED SEISMIC DESIGN

Utkarsh Jadhav,Student, B.E. Civil

One of the major developments in seismic design over the past 10 years has been increased emphasis on limit states design, now generally termed Performance Based Engineering. Three techniques – the capacity spectrum approach, the N2 method and direct displacement-based design have now matured to the stage where seismic assessment of existing structures, or design of new structures can be carried out to ensure that particular deformation-based criteria are met.

Design for seismic resistance has been undergoing a critical reappraisal in recent years, with the emphasis changing from "strength" to "performance". For most of the past 70 years – the period over which specific design calculations for seismic resistance have been required by codes – strength and performance have been considered to be synonymous. However, over the past 25 years there has been a gradual shift from this position with the realisation that increasing strength may not enhance safety, nor necessarily reduce damage. The development of capacity design principles in New Zealand in the 1970's (Park and Paulay, 1976) was an expression of the realisation that the distribution of strength through a building was more important than the absolute value of the design base shear. It was recognised that a frame building would perform better under seismic attack if it could be assured that plastic hinges would occur in beams rather than in columns (weak beam/strong column mechanism), and if the shear strength of members exceeded the shear corresponding to flexural strength. This can be identified as the true start to performance based seismic design, where the overall performance of the building is controlled as a function of the design process.

As an understanding developed in the 1960s and 1970s of the importance of inelastic structural response to large earthquakes, the research community became increasingly involved in attempts to quantify the inelastic deformation capacity of structural components.

Over the past several years, federal guidelines were published which help to facilitate the implementation of Performance Based Design with respect to existing structures. FEMA 273, Guidelines for the Seismic Rehabilitation of Buildings, which has subsequently been updated as FEMA 356, provides specific performance objectives for both the building under consideration and the nonstructural components associated with the building. While written for use with existing structures, the Guidelines may also be used as the basis for the design of the seismic force-resisting system for new structures.

Performance Based Seismic Design has the following distinguishing characteristics.

- Performance Based Seismic Design allows the owner, architect, and structural engineer to choose both the appropriate level of ground shaking and the chosen level of protection for that ground motion.
- Multiple levels of ground shaking can be evaluated, with a different level of performance specified for each level of ground shaking.

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- Target building performance levels range from Continued Operation, in which the building and nonstructural components are expected to sustain almost no damage in response to the design earthquake, to Collapse Prevention, in which the structure should remain standing, but is extensively damaged.
- Specific ductility factors ("m" values) are specified for each component of the seismic force-resisting system. The ductility factor varies depending on the target building performance level, material type, and the relative ductility of the component.

Building Atmanirbhar AI: Challenges and Opportunities Mr. Ranjit Gawande

The arrival of COVID19 pandemic beyond the borders of China earlier this year has thrown the global economy into a meltdown. The chaos caused by the coronavirus crisis along with geopolitical tensions has forced many major global economic powers, including India to rethink their economic and technological strategies, leading Prime Minister Narendra Modi to announce the Atmanirbhar Bharat Abhiyan. With US announcing restrictions to AI software export in January this year, and China implementing a similar policy last month, the time has finally arrived for us to explore a way forward for going Aatmanirbhar in AI.

Students of B.Tech. launch AI-powered document scanning app

The two final year B.Tech students pursuing Civil Engineering at IIT Bombay, launched AIR Scanner, a free-of-cost document-scanning mobile application.The AI (Artificial Intelligence) based Reading Assistant and Document Scanner app is developed by Rohit Kumar Chaudhary and Kavin Agrawal, both students of IIT Bombay.According to a Press Information Bureau (PIB) release issued on Sunday, the app was launched on August 15, as an indigenous alternative to ban Chinese counterpart."Initially, we had been working on developing an app to make the reading experience easy for people who find it difficult to read English. It was then that the Indian government banned many Chinese apps including

mobile scanner apps," said Chaudhary, one of the developers.He added that after the ban on the Chinese app called CamScanner, both the developers surveyed and found that people are facing issues in scanning and organising documents through their mobile phones."It was then we decided to add scanning features too to our existing AIR App," Chaudhary added.As per Chaudhary, what makes his app special are its exclusive safety features.

"AIR Scanner app does not collect any information about the user and all the documents are stored in the phone's local storage. We are not using any cloud storage to store the documents of the users. The app guarantees complete user security," he said.According to the release, the document scanned using a mobile camera will be saved in PDF format and will be stored in the device only.Talking about the motivation behind the innovation, Chaudhary said he wanted to help people in education."As of now, it is available in the English language only, but we are planning to make it available in multiple languages which will make it easy for anyone to read any language.Soon we are planning to convert this project into a Start-Up," he said.Chaudhary added that currently the app is available for Android users only but soon it will be released for iOS users too.

Machine Learning in Bioinformatics — *Ms. Poonam R. Dholi*

Bioinformatics term is a combination of two terms bio, informatics. Bio means related to biology and informatics means information. Thus bioinformatics is a field that deals with processing and understanding of biological data using computational and statistical approach. Machine Learning has a number of applications in the area of bioinformatics. Machine Learning find its application in the following subfields of bioinformatics:

Genomics – Genomics is the study of DNA of organisms. Machine Learning systems can help in finding the location of protein-encoding genes in a DNA structure. Gene prediction is performed by using two types of searches named as extrinsic and intrinsic. Machine Learning is used in problems related to DNA alignment.

Proteomics – Proteomics is the study of proteins and amino acids. Proteomics is applied to problems related to proteins like protein side-chain prediction, protein modeling, and protein map prediction.

Microarrays – Microarrays are used to collect data about large biological materials. Machine learning can help in the data analysis, pattern prediction and genetic induction. It can also help in finding different types of cancer in genes.

System Biology – It deals with the interaction of biological components in the system. These components can be DNA, RNA, proteins and metabolites. Machine Learning help in modeling these interactions.

Text mining – Machine learning help in extraction of knowledge through natural language processing techniques.

Techno savior

Ethereum — *Ms. Pranjali Jadhav*

The intent of Ethereum is to create an alternative protocol for building decentralized applications, providing a different set of tradeoffs that we believe will be very useful for a large class of decentralized applications, with particular emphasis on situations where rapid development time, security for small and rarely used applications, and the ability of different applications to very efficiently interact, are important. Ethereum does this by building what is essentially the ultimate abstract foundational layer: a blockchain with a built-in Turing-complete programming language, allowing anyone to write smart contracts and decentralized applications where they can create their own arbitrary rules for ownership, transaction formats and state transition functions. A bare-bones version of Namecoin can be written in two lines of code, and other protocols like currencies and reputation systems can be built in under twenty. Smart contracts, cryptographic "boxes" that contain value and only unlock it if certain conditions are met, can also be built on top of the platform, with vastly more power than that offered by Bitcoin scripting because of the added powers of Turing-completeness, value-awareness, blockchain-awareness and state.

Philosophy

The design behind Ethereum is intended to follow the following principles:

1. **Simplicity**: the Ethereum protocol should be as simple as possible, even at the cost of some data storage or time inefficiency. An average programmer should ideally be able to follow and implement the entire specification, so as to fully realize the unprecedented democratizing potential that cryptocurrency brings and further the vision of Ethereum as a protocol that is open to all. Any optimization which adds complexity should not be included unless that optimization provides very substantial benefit.
2. **Universality**: a fundamental part of Ethereum's design philosophy is that Ethereum does not have "features". Instead, Ethereum provides an internal Turing-complete scripting language, which a programmer can use to construct any smart contract or transaction type that can be mathematically defined. Want to invent your own financial derivative? With Ethereum, you can. Want to make your own currency? Set it up as an Ethereum contract. Want to set up a full-scale Daemon or Skynet? You may need to have a few thousand interlocking contracts, and be sure to feed them generously, to do that, but nothing is stopping you with Ethereum at your fingertips.
3. **Modularity**: the parts of the Ethereum protocol should be designed to be as modular and separable as possible. Over the course of development, our goal is to create a program where if one was to make a small protocol modification in one place, the application stack would continue to function without any further modification. Innovations such as Ethash (see the Yellow Paper Appendix or wiki article), modified Patricia trees (Yellow Paper, wiki) and RLP (YP, wiki) should be, and are, implemented as separate, feature-complete libraries. This is so that even though they are used in Ethereum, even if Ethereum does not require certain features, such features are still usable in other protocols as well. Ethereum development should be maximally done so as to benefit the entire cryptocurrency ecosystem, not just itself.

4. **Agility**: details of the Ethereum protocol are not set in stone. Although we will be extremely judicious about making modifications to high-level constructs, for instance with the sharding roadmap, abstracting execution, with only data availability enshrined in consensus. Computational tests later on in the development process may lead us to discover that certain modifications, e.g. to the protocol architecture or to the Ethereum Virtual Machine (EVM), will substantially improve scalability or security. If any such opportunities are found, we will exploit them.
5. **Non-discrimination** and **non-censorship**: the protocol should not attempt to actively restrict or prevent specific categories of usage. All regulatory mechanisms in the protocol should be designed to directly regulate the harm and not attempt to oppose specific undesirable applications. A programmer can even run an infinite loop script on top of Ethereum for as long as they are willing to keep paying the per-computational-step transaction fee.

The Internet and the Web — *Ms. Gayatri Barve,SE Computer*

The Internet:

In simplest terms, the Internet is a global network comprised of smaller networks that are interconnected using **standardized** communication protocols. The Internet standards describe a framework known as the Internet protocol suite. This model divides methods into a layered system of protocols.

These layers are as follows:

- **Application layer (highest) –** concerned with the data(URL, type, etc.). This is where HTTP, HTTPS, etc., comes in.
- **Transport layer –** responsible for end-to-end communication over a network.
- **Network layer –** provides data route.

The Internet provides a variety of information and communication facilities; contains forums, databases, email, hypertext, etc. It consists of private, public, academic, business, and government networks of local to global scope, linked by a broad array of electronic, wireless, and optical networking technologies.

2. The World Wide Web:

The Web is a only way to access information through the Internet. It's a system of Internet servers that support specially formatted documents. The documents are formatted in a markup language called **HTML**, or "HyperText Markup Language", which supports a number of features including links and multimedia. These documents are interlinked using hypertext links and are accessible via the Internet.

To link hypertext to the Internet, we need:

1. The markup language, i.e., HTML.
2. The transfer protocol, e.g., HTTP.

3. Uniform Resource Locator (URL), the address of the resource.

URI:

URI stands for **'Uniform Resource Identifier'**. A URI can be a name, locator, or both for an online resource whereas a URL is just the locator. URLs are a subset of URIs. A URL is human-readable text that was designed to replace the numbers (IP addresses) that computers use to communicate with servers.
A URL consists of a protocol, domain name, and path (which includes the specific subfolder structure where a page is located) like-

protocol://WebSiteName.topLevelDomain/path

1. Protocol – **Http or Https**.
2. WebSiteName – **Google** etc.
3. topLevelDomain- **.com, .edu, .in** etc.
4. path- specific folders and/or subfolders that are on a given website.

Who governs the Internet?

The Internet is not governed and has no single authority figure. The ultimate authority for where the Internet is going rests with **the Internet Society**, or ISOC.

ISOC is a voluntary membership organization whose purpose is to promote global information exchange through Internet technology.
ISOC appoints the **IAB- Internet Architecture Board**. They meet regularly to review standards and allocate resources, like addresses.
IETF- Internet Engineering Task Force. Another volunteer organization that meets regularly to discuss operational and technical problems.

Deep Learning as a Powerful Technology that Revolutionizing Automation in Industries — *Kanchan Patil TE Computer*

Smart production refers to the usage of superior records analytics to complement bodily technology for enhancing device performance and choice making. With the extensive deployment of sensors and Internet of Things, there is a growing need of managing large manufacturing facts characterized through excessive quantity, excessive velocity, and high range. Deep gaining knowledge of present's superior analytics gear for processing and analyzing huge production facts. This paper affords a comprehensive survey of typically used deep mastering algorithms and discusses their programs in the direction of making production "clever". The evolvement of deep mastering technologies and their benefits over traditional gadget gaining knowledge of are first of all mentioned. Subsequently, computational strategies based totally on deep getting to know are provided specifically purpose to improve device

overall performance in manufacturing. Several consultant deep mastering models are comparably mentioned. Finally, emerging topics of research on deep learning are highlighted, and destiny trends and challenges related to deep getting to know for smart production are summarized.

Keywords: deep learning, technology, revolution, automation, industries

Introduction

Deep learning is the field of learning deep organized and unstructured portrayal of information. Deep learning is the developing pattern in AI to digest better outcomes when information is vast and complex. Deep learning design comprises of deep layers of neural systems, for example, input layer, shrouded layers, and yield layer. Shrouded layers are utilized to comprehend the mind boggling structures of information. A neural system shouldn't be modified to play out an intricate errand. Gigabytes to terabytes

Background of Deep Learning

Since 2006, profound organized learning, or all the more regularly called profound learning or progressive learning, has developed as another region of AI explore. Amid the previous quite a while, the strategies created from profound learning research have just been affecting a wide scope of flag and data preparing work inside the customary and the new, extended degrees including key parts of AI and manmade brainpower. see outline articles in and furthermore the media inclusion of this advancement in .A progression of workshops, instructional exercises, and special issues or meeting special sessions as of late have been dedicated exclusively to profound learning and its applications to different flag and data preparing territories.

Automation in Industry

Much industry is mechanized and exceptionally specialized utilizing programmed framework. Development of in enterprises is colossal and of more extensive degree. Be that as it may, mechanization level differs from industry to industry. Farming, deals and some administration industry are hard to mechanize though industry like correspondence especially phone industry its exceptionally robotized seething from managing, transmission and charging all done naturally. In rural industry is relevant in the preparing and pressing of sustenance's however there are some administration territories which can't be computerized.

