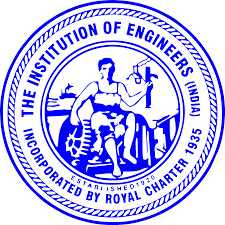
**52nd Engineers Day**

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SOUVENIR



**SEMINAR**

**ON**

**“Engineering for Change”**

**15 SEPTEMBER 2019**

THE INSTITUTION OF ENGINEERS (INDIA)

MUZAFFARPUR LOCAL CENTRE

**(FOUNDED 1969)**

**MUZAFFARPUR INSTITUTE OF TECHNOLOGY**

**MUZAFFARPUR – 842003 (BIHAR)**

Er. Narendra Kumar Jha, MIE Dr. Anjani Kumar Mishra, FIE

Hon. Secretary Chairman

**The Institution of Engineers (India)**

**Muzafffarpur Local Centre**

**M.I.T., Muzaffarpur-842003 (BIHAR**)

**2019**

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2K12-2K14 Prof. C.B.Rai Er. Jayant Ajat Shatru

2K14-2K16 Dr. Sunil Kumar Er. A.P Singh

2K16-2K18 Er. S.K. Mishra Dr. Rajeev Ranjan Kumar

2K18-2K20 Dr. Anjani Kumar Mishra Er. Narendra Kumar Jha

**THE INSTITUTION OF ENGINEERS (INDIA)**

**MUZAFFARPUR LOCAL CENTRE**

**M.I.T., MUZAFFARPUR-842 003**

***2019***

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**A TRIBUTE TO BHARAT RATNA DR. MOKSHGUNDAM VISVESVARYA**

**(Dr.) Anjani Kumar Mishra, FIE,**

**Chairman,**

**The Institution of Engineers (I)**

**Muzaffarpur Local Centre**

We have assembled here on this auspicious day of 15th September to pay tribute to Sir Mokshgundam Visvesvarya an eminent engineer and state man who played a key role in building a modern India. Today is his 158th birth anniversary and 52nd Engineers Day. With just passing over 72nd years of Independence. He was popularly known as MV.

Sir. M.V. was born at Madden halli, Village in Kolar district of Karnataka on 15th September 1861. His father Srinivasa shastry was a Sanskrit Scholar and Ayurvedic practitioner. He lost his father when he was only seven year old. This was great shock to his mother, but she was a very brave lady and had tremendous faith in God. She taught her son with great patience braving all the odds. Without her sacrifics and efforts. M.V. couldn’t have become M.V. the world knows.

Mokshgundam Visvesvarya took primary education at his village school chikaballarpur and then went to Banglore for higher education in 1881. He got some assistance from the Government of Mysore. He had a great appetite for studies since very child hood. His passion for book were such that be always used to forget even thirst or hunger while studying. Teachers were very affectionate to this sharp and intelligent boy.

M.V was admitted to central college at Bangalore. Here he used to get scholarship, but the amount was not sufficient to meet all his needs. The financial hardship however could not dampen the great scholar who continued his studies and topped the jlist of successful candidates. M.V had a great desire to become an engineers but those days engineering education was a costly affair. However M.V did not lose his heart and got engineering education from Pune Engineering College and topped the list of whole Bombay University in 1883.

He was appointed as Asstt. Engineer in Public works Department, Bombay and remained in service for 24 Years under Bombay Govt. During this period he constructed Sakkher Dam on the Indus river. All the great engineers of that time was surprised to see the skill, intellect and working ability of an India engineer.

Thereafter he joined the state of Hyderabad as Chief engineer and solved the problem of floods and utilized the water for irrigation, and those brought the prosperity to the state.

His works were noticed by Maharaja of Mysore and he was offered the post of Dewan in the year 1912. It was a matter of pride to all technocrats, as till then, this post was held only by I.C.S officers. He constructed Krishna Rah Sagar Dam on Cauvery River and the famous Brindavan garden on its flank, which is a living example of Sir. M.V’s developed aesthetic sense.

During his Dewanship the Mysore state underwent rapid development in the field of education, finance and industry many canals were consorted and Mysore University was started.

He was conferred upon the BHART RATNA by the President of India in the year 1955. His work and methodology was appreciated by all and his book planned Economy for India still work as a guide for planning Engineers. He extensively surveyed the food and irrigation problems of India and suggested to link all rivers of Northern India with Ganga through various Canlas.

Sir M.V. was a true patriot a great Scholar and an able administer. He breathed his last on 14th April 1962.

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**Engineering for Change**

**Dr.Anjani Kumar Mishra, FIE**

Abstract:

Engineering for change is the essential requirement for any activities in this present era of worldwide culture and development. This provides affordable and innovative technologies to improve the quality of life of people need to lead easy life. The engineering have large span of solutions for agriculture, energy, habitat, health, information and communication technologies, sanitation, transport and water sectors. This bridge the gap between innovative design and delivery of demand for sustainability. The technologies developed for and used by those living in poverty is often scare, disparate or inaccurate. This information gaps have consequences for both end users as well as development engineers and practitioners, which limit the transparency and accountability for poor quality or even unsafe products entering the market.

Keywords: Engineering, Sustainability, Design, Technology.

Introduction:

Engineering for change works with a different platform