Over the beyond century, the producing industry has passed through some of paradigm shifts, from the Ford meeting line (1900s) to Toyota production gadget (1960s), flexible manufacturing (1980s), reconfigurable production (1990s), agent-based production (2000s), cloud production (2010s).

Comparison between deep learning and traditional machine learning

Both deep gaining knowledge of and traditional device learning are records driven artificial intelligence techniques to model the complicated courting between input and output .

hierarchical structure, deep learning also has extraordinary attributes over traditional device getting to know in phrases of feature getting to know, model production, and version training. Deep mastering integrates feature mastering and version production in a single version via selecting extraordinary kernels or tuning the parameters via stop to cease optimization. Its deep architecture of neural nets with

many hidden layers is essentially multi-level non-linear operations. It transfers every layer's illustration (or functions) from original input into greater abstracted representation in the higher layers to discover the complex inherent systems. For example, the functions which includes area, corner, contour, and object components, are abstracted layer-by way of-layer from an image. These abstracted function representations are then enter to the classifier layer to perform type and regression duties. Overall, deep getting to know is an give up-to-end studying shape with the minimum human inference, and the parameters of deep getting to know version are educated together.

CONCLUSION

Deep getting to know provides superior analytics and gives remarkable potentials to smart manufacturing inside the age of massive information. By unlocking the unparalleled amount of facts into actionable an in sight full facts, deep gaining knowledge of gives choice-makers new visibility into their operations, as well as actual-time overall performance measures and costs. To facilitate advanced analytics, a comprehensive assessment of deep gaining knowledge of strategies is offered with the programs to smart production.

Application of DVR in Microgrid

Miss Varsharani Avhad, M.E. Second year (Power System)

Electrical energy is the most efficient and popular form of energy and the modern society is heavily dependent on the electric supply. The life cannot be imagined without the supply of electricity. At the same time the quality and continuity of the electric power supplied is also very important for the efficient functioning of the end user equipment. Most of the commercial and industrial loads demand high quality uninterrupted power. Thus maintaining the qualitative power is of utmost important. The quality of the power is affected if there is any deviation in the voltage and frequency values at which the power is being supplied. This affects the performance and life time of the end user equipment. Electrical power quality is the degree of any deviation from the nominal values of the voltage magnitude and frequency. Power Quality problems concerning frequency deviation and voltage magnitude deviations because of the presence of harmonics and voltage fluctuations. Other voltage problems are the voltage sags, short interruptions and transient over voltages.

During last some years, the DC microgrids have take a lot more attentions of researchers who are interested research on a DC microgrid. A DC microgrid generally contains the renewable energy sources for example PV array, wind energy, energy storage systems, such as the battery and super capacitor. Generally, the microgrids can work in two mode which is isolated mode or grid connected mode. A grid interfacing power quality compensator contains the shunt and series inverters are connected to the microgrid DC link to improve the power quality for the line currents and load voltages. The proposed system solves the effects resulting from the unbalanced utility grid voltages. Similarly, the dynamic voltage restorer (DVR) has been presented into mitigate the voltage sag and voltage swell. Normally, the DVR is constituted by a voltage source inverter (VSI) with an output filter and a series-connected

transformer. The LC filter is extensively utilized as the output filter in DVR. Moreover, it is reported in that the LC filter with a damping resistor in series with the capacitor can improve the performance excellently of the DVR, so that the power loss incurred by the resistor can be neglected.

Moreover, the DVR is usually supplied by the energy storage. Recently, the renewable energy sources, for example PV, are adopted to power the DVR. In the PV-DVR system has been proposed with different operation mode, and the PV array is working maximum power point tracking (MPPT) mode. Moreover, a battery is adopted for the energy conversation when excess power is generated by the PV array. The DVR is normally controlled by the conventional methods, such as PWM method and hysteretic control method.

It is predictive voltage control method for a tranformerless DVR (TDVR) has been proposed. With the proposed method and TDVR, the load voltage can be maintained at the target value under the conditions of voltage disturbances, unbalanced and nonlinear loads. Actually, the extensive applications of the model predictive control (MPC) for power electronics have been reported, including and converters and inverters. The advantage of MPC is fast dynamic response, so that achieving the regulation of DVR for mitigation of the voltage sag and swell is promising. Additionally, the MPC method has the feature of capability of incorporating constraints, no modulator, varying switching frequency, but high computational requirement.

To design, demonstrate and evaluate the Dynamic Voltage Restorer for voltage sag and swell mitigation purpose, with several advantages when compared to with other systems. For voltage sag and swell mitigation purpose we are using Dynamic voltage restorer (DVR) with integrated DC microgrid. The co-ordination of Dynamic voltage restorer with DC microgrid includes PV array and hybrid energy storage system which contains lithium ion battery and super capacitor used to mitigate the voltage sag and swell for efficient power quality of the main grid system. The Dynamic voltage restorer dynamically regulates bus voltage of the grid for various loading conditions.

In conventional DVR system dynamic voltage restorer is supplied by the DC link capacitor or only battery storage system because of that DVR system have some limitations. So self supported DVR or battery supported DVR not work properly for the long duration of time of faulty condition. Because of that integrated DC microgrid with DVR system is proposes. This system proposes a DC microgrid integrated DVR system to mitigate the voltage sag and swell at grid side. In this system DC microgrid consists of PV panel, a lithium ion battery and also a super capacitor and this microgrid system supply the DVR which is regulated by the MPC control. In this system when voltage sag or swell occurs because of sudden load change or switching operations on load side or grid side then DVR system injects the required magnitude voltage into the grid by using its DC storage system which is converted into AC with the help of a voltage source inverter. If any harmonics are available in the injected signal then it will removed by the LC filter which is connected after the voltage source inverter (VSI). In this proposed system DVR is controlled with the model predictive control which is more efficient than the PI controller system. Compared to the conventional pure energy storage powered DVR, the operation of the

proposed system can be extended because of the combination of renewable energy source and hybrid energy storage devices.

Fault Ride Through Capability of Grid Connected PV System with Enhanced Energy Storage Systems" Miss Madhuri Gullapalli, ME Second year (Power System)

The electric power systems are generally experiencing different trends which may imply major changes in their architecture and operation. They are facing several issues because of integration of renewable energy sources, energy market restructuring, increasing environmental awareness and rising concerns about security of energy supply.

Nowadays, increasing the power system capacity is frequently a challenging option due to economic, environmental, and political constraints that hinder the construction of large power plants and high voltage lines. The aforementioned concerns encourage the use of distributed generation (DG) in which the energy sources are installed close to the end users. Renewable energies with their in sources (like sun and wind) and the lowest impact on the environment are the _rst choice for the primary power of DG units. The increasing penetration of renewable and clean DG in utility distribution grids gives rise to the concept of microgrids.

Microgrids which consist of renewable DG play an important role in minimizing the transmission line stress as they are located near the loads and consumers. The disadvantage of these renewable energy sources is that they are intermittent in nature and their output is unpredictable. Microgrids need to be equipped with energy storage de vices with frequent charging and discharging to reduce the intermittency in the generated power and to maintain microgrid internal instantaneous power balance, improve power quality, and ensure user load power supply reliability.

In a Microgrid with renewable energy sources, the objective is to transfer the maximum possible power. In grid connected mode, since the voltage magnitude and frequency are adapted from the main grid, the controller objectives are different from autonomous operation mode. In grid connected mode the output active and reactive power or input DC link voltage magnitude can be controlled. In autonomous mode, along with the power balance between the loads and the sources, the voltage magnitude and frequency should be controlled.

Recent developments and advances in energy storage and power electronics technologies are making the application of energy storage technologies a viable solution for microgrid applications . The energy storage systems in microgrid can be batteries, flywheels, super-conducting magnetic energy storage (SMES) or supercapacitor energy storage system (SCESS). An energy storage technology usually includes a power conversion unit to convert the energy from one form to another. Two factors characterize the application of an energy storage technology. One is the amount of energy that can be stored in the device which is a characteristic of the storage device itself. Another is the rate at which energy can be transferred into or out of the storage device.

Techno savior

Given this brief background, this project thesis proposes a control strategy that can minimize the power fluctuations in microgrids consisting of renewable energy sources such as solar. Among the energy storage systems supercapacitor energy storage system (SCESS) is proposed as it has high power density. Linear and non-linear models of grid connected PV systems is developed and optimal design of the control parameters are carried out. The power electronics blocks that are used to integrate the renewable sources to the grid are designed. The optimal SCESS to minimize the uctuation and the charging and discharging controllers are designed. The fault ride through capability of the microgrid with and without SCESS is designed and results are provided to verify the efficiency of the proposed controllers.

Electric Vehicles - Energy Management System to Recover Excess Power Generated by Fuel Cells Miss Shital Nikam ME First Year (Power System)

At present, the high pollution rate, the depletion of fossil resources and the increase in the price of these sources prompts us to exploit renewable energy sources such as solar, wind and others. The automobile contribute considerably in air pollution and the release of greenhouse gases, which is why the electric vehicle seems to be a good alternative to reduce these alarming effects.

Government of India launched the Faster Adoption and Manufacturing of (Hybrid and) EVs in India ("FAME India") in March 2015. India unveiled the 'National Electric Mobility Mission Plan (NMEEP) 2020' to address the issues of National energy security, vechicular pollution and growth of domestic manufacturing capabilities. Government of India has plans to make a major shift to EVs by 2030. India is a member of a multi-governmental forum Electric Vehicle Initiatives (EVI) which launched an EV 30@30 campaign in 2017, setting a goal of achieving 30% new EV sales by 2030 in member countries. Initiatives are taken in eight states in India: Andhra Pradesh, Delhi, Karnataka, Kerala, Maharashtra, Telangana, Uttar Pradesh and Uttarakhand.

Hybrid power system contains several energy sources and energy storage systems, to deal with the load demand and need satisfaction. Since 1839, fuel cells have attracted attention of several researchers and were developed for various applications. These renewable energy sources were and still of a great interest.

Automobile applications are dominated by proton exchange membrane fuel cells, thanks to its many advantages. However, in order to ensure the supply of the electric vehicle without interruption, the insertion of an additional source is necessary such as photovoltaic, supercapacitor and batteries. Nevertheless, the combination of several sources requires the introduction of management algorithms enabling to the vehicle to be supplied during all its operation.

This paper treated an energy management of battery-PEM fuel cell hybrid Energy Storage System for electric vehicle, where two strategies of management are proposed in order to improve the efficiency of the hybrid source. The first strategy ensures only the fed of the EV. The second one ensures the EV's supply with the exploitation of the excess power produced by the Fuel cell. The traction of the vehicle is

ensured by an induction machine of 3 kW. The DC bus voltage is kept constant using Direct Torque Control (DTC) for its robustness and easiness to use. Each subsystem is identified and modeled under MATLAB/ Simulink. The two proposed systems are presented and simulation results are given and discussed.

Maximize-M Kalman Filter and Self-tuned P&O Algorithm Based Integration of Solar PV with Low-Voltage Weak Grid System - Shubham Narendra Patil M.E. First year

With the ever increasing electricity demand, fast depletion of fossil fuel and the growing trend towards renewable energy resources, the integration of green distributed energy resources (DERs) such as solar photovoltaic (PhV) generation and wind power in the utility grid is gaining high popularity in the present years. The capability of these modular generators needs to be harnessed properly in order to achieve the maximum benefit out of such integrated systems. Most DERs are connected to the utility grid or microgrids with the help of power electronics interface. They are capable of producing both active and reactive power with the proper control of the inverter interface. A new method of Maximum Power Point Tracking (MPPT) of solar array including the MPPT at solar PhV array side and a new control method of transferring this MPPT power to the inverter side insuring the DC voltage stability by using the concept of power balance at various conversion stages is proposed and studied.

With the ever increasing demand of electricity that has been raising important power system operational issues like voltage and frequency instability, the integration of distributed energy resources into the modern power systems have become very popular. Since last few decades. The fast depletion of fossil fuel reserves and environmental concerns have provided greater incentive to integrate renewable energy based DERs like solar, wind and biomass in modern power systems.

solar photovoltaic (PV) energy systems are becoming popular and frequently used on commercial as well as residential level. Moreover, technology related to the PV array is also growing and trying to extract maximum power from the PV panel. Since the characteristic of the PV panel is nonlinear in nature so, PV characteristic consists of a single point where the PV power is maximum, that is known as maximum power point (MPP)[2][3]. Therefore, to operate at MPP, it needs MPPT ((Maximum Power Point Tracking)) algorithm. The 'perturb and observe (P&O), 'incremental conductance (InC), Hill Climbing' and beta factor, based MPPTs are few techniques, which are highly popular to find the MPP of PV characteristic. However, steady-state oscillation, slow dynamic responses and fixed step change, are the major issues with these techniques. A literature review on MPPT, shows that many authors have tried to solve these problems through some modifications in classical algorithms namely, modified P&O, improved In, fuzzy logic based MPPT, artificial intelligence based MPPT[9] approach, etc. However, still, a reliable optimum solution has not come. Because, if few improved techniques are performing well in the steady state then lagging in a dynamic condition, vice versa. Use of solar PV (Photovoltaic) generation for rural electrification, is growing very rapidly. The popularity of solar PV

generation in the rural area, is due to its static nature, easy installation, low maintenance, and zero fuel cost. Therefore, government, as well as nongovernmental organizations, are installing or supporting the installation of rooftop PV system in rural areas for continuous electricity. These schemes are also popular in the urban areas.Microgrid can work in two modes that include interconnected mode and Islanded mode. In grid connected mode microgrid is connected with the public grid and in islanded mode microgrid works autonomously providing electrical power to local load. Since renewable energy sources are intermittent in nature, due to this fact Microgrid needs control strategy for its reliable operation while maintaining power quality. Electronic interfaced inverters are the major components of Microgrid in Islanded or grid connected mode.These inverters are responsible for the control of active and reactive power to maintain reliable power sharing between renewable energy generators. In islanded operation Distributed Generators are responsible for frequency and voltage control of the microgrid. Similar to traditional power systems, the power/frequency (P/f) droop control is implemented for the microgrid controllers.A microgrid (MG) is an energy system that consists of distributed generators, energy storage units and loads that can operate in either islanded or in grid-connected mode. Grid connected MGs are commonly used due to consistent configurations for variable/dynamic loads that should be fed without interruption. However, these resources introduce new challenges for power management, control and economical operation of the system when several energy sources are available to feed the load and meet demand requirements. Power management and control schemes are systematised into lower level and upper level controls. Lower level control is known as primary control and is responsible for stabilising voltage and frequency.Photovoltaic (PV) power systems have become one of the most promising renewable generation technologies because of their attractive characteristics such as abundance of solar and clean energy. Rapid PV technology development and declining installation costs are also stimulating the increasing deployment of PV in power systems. However, due to the nature of solar energy and PV panels, instantaneous power output of a PV system depends largely on its operating environment, such as solar irradiance and surrounding temperature, resulting in constant fluctuations in the output power.

II. MICRO-GRID CONNECTED /ISLANDING OPERATION

A. Micro-grid connected /islanding operation methods

Micro-grid could operate in grid-connected mode and islanding mode. Grid-connected mode means that there is a connection between micro-grid and utility system, loads flow between them. Islanding operation means that when faults happen in grid, micro-grid is isolated from the remainder of the utility system and DGs supply power energy to load. Islanding operation improves reliability of power supply.

Islanding has great harmfulness: firstly, due to the islanding areas is out of grid's control, the voltage and frequency may be unstable and it will threaten safety operation of electric equipments; secondly, workers couldn't judge if equipment is power down or not when islanding happened, so the worker's life is threatened; thirdly, main grid would be impacted when micro-grid reconnected with main grid.

B. The grid code about islanding operation

Due to the great harmfulness of islanding, the require DG to be disconnected from the grid once it is islanded. Anti-islanding protection could ensure grid running normally, but with the increase of distributed generation's capacity, the current anti-islanding protection exist some defects. For example, the DG couldn't be made full use; reliability of distributed network power supply is reduced, etc. As we know, faults cannot be avoided in power system. If DGs are isolated from the utility system whenever a fault occurs, then reliability of power supply is hard to be ensured and superiority of DG can't be reflected. Based on the analysis above, practices of disconnecting the DG when faults happen will no longer be a practical or reliable solution.is a new standard proposed intentional islanding and unintentional islanding, intentional islanding means that a micro-grid or a portion of the power grid, which consists of loads and a distributed generation system, is isolated from the remainder of the utility system according to foregone planning Intentional islanding could keep micro-grid operation stable and improve reliability of power supply. Unintentional islanding is an operation state that DGs supply power to loads independently. This operation state is incidental and unstable. This code approves intentional islanding operation and prohibits unintentional islanding. Stable micro-grid operation depends on the smooth switching of operation mode. The key is to choose an appropriate control strategy.

III. CONTROL STRATEGY OF MICRO-GRID CONNECTED/ISLANDING OPERATION

A. Traditional Control Strategy of Micro-Grid connected /islanding Operation

Nowadays, master-slave and peer-to-peer control strategy are used in micro-grid. Master-slave control means that all the DGs in micro-grid adopt P-Q control in grid-connected mode, but in islanding mode, in order to keep voltage and frequency stable, one or several DGs are changed to V-f control. Peer-to-peer control means that all of DGs in micro-grid adopt droop control, which could ensure reasonable power assignment among DGs. P-Q control means that DG is controlled to output maximum power or specified power according to actual condition. The principle of P-Q control when micro-grid frequency is 50Hz and connected bus voltage is rated, DG operates at point B and power output is Pref, Qref; if connected bus voltage and micro-grid frequency rising or reduced, then operating point moves from B to A or C to keep power output at Pref, Qref. P-Q control is designed to maximize the utilization of renewable energy, it is suitable for intermitted resources. P-Q control is easy relatively, but it can't keep voltage and frequency stable.

IV. INTEGRATION OF DERs TO THE GRID

The high penetration of DERs in the modern electricity grid can provide many potential positive benefits through their integration but they can have many negative impacts on the network if power output and voltage at the Point of common coupling (PCC) is not properly regulated through controls. The challenge mainly lies in the integration of varying renewable sources like Solar PhV and Wind Energy Conversion systems. DERs can provide a technical relief to the grid in the form of reduced losses, reduced network flows and voltage drops, however, there are several negative impacts due to high penetration of these variable resources which include voltage swell, voltage fluctuations, reverse power flow, changes in power factor, injection of unwanted harmonics, frequency regulation issues, fault currents and grounding issues and unintentional islanding.

Techno savior

PV-STATCOM: A Smart Inverter for Distribution Systems"

Miss Thenge Swarupa Sambhaji ME First Year (Power System) Nov 2018

Environmental concerns such as pollution and limited resources of gas and fossil fuels have caused a surge of interest in renewable energy in recent years. One of the major renewable energy sources in the world is the photovoltaic system (PV) which converts solar power to electrical power. Historically, the _rst PV was used in space program as a cost efficient power supply in 1960s. In 1970s, governments started investing in solar power industry. For most of 1980s and 1990s, off-grid PV power plants were employed as an attractive cost effective power supply choice to electrify rural or inaccessible areas. In last two decades, due to significant developments in power electronics and solar panels, the solar energy industry has achieved a rapid growth in the world. This growth is expected to reduce PV electricity generation costs. Finally, with the drop of PV panel prices, the volume of PV installation has grown significantly. The world-wide installed capacity of PV systems reached 138.9 GW by end of 2013 compared to the installed capacity of 1.4 GW in 2000. By the end of 2013, the global outlook revealed that Germany was the world's largest overall producer of photovoltaic power with a total capacity of 35.7 GW while China had the fastest growth rate of 11.8 GW per year. In a short term outlook, it is expected by 2018, the worldwide capacity of PV power will reach almost 400 GW which implies a doubling of the capacity of year 2013.In 2009, the introduction of the Feed-In-Tari_ (FIT) program has made Ontario a Canadian provincial leader in solar energy projects. In October 2010, the largest solar farm in the world was installed in Sarnia, Ontario with 80 MW which can supply more than 12,000 homes. The total installed PV power of Canada reached 1.2 GW by installing 444 MW in 2013. PV systems are classified as roof-top and ground-mounted systems with different capacities from few kilowatts to hundreds of megawatts. In roof-type photovoltaic system, solar panels are installed on rooftops of residential, commercial or institutional buildings whereas ground-mounted type photovoltaic systems are installed on the ground. Also, PV systems can be installed either as a grid-connected system or stand-alone system (o_-grid system). In case the system is grid-connected, when the power generation of PV system is more than the consumption by the load, the excess power can be fed to the grid. Based on the power capacity, PV systems can be classified to utility-scale, medium-scale and small-scale. Utility scale PV sizes are between 1MW to 10.MW and connected to medium-voltage distribution feeder (e.g., 27.6 kV feeders) through one or more interconnection transformers. Medium-scale PV systems are defended to have a power range between 10kW to 1000kW, and installed on small and large buildings. A medium-size PV system is connected to medium or low voltage distribution feeders based on their capacity. Small-scale PV system is considered to be of capacity range up to 10kW. A small-scale PV is connected to low voltage feeder (120/208 V), either through three phase or single phase supply. In North America, many small-scale PV units are lumped and connected to a common PCC through a transformer . The Ontario Power Authority (OPA) has rolled out the Feed-in Tari_ (FIT) for

Matoshri College of Engineering and Research Centre, Nashik
Eklahareshivar, Near Odhagaon, Opp Nashik-Aurangabad Highway, Nashik,
Pin-422105, www.engg.matoshri.edu.in
Contact: 0253 2406600,612

the PV power fed to the grid, according to which the FIT price for the roof-type systems are higher than ground- mounted type PV systems for different range of power.

Safety System for FOG and ROCK falling — *D.D.Ahire*

Environmental protection is a practice of protecting the natural environment on individual, organizational or governmental levels, for the benefit of both the environment and humans. The amount of greenhouse gas in the atmosphere is already above the threshold that can potentially cause dangerous climate change. We are already at risk of many areas of pollution. It's not next year or next decade, it's now. Around 70 percent of disasters are now climate related.

According to the National Crime Records Bureau (NCRB), in 2014, 9039 road crashes took place because of unfavorable weather conditions, especially fog, killing 5,300 people. Government officials said since all these accidents and deaths happen in two-three months, there is a need to put special focus on managing the crisis. "Two factors- missing lane marking, signages, signals and weak enforcement are primarily response for the bloodbath on our roads. The three necessary features on our roads to guide drivers are missing and there is no enforcement on our highways. which account for 65% of the total road deaths," road safety expert Roll it Baluja said. Government officials said since all these accidents and deaths happen in two-three months, there is a need to put special focus on managing the crisis.

With almost 1% of the reported accidents being associated with slope stability problems, landslides and rock fall have been responsible for nearly 25% of fatalities in hill slopes and surface mines over past few decades. Morpho-dynamic terrain of Himalaya is continually facing challenges in stability of rock/slopes, which are aggravated due to increased disturbance level in rock/soil mass due to human intervention. Lack of enough knowledge and understanding of the phenomenon, frequent occurrences of rock fall along state and national highways, the consequent inconveniences and loss of lives highlight the importance of addressing the subject on a priority basis. On the contrary, benches at intermediate height reduced the energy of falling blocks but could not restrict the blocks to cross over the ditch on to the road. An optimisation of the angle of inclination of the ditch angle was also carried out. The study will be very useful for safe design of structures for prevention and mitigation of hazards due to rock failures along these slopes.

To overcome the problems we build a Safety system for fog and rock falling using Programmable Logic Controller (PLC). It will count no. of vehicles entering & exiting in this area which will be compared and that vehicles will be passing through all the sensors. And if no. of vehicles will be less than entering vehicles into that area that means something is wrong inside. Then automatically siren will be raised and signals before that area will be red and barrier will be closed automatically so that another vehicle will not enter and will prevent to bump again. Sensors will detect the fog & rock falling in hill areas or highways to act for safety of public and roads. Even the counting will provide us the data about how much vehicles pass through dangerous roads to make the system more effective.

Techno savior

Fog is produced by the suspension of very fine moisture droplets in the air. When light hits these droplets, it scatters and results in a loss of contrast and a dense white background. As these droplets get smaller, fog gets thicker and makes for roadways that are even more blanketed. As a result, cur drivers cannot see very far ahead, and car accidents become an even greater possibility than normal and the hazard due to rock fall is primarily at locations on, and some distance radiating away from, the incline where the fall occurs. This can affect a very wide area, and rock la hazards are there will be diffliculty to contain and control. In the aim of reducing the number of traffic accidents or at least limiting their impact, vehicles are increasingly being fitted with active safety systems. Such systems however only prove effective once the accident is well into its occurrence phase. To avoid this type of situation from arising in the first place, it becomes necessary to anticipate the associated risks and act accordingly. 'this stage requires good perception coupled with an acute understanding of the driving environment. This framework has given rise to introducing special sensors (cameras, laser, radar) into certain vehicles. Given the negative economic and community impacts of rockfalls, a targeted method for identifying the highest risk rockfall areas along state routes is crucial to ensure a safe, efficient transportation system that can function during emergency events.

Wireless Communications from High Altitude Platforms — *Mansi Patil*

Abstract

The demand for wireless communication is increasing day by day. People want a high speed of communication in less time. No one is interested in use of bunch of wires. So we move to wireless communication. As technology increases a demand also increases. Now everyone wants a fast communication from anywhere to anyone. Even rural area also requires internet facility. It is too hard to establish a Base station for particular small village for broadband communication or any wireless communication. Even it's too costly to launch a satellite for particular rural area. So Engineers made a intermediate way to satisfy both facilities of data transfer from terrestrial to satellite and satellite to terrestrial via HAP (High Altitude Platform). HAP is operated at altitude of 17-22km. HAP provides facilities of wireless communications.

INTRODUCTION

In current era demand for wireless communication is notoriously increases. A terrestrial and satellite system provides wireless communication services. Terrestrial systems are used in mobile applications while satellite systems are used where terrestrial system not reached. HAPs are airship or airplanes which altitudes at 17-22km above earth surface. HAPs have been proposed mobile services in stratosphere. It have advantages of both terrestrial as well as satellite. It also provides services like 3G, emergency services and Wi-MAX. HAP networks are provides different services like military application, earth monitoring, traffic monitoring and control. In terms of services, HAP offering low cost and high facility services.

HAP INFRASTRUCTURE

Techno savior

Infrastructure of HAPs is categories in different types which are as follows

1) Balloons : The earliest aerial platforms were balloons.• It was filled by hydrogen.• It was used in military applications
2) Airships : Airships are helium filled containers of the order of 100m or more in length. Electric motors and propellers are used for station keeping, and the airship flies against the prevailing wind. Prime power is required for propulsion and station-keeping as well as for the payload and applications; it is provided from lightweight solar cells in the form of large flexible sheets
3) Aeroplane : It is unmanned solar powered plane, which needs to fly against the wind.

It is having wide range of topologies due to their rapid deployment and kind of service to provide. Basically there are three types of it. First, intermediate between satellite and terrestrial system, improving the satellite radio links, coverage and resource management implies. Second, it can be used in the stratospheric, with a terrestrial network. Third, it can be again used as a stratospheric, But also using a satellite for areas without connection to terrestrial networks where satellite links are available.

A. A terrestrial-HAP-satellite system: It is a mixed infrastructure, includes a HAPs network using a satellite as a link to the terrestrial networks to the final users. It provides best features of both HAPs and satellite communications. It can support high QOS(Quality Of services). First, the capability of the satellites of broadcasting and multicasting are used to transmit information from fiber networks to the HAP network deployed below the satellite. Second, HAPs are used to improve the satellite performance over the earth.
B. A integrated terrestrial – HAP system: This system works without the satellite-HAP link. Haps are considered to project one or more macro cells Here HAP network can be connected to terrestrial network through gateway.
C. A standalone HAP system: This system is used in many applications. For example broadband for all. In rural or remote area, it is expensive to deploy terrestrial systems. Satellite system is costly to be launched if traffic demand is small. This system may be deployed economically and efficiently.

HAP APPLICATIONS

HAPs offer such a big variety of services according to the topologies as broadcasting services (TV and radio) , Internet access, telephony etc. Main applications of HAPs are as follows: i. Broadband Fixed Wireless Access Applications ii. 2G/3G and 4G applications iii. Emergency and disaster scenarios iv. Military Communications v. Earth monitoring and positioning

SMART POWER GENERATION FROM WASTE HEAT BY THERMO ELECTRIC GENERATOR

RUTUJA DESHMUKH

Abstract- Generating electricity in present there is a shortage of fossil fuel, oil, gas, etc. burning of these fuels causes environmental problem like radio activity pollution, global warming etc. So that these (coal, oil, gas) are the limiting resources hence resulting new technology is needed for electricity generation,

by using thermoelectric generators to generate power as a most promising technology and environmental free and several advantages in production. Thermoelectric generator can convert directly thermal (heat) energy into electrical energy. In this TEG there are no moving parts and it can not be produce any waste during power production hence it is consider as a green technology. Thermoelectric power generator convert direct waste heat in to generate electricity By this it eliminated emission so we can believe this green technology. Thermoelectric power generation offer a potential application in the direct exchange of waste-heat energy into electrical power where it is unnecessary to believe the cost of the thermal energy input .This method will have an maximum outcome. The application of this option green technology in converting waste-heat energy directly into electrical power can too improve the overall efficiencies of energy conversion systems. Heat source which is need for this conversion is less when contrast to conventional methods. By using this energy is used to charge the mobile electronics

INTRODUCTION Recently we are depending upon fossil fuels for maximum electricity generation. However, the reserves of fossil fuels will be goes on depleting, since oil & gas are the least sources. Recent years .cost of unit electricity has increasing to unpredictable levels due the less supply of (oil gas coal). Thus the , green energies are more attractive artificial to electricity generation, as it will also provide a pollution free and cost less. In this innovative project, we are using one device which is used to be created and introduced by human as a renewable energy that is thermo electric generator equipment to generate electricity As we know Renewable energies are, solar energy, wind energy,hydro energy, tidal energy, etc. above energies can produce electricity in different forms and way of generating method. There are some disadvantages. Solar cells are the most commonly used in applications such as household industrial and spacecraft electrical systems. However, if there is no sun light there will no production of electricity alternative sources are necessary for generating electricity. or a method of storing energy for future use. Wind and hydro electric energy have their own drawback making them less power production and insufficient for wider usage. The device by converting heat energy to electrical energy. This thermoelectric generator is suitable power for space research, Satellites and even unmanned facilities. Satellites are settled at the planets that so for from the earth. For example, thermoelectric devices can be used in vehicles to producing electricity using the waste heat of the engine also.TEG is used to convert thermal energy (heat) into electricity based on “Seebeck effect” directly. Here there is charge movement in the media. Advantages of Thermoelectric power generators are. - Small size and less weight. . - Green Technology. - increase the overall efficiency (5% to 8%). - Alternative power sources of energy. - It require less space and cost compare to other source waste heat to generate the power is to decrease the cost-per-unit of the devices. TEG can be used in , Jet Engine parts, IC Engines parts, Furnace cover, Hot water tubes, Refrigerator Computer/laptop Body heat etc

Theory and the technology when “electrons” are in motion, we have an electrical current (i.e., charge per unit time per unit area).electrical voltage (“pressure”) usually is the driving force but, other forces like temperature difference andhence flow of thermal energy/heat can drive the electrons

PROBLEM DEFINITION

Techno savior

Some developing countries and most populated industrialized countries (India china Mongolia Korea) etc. have average of 3 to 10 hours of daily power-cuts because the increase in demand of consumer utilization electricity exceeds so that the production of electrical energy is lesser then the consumer demand. And also shortage of fossil fuel and coal i.e. about 60% of electricity is generated from fossil fuels. (Oil and gas) are imported from Arabian countries. So that pollution also may occur due to the combustion of this fossil fuel. And also the generating the power from these conventional sources may lead to harmful environment and pollute the nature. In the new generation they are depending upon the rechargeable batteries or diesel /petrol engine etc. when there is no power and at the time of load shedding. The use of generator is common in industrial and commercial sector. This ultimately increases the shortage of power and more cost. And also the people are not utilizing the power properly they were unnecessarily wasting the power and they are not designing the power consumption properly hence basically a low power production in that also wasting means in the future we live without light Now a days consumer demand is more then the power production that is the major difficulty to overcome.

Objective

The main aim of this project is to develop much cleaner noise less cost effective different way of power generation method for charging the battery as well as to utilization proper only the requirement of usage, which helps to reduces the global warming as well as reduce the power shortages, load shedding and also we can transfer the portable generating unit. In this project the conversion of waste heat into generate electricity by using thermoelectric generator. Waste may refrigerator heat, vehicle radiator heat, laptop heat, even body heat can be used as a input source as a waste heat to generate electricity and it can be charged directly mobile battery and also stored in a rechargeable lead acid battery for further usage. And also waste energy human body locomotion also produce electricity body weight locomotion of the energy in to electrical energy by using electromagnetic induction principle. The control mechanism carries regulator circuit etc and the power saving mechanism carries microcontroller relays etc. 1) Charge the mobile battery where ever waste heat is obtained 2) Maintain the heat transfer from hot side to cold side because of uniform charging mobile battery 3) Charge the 12v battery for further usage to converting by using inverter to 220v

SCOPE OF THE STUDY

The scopes of project study are; 1) by using thermoelectric generator connecting in series /parallel we can generate the power for maximum level 2) even body heat also generate the heat that can be utilizing by using TEG to generate the power to charge the portable equipment like laptop mobile etc 3) by installed in the vehicle above the radiator means the vehicle battery will charge self

CONCLUSION

Present method for electricity generation is converting thermal energy into mechanical energy by turbine then into electricity by using generator. Burning of these fuels causes environmental problem like radio activity pollution, global warming. hence (coal, oil, gas) are the limiting resources resulting new technology is needed. The project paper is tested and implemented. The system gives the best economical pollution free, required energy solution to the people. Two power generators have been built

using TEG modules and tested. The power of the first one could reach about 500 W (predicted using experimental data) with a temperature difference of about 200°C between hot and cold sides. This work can be used for many applications in urban and rural areas where power availability is less or totally absence. By making this system generates and charge 12v which is capable to recharge a mobile. it avoiding dependency of grid supply. This is a Promising technology for solving power crisis to an affordable extent

Eye Directive Wheelchair — *Mayuri Hire*

Abstract

The Eye Directive wheelchair is a mobility-aided device for persons with moderate/severe physical disabilities or chronic diseases as well as for the elderly. There are various interfaces for wheelchair available in the market, still they remain under-utilized, the reason being the ability, power and mind presence required to operate them. The proposed model is a possible alternative. In this model, we use the optical-type eye tracking system to control powered wheel chair. User's eye movements are translated to screen position using the optical type eye tracking system, without any direct contact. When user looks at appropriate angle, then computer input system will send command to the software based on the angle of rotation of pupil i.e., when user moves his eyes balls left (move left), right (move right), straight (move forward) in all other cases wheel chair will stop. Also, obstacle detection sensors are connected to the arduino to provide necessary feedback for proper operation of the wheelchair and to ensure the user's safety. The motors attached to the wheelchair support differential steering which avoids clumsy motion. The wheelchair has also been provided with a joystick control to ensure safe movement in case of tired vision and with a safety stop button, which will enable the user to stop the wheelchair at his own ease

Introduction

The wheel chair model design illustrated here is a wellequipped and flexible motorized wheelchair for paralytic and motor disabled patients to drive the wheelchair without straining any of their physical posture. The gaze movement is tracked autonomously and the wheelchair is directed according to the eye position. It is an eco-friendly and cost-effective wheelchair that dissipates less power and can be fabricated using minimum resources. System has been designed taking into consideration the physical disability, thus it won't affect the patient physically. Obstacle and ground clearance sensing is performed to ensure patient's safety. Audible notification for the obstacles has been provided. Alternatively a joystick has been embedded for the control of wheelchair

Design and Specifications

In Image Capturing Module, images are captured using wireless camera and are sent to the base station (computer/ laptop) for further processing. In Microprocessor Interfacing, the generated electric digital output from the base station is used to direct the motors of the wheelchair. Microprocessor also takes care of the obstacles and the user inputs.

Wireless camera: Eye of the user is captured with a pin hole wireless camera which transmits the images to the base station wirelessly.

Computer Base station: The images received from the camera are processed using Open source Computer Vision library and the gaze movement is sent to the chair via X-Bee communication.

Microcontroller: They are used to maintain wireless communication protocols and on the receiver side, it also takes care of obstacles and manual user inputs. The microcontroller used in this model is Arduino. Arduino is a single-board microcontroller, intended to make building interactive objects or environments more accessible. The hardware consists of an open-source hardware board designed around an 8-bit Atmel AVR microcontroller, or a 32-bit Atmel ARM. The system uses two microcontrollers. The Transmitting Microcontroller is connected to the processing unit. This microcontroller converts the information received from the processing unit into signals and transmits them wirelessly over to the receiving microcontroller attached to the wheelchair. The Receiving Microcontroller receives signals from the transmitting microcontroller wirelessly and accordingly initiates the movement in the required direction. This microcontroller is mounted on the wheelchair and is connected to the motor driver. It is also connected to the object sensors, joystick control and the emergency stop button. This microcontroller can start the motion, change the direction and even stop the system on receiving commands from the above mentioned attachments.

Motor Driver: They provide the high current required to drive the motors. Motor driver is required to run the motors since the motors require more current than the microcontroller pin can generate. Motor driver is basically a current amplifier which takes a low-current signal from the microcontroller and gives out a proportionally higher current signal which can control and drive a motor. In most cases, a transistor can act as a switch and perform this task which drives the motor in a single direction.

Obstacle Sensors : The wheelchair has been mounted with four ultrasonic sensors to avoid collision and damage to the user. The three sensors monitor the forward, left and right directions. Ultrasonic sensors use electrical-mechanical energy transformation to measure distance from the sensor to the target object. The arduino rings the buzzer if any obstacle is detected within the range of 100-230 cm from the wheelchair, so that the obstacle can clear the way and ensures safe passage for the wheelchair. But if the obstacle still prevails within the 30cm range from the wheelchair, then the arduino sends stop command to the motor driver, ensuring the system comes to a halt. The fourth sensor is used for ground clearance. Ground clearance measures the height between the sensor and the flat surface (ground). The arduino will send stop command to the motor driver if there is a sudden step and/ slope.

Battery : The system uses lithium ion cells to supply power to the components mounted on the wheelchair. The battery contains 30 cells of Li-Ion having 3.7V 1.5AHr each. Battery is connected in 6x5 fashion i.e. 5 sets of batteries having 6 cells in series are connected in parallel. Hence battery gives overall 22.2V output with 7.5AHr capacity.

Conclusions

The system functions with an accuracy rate of 70-90 %. The aim of this project is to contribute to the society in our small way by setting out an idea for a system which could actually better the lives of

millions of people across the globe. Direction in which pupil looks is decided by fixing range to the particular direction as user looks. Detection of pupil is done even on illumination unless the illumination is covering whole eye, this is because when the light hits the pupil and illumination spreads on the pupil covering whole pupil which ignores those pixels so as we treat the illumination spots it will leave behind a maximum change edges that cannot be determined and the operator will consider another position to be a iris location. This process works even if image taken in little dark environment.

Radio Frequency Energy Harvesting - Sources and Technique

D.D.Dighe

Reference- www.google.com

Energy harvesting technology is attracting huge attention and holds a promising future for generating electrical power. This process offers various environmentally friendly alternative energy sources. Especially, radio frequency (RF) energy has interesting key at□ tributes that make it very attractive for low-power consumer electronics and wireless sensor networks (WSNs). Ambient RF energy could be provided by commercial RF broadcasting stations such as TV, GSM, Wi-Fi, or radar. In this study, particular attention is given to radio frequency energy harvesting (RFEH) as a green technology, which is very suitable for overcoming problems related to wireless sensor nodes located in harsh environments or inaccessible places. The aim of this paper is to review the progress achievements, the current approaches, and the future directions in the field of RF harvesting energy. Therefore, our aim is to provide RF energy harvesting techniques that open the possibility to power directly electronics or recharge secondary batteries. As a result, this overview is expected to lead to relevant techniques for developing an efficient RF energy harvesting system.

As the demand for wireless sensor networks (WSNs) increases, the need for external power supply drastically increases as well. Besides the problems of recharging and replacing, size and weight, batteries are an exhaustible source with an adverse environmental effect. For these reasons, it is highly desirable to find an alternative solution in order to overcome these power limitations.

The environment represents a relatively good source of available energy compared with the energy stored in batteries or super-capacitors. In this context, energy harvesting, also known as power harvesting and energy scavenging, is an alternative process for primary batteries, where energy is obtained from the ambient environment. An energy harvester typically captures, accumulates, stores, and manages ambient energy in order to convert it into useful electrical energy for autonomous wireless sensor networks. The use of energy scavenging minimizes maintenance and cost operation; therefore, batteries can be eventually removed in WSNs as well as in portable electronic devices. Many potential ways to harvest energy from environment are available, including solar and wind powers, radio frequency energy and ocean waves, and thermal energy and mechanical vibrations.

The basic structure of a radio frequency energy harvesting system consists of a receiving antenna, matching circuit, peak detector, and voltage elevator. Where electromagnetic waves are captured by the

antenna, voltage is amplified using the matching circuit, signal is converted to a voltage value thanks to the peak detector, and finally this voltage output is adjusted using the voltage elevator. The whole system formed by receiving antenna, matching network, and rectifier is usually known as a rectenna or an RF/direct current (DC), which is able to harvest high-frequency.

Energy in free space and convert it to DC power. The detail of each block is subsequently discussed in order to define specifications and limitations of the power conversion system. Further, a block of power management and another for energy storage could be integrated into the energy harvesting system. The energy storage subsystem is responsible for storing all the captured energy and providing a constant output voltage. Energy harvester is a promising power solution for WSNs. Instead of depending on centralized power sources for charging, sensor devices operate the existing energy in the environment. The DC voltage is stored in a holding capacitor or super-capacitor in order to power supply integrated circuits.

Antenna RF energy harvesting technique needs, as mentioned in the previous section, an efficient antenna with a circuit capable of converting alternating current (AC) voltage to direct current voltage. The front end is a key component to ensure the successful operation of RFEH system. It has the duty of capturing electromagnetic waves, which will be used later to power the integrated system. Moreover, the antenna efficiency is related to the frequency: energy obtained from an antenna with small bandwidth, than a wideband receiver antenna used to capture signals from multiple sources. RF antenna can harvest energy from a variety of sources, including broadcast TV signal (ultrahigh frequency (UHF)), mobile phones (900–950 MHz), or Local Area Network (2.45 GHz/ 5.8 GHz).

Matching circuit Matching circuits are essentially used to match the antenna impedance to the rectifier circuit in order to achieve maximum power and improve efficiency, by using coils and capacitors. Several matching circuits are available; however, the main configurations that have been proposed are the transformer, the parallel coil, and the LC network.

Rectifier Radio frequency signal captured by the antenna is an alternating current (AC) signal. In order to get a DC signal out of AC signal and improve the efficiency of the RF–DC power conversion system, a rectifier circuit is used. Rectification subsystem or peak detector, which has been already used on crystal radio, consists only of diodes and capacitors.

RF energy harvesters open up new exciting possibilities in wireless communication and networking by enabling energy self-sufficient, environmentally friendly operation with practically infinite lifetimes, and synergistic distribution of information and energy in networks. The energy is harvested from commercial RF broadcasting stations, especially for powering wireless sensor networks or other applications that require only a small amount of energy (10−3 to 10−6 W). Further, RFID sensors can be powered by scavenging ambient power from radio frequency signals in order to prolong the lifetime to several decades and reduce maintenance costs.

Techno savior

Automated Identification of WBC - More Kaveri (BE IT)

White blood cell composition reveals important diagnostic information about the patients. Substituting automatic detection of white blood cells for manually locating identifying and counting different classes of cells is an important topic in the domain of cancer diagnosis. Microscopic differential white blood cell count is still performed by haematologists, being indispensable in diagnostics with malignance suspicious. While its value as a reference method for blood samples containing abnormal cells remains indisputable, it is slow and subjective and its reproducibility is poor. Therefore, automation of this task is very helpful for improving the haematological procedure and accelerating diagnosis of many diseases. The differential counting of white blood cell provides confusing information to pathologist for diagnosis and treatment of many diseases manually counting of white blood cell is a tire some, time-consuming and susceptible to error procedure due to the tedious nature of this process, an automatic system is a need in this automatic process, segmentation and classification of white blood cell are the most important stages. **WBCs** are produced in the bone marrow by hemopoeitic stem cells, which differentiate into either lymphoid or myeloid progenitor cells. A major distinguishing feature is the presence of granules; **white blood cells** are often characterized as granulocytes or agranulocytes. The main purpose of the present study is to develop an automatic tool to identify and classify the white blood cells namely, lymphocytes, monocytes and neutrophil in digital microscopic images. We have proposed color based segmentation method and the geometric features extracted for each segment are used to identify and classify the different types of white blood cells. The experimental results are compared with the manual results obtained by the pathologist and demonstrate the efficiency of the proposed method.

Text Generation using hand Gesture Recognition : Archana kolhe (B.E I.T)

Now days much research is going on in the field of Artificial Intelligence in Natural language processing. Hand gesture, body postures are also the natural languages. The use of hand gestures provides unattractive alternative to the cumbersome interface devices for human-computer interaction (HCI). The primary goal of gesture recognition research is to create a system which can identify specific human gestures and use them to convey information. A gesture may be defined as a physical movement of the hands, arms, face, and body with the intent to convey information or meaning. Some medium is required for a deaf person to interact with a normal person. Sign language is the best media to interact between them. Similarly, Indian sign language is developed for Indians during the literature survey we analyzed various hand gesture recognition systems which use some different approach and algorithms. Commonly two approaches of gesture recognition are data gloves and vision based. We studied main function of hand gesture recognition it converts the sign language into some text format and sound. Therefore, gesture recognition system we were designed by using predefined approach with some advanced algorithm which gives accuracy and helps to convert gestures into text format. This system provides basic feature like data acquisition, segmentation, feature extraction, skin detection and sign to text conversion.

Techno savior

A Smart Anti-theft System for Vehicle Security -Ankita Palde(B.E I.T)

Security, especially theft security of vehicle in common parking places has become a matter of concern. An efficient automotive security system is implemented for anti-theft using an embedded system integrated with Global Positioning System (GPS) and Global System for Mobile Communication (GSM).This proposed work is an attempt to design and develop a smart anti-theft system that uses GPS and GSM system to prevent theft and to determine the exact location of vehicle. The system contains GPS module, GSM modem, Infrared sensors, DTMF decoder IC MT8870DE, 8051 microcontroller, relay switch, vibration sensor, paint spray and high voltage mesh. GPS system track the current location of vehicle, there are two types of tracking used one is online tracking and other is offline tracking. GSM system is also installed in the vehicle for sending the information to the owner of the vehicle because GPS system can only receive the vehicle location information from satellites. In case of accident this system automatically sends the message for help to ones relatives. The preventive measures like engine ignition cutoff, fuel supply cutoff, electric shock system (installed on steering wheel) and paint spray system are installed in the vehicle which is controlled using user or owner GSM mobile. The owner can lock or unlock his/her vehicle with the help of SMS. This complete system is designed taking in consideration the low range vehicles to provide them extreme security.

Tracking and Theft Prevention System for Two Wheeler Using Android - Darshan Hujband (B.E I.T)

In automobile field, the security and theft prevention are one of the main areas in current scenario. The security goals are achieved by the GSM, GPS technology. But it is commonly used for the four wheeler and not in the two wheeler. Using these technologies, we can only track and monitor the vehicle. Previously, GPS is used to get the current position of the two wheeler and that data will be send to the user mobile phone through the GSM. This paper implements for theft prevention in two wheeler using GSM, GPS and Android technology. We can track, monitor and stop the stolen two wheeler too by this system. The two wheeler position is obtained by the GPS module, which is send to the microcontroller, which then sends the message to the user smart phone through the GSM module. Here Atmel microcontroller, air solenoid and water solenoid valves are interfaced with GSM modem and GPS module which will be fixed in the two wheeler. User can stop the vehicle under theft by android application. n this paper, theft prevention system for two based on GSM is implement. Dedicated android application is designed for control the solenoid valves through the atmega microcontroller. Thermal electrical generator is also fixed on the heat surface and it will generate small amount of the power according the peltier effect. GSM and GPS are interfaced with microcontroller and GPS device sends the value to the microcontroller frequently. Then the GSM get the GPS value and it will send the location of the two wheeler to the owner mobile through SMS. Android application is designed for control the solenoid valve. Finally the theft is directly prevented by the two wheeler owner itself.

Techno savior

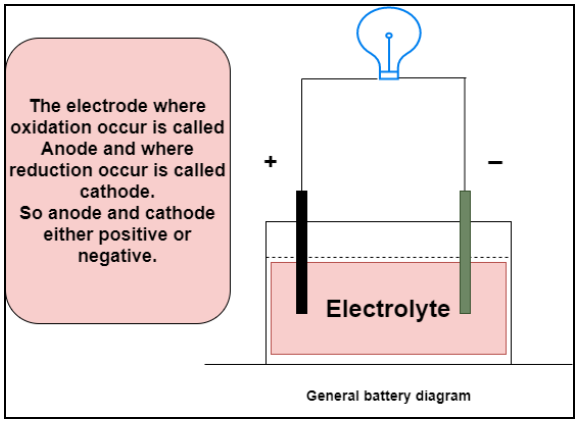
Intelligent Car Security System Microcontroller based –Shruti Tatar (B.E I.T)

Theft attempts and crashing of cars due to careless parking are common issues in unattended public parking lots. This work presents an intelligent car security system that provides security to the car against theft and crashing in parking lots. The main parts of the system are GSM and GPS modems, Camera, XYZ sensor and Microcontroller. The design focus is to make a highly secure, flexible, reliable and cost effective system. Any crash that happens to the car in the parking lots is immediately communicated to the owner through SMS. Motion sensors detect any vibration such as theft or crash and instantly capture the picture of the incident. The system also saves the picture of any damage caused to the vehicle rendering it as an evidence for further investigation in future. A prototype of the proposed system has been implemented. The test results prove that the system can monitor the parking area of the vehicle, inform the car owner about the status and the location of the car in case of any crash and helps in identifying who is responsible for such an incident by detecting the vibration and taking pictures around the parking area.

Introduction to batteries and their types — *Mr. Shrikant B. Thakare*

What is a Battery?

A battery is an electrochemical device that can store energy in the form of chemical energy. It translates to electric energy when the battery is connected in a circuit due to the flow of electrons because of the specific placement of chemicals. It was invented by Alessandro Volta, whereas Gaston Plante invented the rechargeable battery.The battery consists of three elements: the negative side, the positive side, and electrolyte (the chemical which reacts with both sides), as shown in the image below. The electrolyte is used as an electron transportation medium between the anode and cathode.It works due to electrochemical reactions called oxidation and reduction. In this reaction, electrons flow from one side to another side when the external circuit is connected to the anode and cathode.



General battery diagram.

The battery's chemical composition can vary for different applications, specifications, sizes, etc., which are explained below in types of batteries.

Techno savior

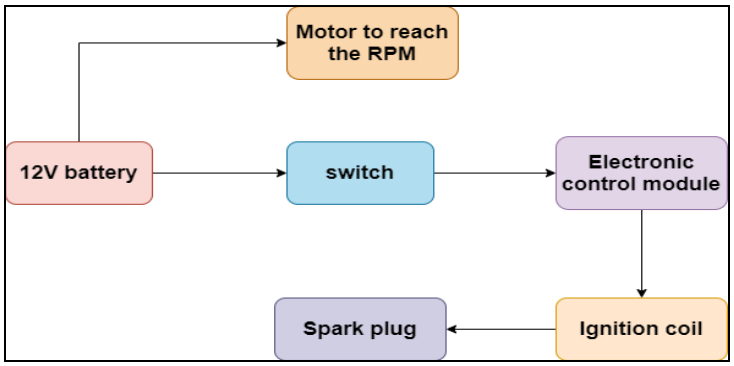
Battery applications

The battery is used in applications where energy is required to be stored for future purposes. Portable, emergency, and low-power devices generally use batteries. A portable device, such as a mobile laptop, has a battery to use anywhere you want. An emergency device like an inverter, torch, etc., is used when there is no electricity. Low power devices like watches, oximeter, etc., can run for a long time after replacing the battery. The mains supply is not suitable for all situations.

The requirement of a battery depends upon various conditions like how much power is needed or what device portability is. But what about the wall watch? Why is this not connected to a socket?

The wall watch consumes very little power. A 1.2v battery can make it run almost for two years, but this is not the main reason. The watch should be powered up every instant to get the correct time; this can be done by battery. A single hindrance in power will cause a delay in time. That's why it is designed to work with less power thereby allowing the watch to run for a longer period and making the battery an efficient way to supply power constantly.

Let's take another example. Generally, a vehicle works on petrol. In a self-start vehicle, the initial ignition of the engine is done by an ignition coil and a motor. The motor is used to reach specific rpm of the engine, and the ignition coil is used as a source of ignition. This vehicle ignition coil draws about four Amps. This current can vary among different manufacturers, and there is lots of space in the vehicle. That's why to fill the higher current requirement lead-acid battery is perfect for it.



Vehicle ignition.

From the above example, we can say that the use of batteries depends upon condition and application.

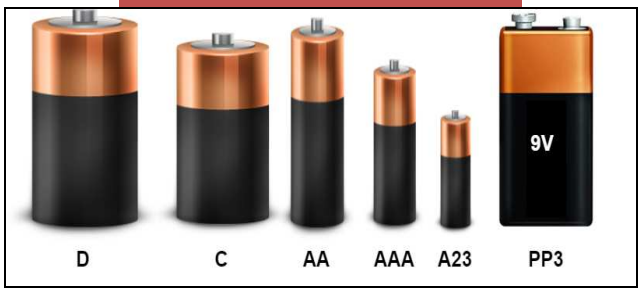
Types of Batteries

Based on functionality, there are two types of batteries available in the market.

1. **Primary Batteries.**
2. **Secondary Batteries.**

Primary Batteries

The batteries made for one-time use only and unable to recharge, are called **primary batteries**. This type of battery is thrown away after use. It is also known as **non-rechargeable batteries**. It's a very simple and convenient source of power for portable devices like a watch, camera, torch, etc. The battery comes in a standard size, as given below.



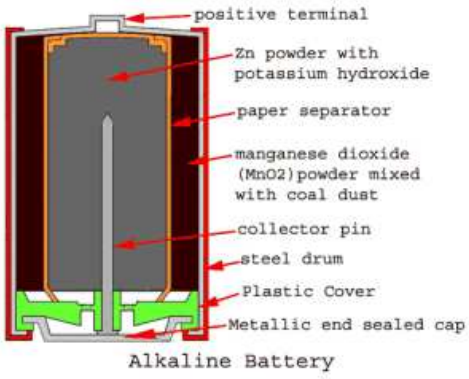
The standard size of the battery

These batteries are cheap, small, lightweight, and there is no or low maintenance required.

Some common primary batteries

1. **Alkaline battery**

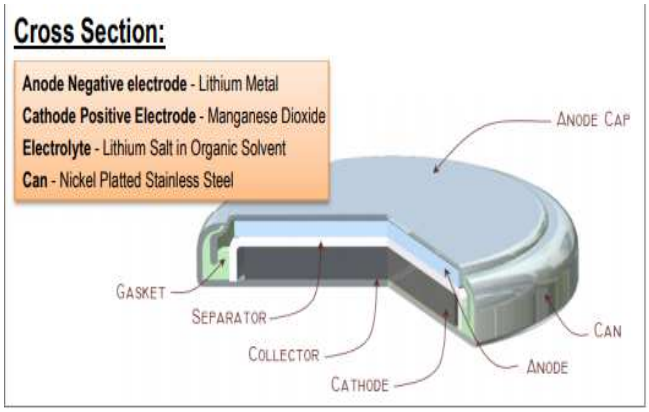
The alkaline battery mainly consists of zinc and manganese dioxide as electrodes. The alkaline electrolyte is used as either potassium or sodium hydroxide. As you can see in the image below, the outer casing is a steel drum, and there is a cap on a drum which is a positive terminal. Inside this drum, the fine-grained manganese dioxide (MnO_2) power mixed with coal dust is molted, as shown in the image. This molted mixture is part of the cathode in an alkaline battery. There is another powder filled inside the cathode powder, which is Zinc powder with potassium hydroxide. The Zinc (Zn) powder is part of the anode in an alkaline battery. Both powders are separated by a paper separator. The paper separator is soaked with potassium hydroxide, an electrolyte between the cathode (MnO_2) and anode (Zn). The metallic brass pin is inserted along with the center axis of the alkaline battery, which is a negative collector pin. The pin is in touch with the metallic end. There is a plastic cover, which separates the metallic end and the steel drum. The metallic end is the negative terminal of an alkaline battery. This battery is used where low voltage is required. One single cell can provide 1.5V. This is very cheap, so it can reduce the cost of the product. Every clock which hangs on the wall or remotes that control your TV and AC works on these alkaline batteries



Alkaline Battery

.**Button cell battery :**As you can see, the button cell is in the form of a button leading the body to be the cathode, and the anode is insulated at the top of the battery. The body is made of nickel-platted stainless steel – a positive terminal of the coin cell. At the top of the CAN, you can see a negative terminal cap. Both the CAN and the top

cap are separated by a gasket made of insulator material. Inside the battery, there are two materials: Lithium metal and manganese dioxide, separated by a separator. The electrolyte used in the battery is lithium salt in an organic solvent.



Button cell (**Source**)

Button or coin cells can be seen in watches in different sizes. This also comes in the alkaline batteries category because it comprises three substances- lithium as anode and manganese dioxide as a cathode, and alkaline as an electrolyte. These batteries are used to power small devices like watches, pocket calculator RAM, etc.

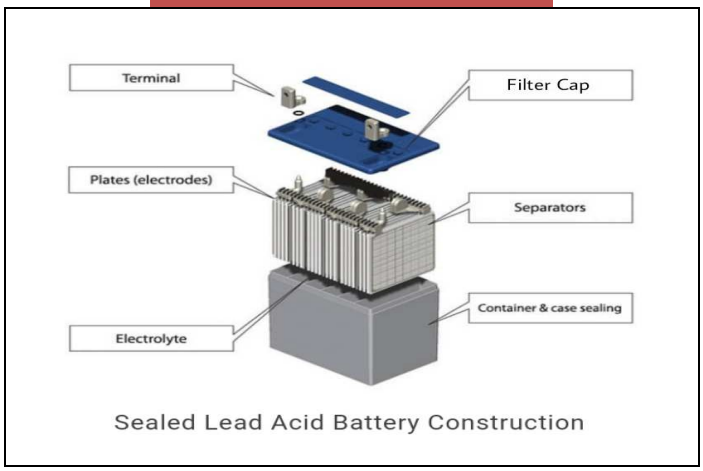
Secondary Batteries: The battery which is made for reusable purposes by recharging are called **secondary batteries**. They are also called **rechargeable batteries**. They have the same electrochemical reaction as alkaline batteries, but the electrochemical reaction can be reversed. This type of battery is used for portable devices like mobile phones, laptops, electric vehicles, etc. Also, a rechargeable battery is used with an inverter which stores power to supply our household devices.

Some common secondary batteries

Lead-Acid batteries :

The lead-acid battery container is made up of hard rubber of a bituminous compound. The container obtains dilute sulfuric acid, which is an electrolyte. The lead plates made of grid form are dipped in the electrolyte. The positive plate of the lead-acid battery is made of lead peroxide(PbO_2). This is a dark brown hard, and brittle substance. The negative plate is made of pure lead in soft sponge conditions. A separator separates both electrodes. This separator can be made of cellulose, polyvinyl chloride, organic rubber, and polyolefins. The positive and negative are connected on the top of the battery, which is the outer positive and negative terminal to connect the load or device. There is a filter cap with a small hole in the center. The filter cap provides access for adding electrolytes, and the holes allow gases to be vented to the atmosphere. These batteries are low cost, reliable, larger, and are heavily weighted. It is mostly used in heavy-duty applications because it is not portable due to its weight and size. It is used in non-portable applications like solar-panel energy storage, vehicle ignition and lights, backup power, and load leveling in power generation and distribution.

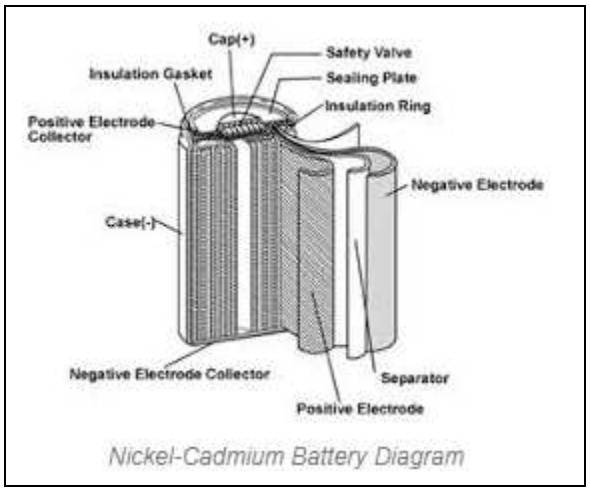
1.



Lead Acid Battery (**Source**)

Nickel-Cadmium batteries

A Nickel-cadmium battery (Ni-Cd or NiCad battery) is made of nickel oxide hydroxide as cathode and metallic cadmium as an anode. Firstly, a layer of nickel oxide NiO2 is kept around the redox. This layer act as a cathode. Above this cathode layer, a separator of KOH or NaOH is made to provide OH ions. After this layer, the cadmium layer act as an anode of the ni-cd battery. Nickel layer act as a positive electrode and cadmium act as a negative electrode. The arrangement of the layer is rolled in a cylindrical shape in a case. The outer case is made of metal with a sealing plate and safety valve, which allow it to realize gasses out of the container. A cap on the top of the cell is insulated by a gasket, which acts as a positive of the ni-cd battery.

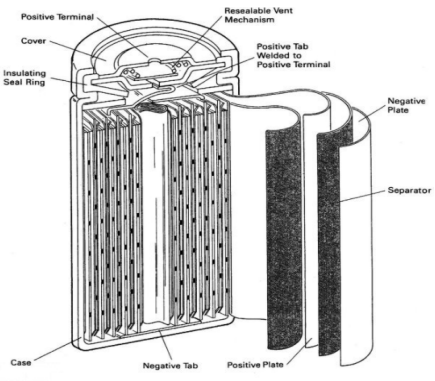


Nickel-Cadmium Battery.

These batteries are relatively less in cost, with toxic materials and a high self-discharge rate. It has a higher number of charging and discharging cycles. The energy density is higher than lead-acid batteries. It is smaller,

lighter, and available in different sizes like alkaline batteries. It is generally used in low-cost devices like toys, solar light or cordless phones, etc.

Nickel-Metal Hydride batteries: Nickel metal hydride battery (NiMH or Ni-MH) is made of Nickel oxide hydroxide as cathode and hydrogen-absorbing alloy as an Anode. The construction of the Ni-MH battery is the same as the Ni-cd battery. The Nickel oxide hydroxide layer and hydrogen-absorbing alloy are rolled with the separator of KOH or NaOH. The outer metal case Act as a negative terminal is connected with hydrogen-absorbing alloy. The cap on the top of the cell acts as a positive terminal and is connected with Nickel oxide hydroxide. An insulating seal ring or gasket separates both negative and positive terminals.



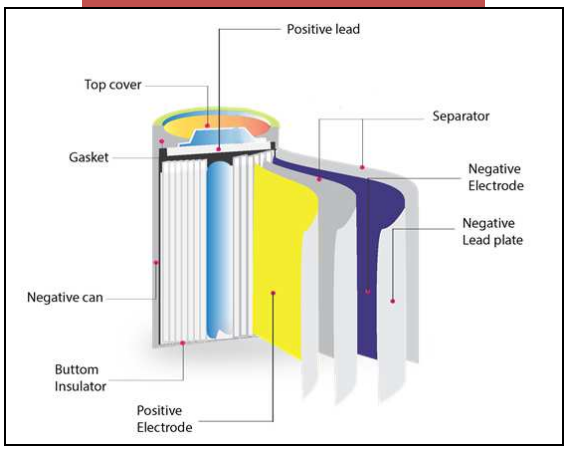
Nickel-Metal Hydride Battery. (**Source**)

Compared to Ni-Cd, these are more efficient with higher energy density, less toxic, and lower self-discharge rate. It is relatively expensive when compared to Ni-Cd. It has resistance to over-charging and over-discharging. It isn't very easy to charge, and some manufacturers provide their specific chargers.

Lithium-ion batteries

Lithium-ion batteries have anode made of graphite and cathode made of lithium metal oxide. The lithium salt as an organic solvent is used as an electrolyte. When the battery is connected to the circuit or load, lithium-ion migrates from the negative electrode to the positive electrode.In the image below, the construction of the li-ion battery is similar to the Ni-Cd and Ni-NH batteries, apart from materials. The lithium metal oxide is coated on aluminum foil which is the positive electrode. The graphite is coated on copper foil which is the negative electrode. Both foils are rolled in a cylindrical shape with a separator between them. The spectator is soaked with electrolyte material which generally is lithium salt as an organic solvent. The outer metal casing is negative, and the top cap is the positive terminal. Both are separated by a gasket, which is made of insulating material.

Techno savior



Lithium-Ion Battery. (**Source**)

Lithium-ion batteries are used in mobiles, laptops, and many portable devices. It is also used in the military and aerospace due to its lightweight nature. It has a higher energy density and low self-discharge compared to other types of batteries. It is also available in various sizes. Its single-cell voltage is higher. These have a significant risk of explosion when it is short-circuited or externally damaged.

Source - https://www.engineersgarage.com

Electric air taxi – Opening skies above cities : Mr. Mayur Wagh, -BE Mechanical

The air taxi could become a viable mode of urban transportation in the future, taking cars off the road, saving time, and obliterating urban boundaries. The new flying car donning the looks of a helicopter-drone hybrid will initially cruise at a speed of 180 mph, with the ability to seat few passengers, including a pilot. It would be equipped with multiple rotors, increasing safety in the case of any individual rotor failure, and a parachute system for emergencies.The aircraft would take off vertically, transition to wing-borne lift in cruise, and then transition back to vertical flight to land. Many tilt-rotors on the tail and several other rotors distributed around the egg-shaped cabin would facilitate vertical take-off and landing, which would be quieter than helicopters with combustion engines.With rotor-powered flight eliminating the need for a runway, and smaller, electric-powered rotors producing less noise than a combustion engine helicopter, aerial vehicles could perform short flights over or between cities.Several companies are working in the air taxi domain, including start-ups, drone makers, ride-hailing companies, aircraft manufacturers such as Boeing, Airbus, Bell, Embraer, Joby Aviation, and automakers such as Hyundai, Toyota, and Porsche. Lilium, one of the most promising start-ups in the field, hopes to ferry passengers between Manhattan and Kennedy International Airport in its fleet of aerial vehicles within five years.

How the concept of smaller aircraft took off

In 1996, the General Aviation Propulsion (GAP) program was initiated by NASA to encourage and advance the US light-aircraft industry. The program aimed at developing more affordable propulsion systems, mainly engines.

Techno savior

Williams International teamed up with NASA to develop the FJX-2 turbofan engine. This smallest commercial engine, weighing less than 45.4 kg (100 lbs), paved the way for the development of a new class of lightweight aircraft. In 1998, Williams International's president and founder, Dr. Sam Williams, joined with entrepreneur Vern Raburn to form the Eclipse Aviation Corporation that went on to develop the very light jet (VLJ) called Eclipse 500 jet aircraft in 2005.In 2001, NASA and the aerospace industry came together to harness the potential of light-jet aircraft manufacturing. It led to the birth of the Small Aircraft Transportation System (SATS) under which air taxis could make a quick, no-hassles plane ride, dispensing with the need for spending long, agonizing hours on the highway. Subsequently, partnering with the Federal Aviation Administration and the National Consortium for Aviation Mobility (NCAM), NASA set up the Advanced General Aviation Transport Experiment (AGATE) program. AGATE aimed to evolve the technology needed to support the air taxi concept by enabling safe and affordable access to almost any runway in the United States. The air taxi segment has picked up the momentum since 2016, as part of the burgeoning field of personal air vehicles such as passenger drones.Air taxi operations are governed in the US by Part 135 of the Federal Aviation Regulations (FAR). Canada regulates air taxi operations under Canadian Aviation Regulation 703. Both commercial single-engine aircraft and multi-engine helicopters flown by day visual flight rules by one pilot as also all multi-engine, non-turbo-jet aircraft with a maximum take-off weight 8,618 kg are covered under this regulation.

Hyundai and Uber join hands for aerial ride-share network

Significantly, Hyundai has partnered with Uber to design a concept for a future air-taxi service offering a small commercial aircraft for short flights on demand. The concept is called Urban Air Mobility (UAM), wherein small, electric passenger vehicles would make use of the airspace above cities. In the UAM concept, the vehicles would be piloted in the early stages of commercialization, but they could eventually travel autonomously, like personal drones. The concept builds further on the emerging technology of eVTOL (Electric Vertical Take-off and Landing).At the Consumer Electronics Show (CES) held in Las Vegas in January 2020, the two companies announced that they were joining forces to develop an all-electric air taxi that would be part of a future "aerial ride-share network." Hyundai would help produce and deploy the aircraft while Uber would provide airspace support, ground operations, and, of course, the app through which customers can book flights.Hyundai's concept car S-A1 is designed for cruising 1,000 to 2,000 feet above the ground, taking trips up to 60 miles with four passengers and a pilot on board.The Korean manufacturer plans to build a ground-based infrastructure to support a flying-taxi service. The concept includes a "hub" structure with a landing pad on top, and an adaptive minibus called the "purpose-built vehicle" (PBV). These PPVs could be customized to serve different functions such as a coffee shop and a medical clinic. They would be used for ground transportation to and from the station as they ferry passengers from their pick-up point to the hub for take-off. Resembling a beige rectangle and utilizing AI to find optimal routes and travel in platoons, PBVs are built from lightweight carbon composite materials. They feature a technology-laden interior for the entertainment and comfort of passengers.Hyundai proposes to blend its manufacturing expertise with Uber's technology platform to launch a vibrant air taxi network in the coming years under Uber Elevate, the company's aerial ride-hailing division. While Amazon's drone delivery program may take years to materialize, you could likely be hailing an Uber Elevate to the club next time you're in a city like Miami or New York.Uber is one of the companies leading the eVTOL charge and has presented several aerial vehicle concepts for the past few years. In addition to Hyundai, its partners include the Boeing subsidiary Aurora Flight Sciences, Embraer, Joby Aviation, Jaunt, Pipistrel, Karem Aircraft, and several real estate companies. Earlier, it collaborated with NASA and Bell Helicopter too. Uber has inked deals with the National Aeronautics and Space Administration to evolve ideas related to the infrastructure and technology of a crewless aerial

network.In fact, Uber has long been teasing the idea for a flying rideshare car that may come into fruition sooner than you may think. After investing heavily in the development of a flying taxi that can easily and safely transport people from one place to another, the company plans to launch an urban air taxi system by the mid-2020s, starting in Dallas, Texas, and Los Angeles, California. Uber will offer aerial rides in New York from lower Manhattan to John F. Kennedy International Airport.Uber sees the partnership with Hyundai as an opportunity to draw on the automaker's mass manufacturing capabilities to create a service that is both affordable and accessible. And, Hyundai would like to position itself as a "smart mobility solution provider" and not just a carmaker.

Advantages of Air Taxi

Air taxi service offers several distinct advantages, some of which include:

- Less load on major airports
- Less traffic jams on highways
- Providing travelers flexibility in travel schedules
- Newer departure and arrival points
- Reduced costs in smaller airlines operations

Among its other advantages, air taxis could provide an economic boom by increasing the number of people heading for recreation and tourism destinations that are not near major airports.

Concerns and challenges

While the air taxi system has been gradually evolving, many challenges are confronting it. While UAM is the latest in a long line of "flying car" concepts, eVTOL technology is still in its infancy, with only a few companies like Boeing and Lilium having tested a prototype.

The players in the air taxi field face enormous regulatory and technical challenges in getting their respective services off the ground. There are dozens of hurdles that these companies must overcome on the long road to regulatory approval. As per a Morgan Stanley report, air taxis will probably be used first in package delivery, which has fewer technical and regulatory barriers.Building an air taxi that is quiet, safe, and economical will mean overcoming several engineering and technical hurdles. On the one hand, battery technology is limited, and on the other, the cost of operation and maintenance needs to be low enough to make rides commercially viable.Though air taxi fares may come down as the system matures and expands, they will initially cost significantly more than traditional air travel. In the inception phase, air taxis may attract mainly business travelers and others who do not mind paying the extra expense to save their time.Safety of operations is another concern likely to bother air taxi travelers. They will also worry about the capability of landing hubs or local airports to handle the fleet of smaller aircraft. The latest computer and electronic technology can help manufacturers increase the safety and reliability of their planes. They also need to utilize advances in navigation and air traffic control for the smooth operations of light aerial vehicles.

Summing up

Air taxi service may begin on a small scale in the next few years, but it will take many more years for travel by air taxi to go from being a novel choice to common practice. Another bottleneck is the lack of synergy between technological advances for small-airport infrastructures with the development of light aircraft.However, analysts expect urban air taxis — electric-powered, minimal noise, with vertical take-off and landing capabilities — to be common by 2040, with the global market expected to be between $1.4 trillion and $2.9 trillion in size by then. So, be open to avail air taxis that will allow you to travel faster and more conveniently than ever before.

Source - https://www.engineersgarage.com

Techno savior

Drinking Water from Air – Wind Water Turbine : Mr. Ganesh Shirsath, BE Mechanical

Yes, you've read it right. The idea of **collecting water from atmospheric moisture** is pretty age old, but no one seemed to have implemented it in a practical way until Eole Water Company have successfully tested their prototype in a desert in abu-dhabi. They successfully collected around 1000 litters of water per day from their machine, a kind of wind turbine. The idea was developed by Marc Parent, the founder of Eole Water.

Before we learn how it works, let's go through a few scientific terms;

Condensation

Condensation is simply the process of conversion of any matter from its gaseous state to its liquid state. It can be viewed as an opposite process of vaporization. Condensation is a natural phenomenon always happens in atmosphere, cooling down the rising water vapour forming clouds.

Humidity

Atmosphere is rich in water molecule. They reside in air as water vapour, the gaseous form of water. Humidity is the percentage of water vapour content of the air.

Dew point

Dew point is a particular temperature and pressure at which a humid atmosphere is 100% saturated, i.e. the atmosphere can't hold anymore water vapour at that temperature and pressure. If temperature drops below dew point at the same atmospheric pressure, dew occurs.

The sweating bottle example

The sweating bottle example

Take a bottle of ice cold water from fridge. Leave it on the table for a while. You can see tiny water droplets forms on the surface of the bottle.

Matoshri College of Engineering and Research Centre, Nashik
Eklahareshivar, Near Odhagaon, Opp Nashik-Aurangabad Highway, Nashik,
Pin-422105, www.engg.matoshri.edu.in
Contact: 0253 2406600,612

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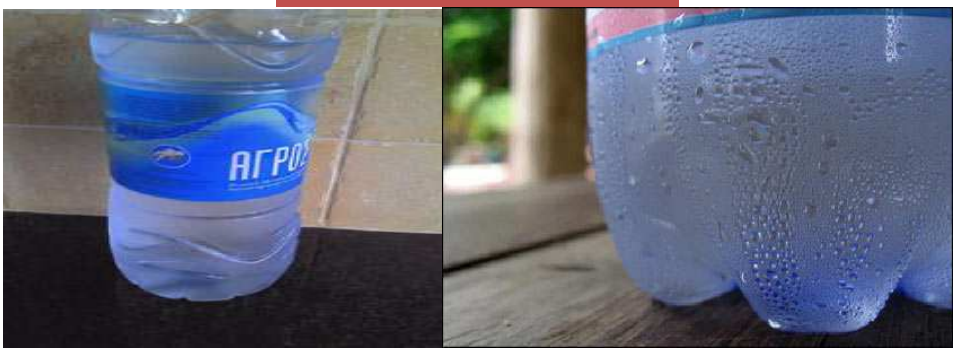


It happens because of condensation. The air surrounding the water bottle has enough water vapour in it. The cold water absorbs heat from the surrounding and the temperature of the air just touching the bottle surface falls below the dew point. Hence water can't stay longer in the atmosphere and forms water droplets on the surface of the bottle.

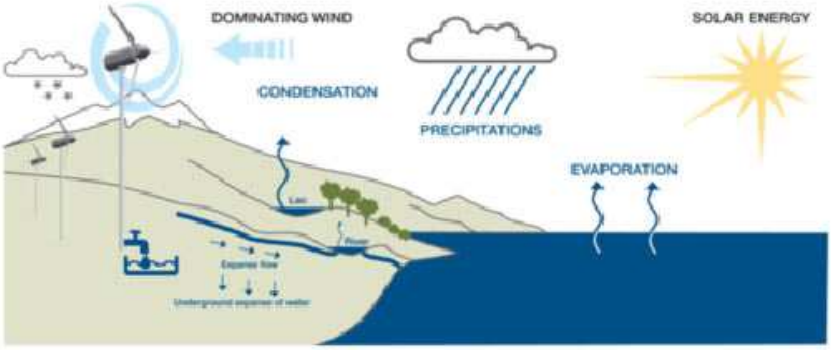
This is exactly what happens in the '**wind-water turbine**' also.

Working

Water gets evaporated from water bodies like sea, lagoons etc. and forms water vapour over them. This water vapour is carried by the wind to very long distance. Once this wind reaches the wind water turbine, it sucks the humid air inside and collect water from it through the process of condensation.

The **working of the wind water turbine** includes the following steps

1) Generate electric power from the wind
2) It sucks the air inside
3) Air is condensed inside the turbine body.
4) Collects the water formed and is filtered and stored
5) Excess heat is radiated through the back end of the turbine body



The wind water turbine operation

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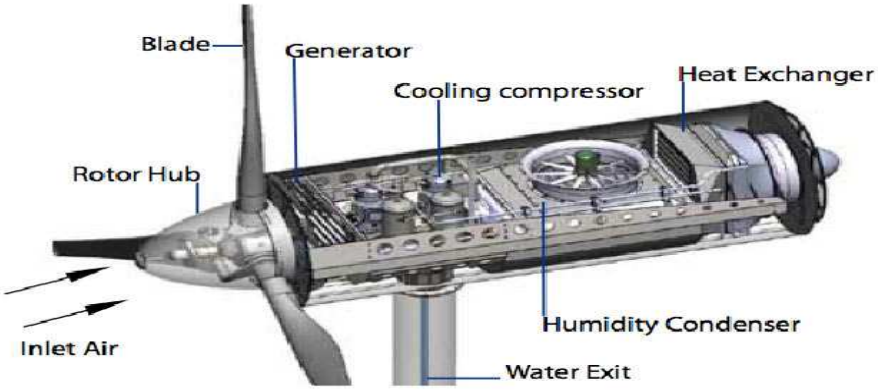
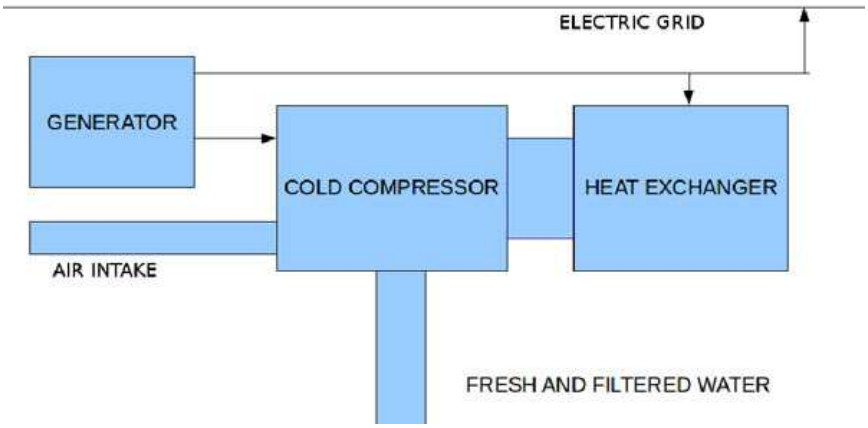


Internal view of a wind-water turbine



Block diagram of turbine operation

Generator

It has a gear system which converts low speed rotation of the turbine to very high speed. The internal generator rotates at this speed and generates more than enough electric power to run the following system. The extra power generated is routed to the local power grid.

Condenser

This section involves a cold compressor which can reduce the temperature inside the condensation unit, to a value well below the outside temperature. Temperature in this section is maintained below the dew point of the air. Thus condensation of the air which has been sucked in occurs, water droplets forms and get collected. These droplets form at a high rate producing around 65 litters per hour. The stored water is then filtered and pumped out.

Heat exchanger

It collects the heat from the cold compressor and radiates the excess heat out keeping the condenser section at a very low temperature.

Water filter

Matoshri College of Engineering and Research Centre, Nashik
Eklahareshivar, Near Odhagaon, Opp Nashik-Aurangabad Highway, Nashik,
Pin-422105, www.engg.matoshri.edu.in
Contact: 0253 2406600,612

Atmosphere contains all sorts of impurities like dust, smoke, poisonous gas etc. So we can't expect the water collected from the atmosphere to be drinkable. The wind-water turbine has a water filtering section for purifying the water collected from the air.

Advantages & Conclusion

Advantages of wind-water turbine

- No external power required
- Perform well even in areas like desert where no water bodies present
- Single turbine can generate enough water for more than 50 families per day
- Can be easily deployed in large numbers
- Generates electricity also which can power nearby houses or can be fed to a power grid

Conclusion

There is a long struggling journey between an idea and a practical implementation of the same. Most of the people give up their effort during the process, but a few come up successfully and their efforts are remembered ever, and those inventions become a land mark in the history of the humanity.The Eole wind water turbine is a single solution for two major problems the world facing today, energy and pure drinking water. Let's hope the technology is widely deployed around the globe as early as possible and leave little chance for future 'war for water'. The slogan of the company says it all, "Give us wind, we give you water".

Source - https://www.engineersgarage.com

Invention Story of Ball Point Pen Author: Mr. Shrikant B. Thakare

Every invention has a story which sizzles right behind the scenes. Ball Pen is also one invention, which though is of huge importance, yet not many know where it originated from. The **history of the pen** can be traced back to 1880s, when the first patent on a ball pen was issued to John Loud. This leather tanner attempted to make a writing object with which he could write on the leather he tanned. The pen, he had invented, constituted of a rotating steel ball as the tip held in a socket. It could write on the leather as intended by Loud. However, the invention proved futile for others as it proved way too coarse and messy for letter writing; so was disapproved commercially. The original patent lapsed with the failure of this invention on the grounds of practicality and usability.

Fig. 1: Image Of commercially used Ball Point pen

The second innings for the ball pen was in the making and it all began again with the first and very famous stylized fountain pen. Invented by Cross, the fountain pen is identified as daddy to the ball pens. This invention

triggered more of brainstorming that lasted till ball pen was born. Laszlo Jozsef Biro, a native of Budapest owns the patent of the ball pen to his name. What he had invented was a ball pen that contained ink cartridge in the pressurized form. A journalist named Biro took no time in noticing the quick drying capability of the ink used in the newspapers, and thought that if the same ink was utilized in a pen that smudged letters problem could be resolved. Being a proof reader, Biro had to refill his fountain pen from an ink bottle incessantly and this drove him crazy at times.

In the beginning of 1930s, along with his brother **Georg**, a chemist, **Biro** began with the experiment of a pen that would not need to be refilled and at the same time would not smudge the pages too. The concept revolved around a ball which was used on the tip of the pen and as this pen was moved on the paper, the ball would rotate pulling the ink from the cartridge. This time, the design of the pen was acclimatized with practicality and hence, the two brothers used a sealed reservoir which would store the ink inside the pen. In terms of consistency too, the ink was changed to thicker and quick drying ink. As the designing flaws were bid goodbye, Laszlo Biro was issued a patent to the pen in the year 1938. It could well be summed up, that even though Laszlo was not the first inventor of a ball pen; he was however, the successful inventor of a working design of ball pen which is now universally acceptable.

The story doesn't end here; in the year 1943, the two brothers began their quest for getting their invention worldwide recognition as well as financial support. They moved to Argentina and discovered someone who willingly financed the Birome pen and in no time, a factory was started to manufacture more ball pens. The ball pen was initially advertised as the only pen which could write even under the water. There were demonstrations witnessed by huge audiences, plenty of those who longed to write with the ball pen under the water. The company led by Biro became the leading producers of ball pens. The British soon caught wind of it and fascinated by the qualities of the ball pen, they bought the patent. The company was thus, sold to BIC Corporation who started producing and supplying pens to the Royal Air Force. Biro pens were considered highly useful for the pilots as they could write even in the pressure of high altitudes. This was also a major breakthrough for the ball pen that faced huge rivalry from the fountain pen as initially it was marked as a useful and fashionable accessory, but then being used at high altitudes added to the technological specification of the pen.

At a much reduced price, **the ball pen** made a foray into the British market. Laszlo Biro, the inventor continued his display of entrepreneurial flair and managed to secure significant financial scores to his name, however, he soon lost the Biro Company to Henry Martin who took over the production of ball pen from Laszlo Biro. Martin made the ball pen an established name (Biro Swan) in the market, but the credentials to bring ball pen to the position that it enjoys today, go to Marcel Bich. He founded a company that manufactured his own patented ball pen designs. BIC Cristal, that directly succeeded Biro, enjoys the largest share in the market today. Pen had discovered a market for itself a lot earlier, but the quality practices which underwent in making the ball pen as perfect as it is today are owed to Bich who established the ball pen high on the international benchmarks. Ever since then, the ball pen has been evolving and a lot has been added to the history of pens.

Today, ball pens are manufactured in almost every country. What goes in their making is also a well defined geographical needs criterion to ensure that the ink viscosity and tip tolerances are as per the environment, where the pens are meant to be used. The present scenario is such that the market is flooded with pens in unlimited varieties, designs and colors. It is a "choose as you may" situation for the users. Ranging from handcrafted ball pens to simple and sober ones, you will find them all in a variety unimaginable. Ever wondered, such a small item has given the world so much. A small invention has now become an indispensable part of our lives. It might not be the most technologically high-end instrument, but probably one of the most essential ones, one we can't do

without. How many times have you complained your pen got stolen? That is just because a lot of us need them in our everyday lives. Whether to a student or a business man, pen is highly useful tool.

Source - https://www.engineersgarage.com

The Amazing World of Robotics and its Promising Future

Mr. Santosh Holgir, Student-BE Mechanical

As soon as we come across the word robot, we tend to imagine a metallic structure with arms and legs carrying a human-like appearance and running errands for our help. However, in actual terms, it's just a machine operated externally or through a controller embedded within and doesn't necessarily look like a human. Technically, robotics is a branch of Science and Engineering which deals with designing, constructing, and operating robots as well as computer systems for their control, sensory feedback, and information processing.

Figure 1: Introduction to Robotics

Interestingly, the concept is almost as old as the hills with the first robot dating back to 350 BC, built in the form of a mechanical bird, by a Greek mathematician named Archytas. Although the term was coined ages ago, the actual potential of the fully autonomous robotics was realised in the second half of the 20th century.

APPLICATIONS OF ROBOTICS

The primary objective of robotics was to just perform a set of complex tasks mainly in factories with parts of robots but now it has spread to a lot of fields. Today, we can find the following industrial applications of robotics -:

Military: It goes without saying that military operations involve a high level of risk and hence it makes sense to use machines so as to save human lives. There a lot of varieties of military robots namely UAVs (Unmanned Aerial Vehicles aka drones), UGVs (Unmanned Ground Vehicles) and UUVs (Unmanned Underwater Vehicles). These are used to locate the terrorists and launching attacks. There are even four-legged robots for carrying heavy arms and ammunition.

Figure 2: Four-legged Military Robot

You may also read: **Robots in the Military**

Education: Many schools and institutes are using robots to educate and engage the students for STEM programs (Science, Technology, Engineering, and Mathematics). There are a lot of kits available for students through which they can learn a lot about robotics. Not only this, but kids with autism and other behavioral disorders also find it more convenient to interact with robots and gain knowledge about various subjects.

Healthcare: Various kinds of robots are being developed to be used in hospitals to aid the doctors and nurses in taking care of the patients. There are robots that can disinfect a place, take care of the needs of the patients and even remove unwanted elements from the body without surgery. There is also a robot named da Vinci which helps in performing surgeries with precision which are difficult to perform manually.

Agriculture: Many small-sized robots are used in agricultural fields which are equipped with camera and sensors. These navigate through fields and detect the weeds and other kinds of infection. The sensors help in applying the spray only on the affected areas, thereby protecting the environment from the release of harmful chemicals in the air.

Factory: Industrial robots are evidently being equipped on a large scale in factories building heavy equipment. Factors like negative population growth in certain countries, the disinterest of the younger workforce to indulge in factory work and time-saving efficiency of robotic parts are determining the surge in the usage of industrial robots. The most common illustration that can be cited here is the automobile factories that build cars through robotic parts along with human workers.

Space: Several countries have built their own space robots carrying various shapes and sizes in order to explore the space. Some of them can't even control their own weight on earth but work efficiently in space with excellent dexterity. Since there isn't any gravity and certain situations are challenging for survival, these robots can be easily substituted in the space for capturing videos and for performing other routine tasks.

Figure 3: Mars Rover in Space

TYPES OF ROBOTS From the heavy, metallic, and wired machines known as super robots to tiny devices known as nanobots, the field of robotics has been explored to a great extent. Enlisted below are the varieties of robots that have been designed lately. Let's check out the list of some interesting forms of robots -:

Exoskeletons: It's a technology where an electronic body suit offers limb movement and increased strength to the user. Primarily, these are used for the military purpose to lift heavy load and for patients suffering from spinal injuries.

Example: Ekso Bionics has developed full body ekso suits that can be worn by people who are victims of stroke or a spinal cord injury to get back on their feet. Originally developed for DARPA to be used by soldiers, these suits are also used in various rehabilitation clinics for patients with lower extremity weakness.

Humanoid robots: These are the robots that have a body resembling with a human containing a head, two arms, a torso and two legs. A subcategory of humanoids is known as Androids who appear much like a human with respect to the aesthetic aspects and can imitate the expressions of a human.

Example: Atlas is one of the most advanced humanoid robot developed by Google-owned Boston Dynamics. Although it's not an android with human-like skin and expressions, yet it can do a lot of interesting stuff. It can walk in snow and re-balance itself just like us, open doors, lift boxes and even sense objects lying in front of it.

Animal Robots: Bio-inspired robotics is a fairly new category of robotics where the natural biological characteristics of living beings are replicated in the form of animal-inspired robotic models. The traits of animals like the way they hop, climb, walk or crawl is observed and then efforts are made to iterate them in a machine setup.

Example: There is a robot named Cheetah developed by Boston Dynamics that can gallop at more than 29 miles per hour. A similar robot with the same name is developed by MIT which can sense obstacles and jump over them while running at 13 miles per hour.

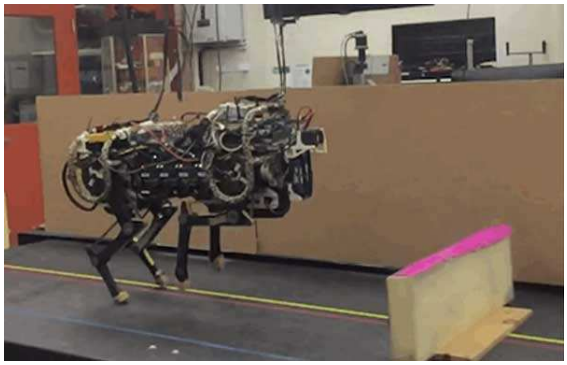


Figure 4: Cheetah Robot being tested in the lab

Rescue Robots: One of the most logical and sensible uses of robots is to deploy them in situations of disaster management for rescue operations. It takes a lot of courage as well as efforts to search and save the victims during a human or man-made disaster. Even though there have been instances when robots were designated for rescue operations but they failed to perform as per the expectations. It's still considered as an emerging technology since there are a lot of challenges to be faced.

Techno savior

Nanobots: These tiny devices are designed to perform repetitive tasks with precision at nanoscale dimensions of a few nanometers or less. These are applied in the assembly and maintenance of sophisticated systems or for building devices, machines, and circuits at the atomic or molecular level. Besides, nanobots are equipped in healthcare for the purpose of drug delivery, destroying cancer cells, etc.

Example: A group of physicists at the University of Mainz in Germany have designed the world's smallest engine from a single atom. It converts heat energy into the movement at the smallest scale that one has ever seen.

Swarm: Swarm robotics is much like imitating a group of insects or ants in the form of tiny devices crawling together and forming certain designs. These can be used in the fields like agriculture, rescue tasks or military operations.

Example: A swarm of 1,024 tiny robots was devised by Harvard University that could make certain formations like alphabets, five-pointed stars and other complex designs without any central intelligence.

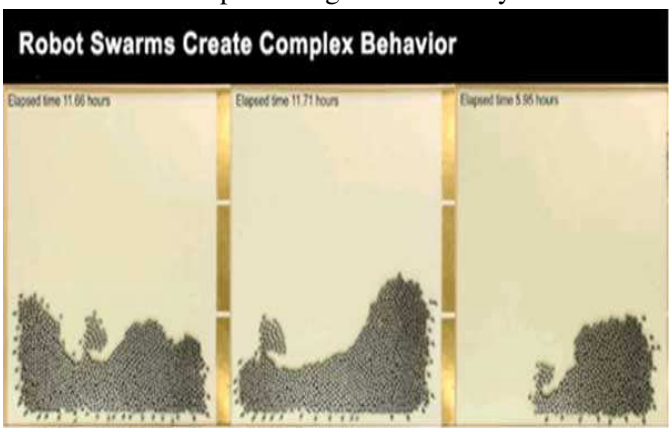


Figure 5: Swarm Robots creating various formations

CONCLUSION

Today there are plenty of robots carrying a variety of shapes, sizes, and structures but all of them are subject to certain challenges. For instance, the robots participating in DARPA contest were efficient in human-like tasks but they didn't have a proper system to perceive their environment and were simply following instructions from the operator. Then there are mini robots like Darwin developed by ROBOTIS who are quite skilled in walking, playing football, and even get up after falling but then they can't be put to use in applications needing physical strength. There is also a robot named Cozmo by Anki which can even express feelings and play but it's merely for entertainment.

Moving on, there are certain implications of robotics that need to be discussed. It's been a long-time notion that the development and deployment of robots are going to take away numerous jobs from the human workforce. However, Sherry Turkle who is a professor at MIT says that robots are not substitutes but companions of humans and their development would rather generate jobs.

Another concern is that we need to set a limit on the nature of tasks that are designated to the robots. It's logical to use them at places which are too dangerous for humans to access but it also raises a big question that if anything goes wrong, who will bear the blame. Undoubtedly, technology has always offered numerous benefits and plays an important role in our life but it's equally important to decide the limit of its usage.*Source - https://www.engineersgarage.com*

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Matoshri College of Engineering & Research Centre, Nashik

Eklahareshivar, Near Odhagaon, Opposite to Nashik-Aurangabad Highway, Nashik, Maharashtra 422105

Website: engg.matoshri.edu.in/Email: matoshricoe.hr@gmail.com

Contact: 0253-2406600/1/2/3

Toll free No.:1800 233 6602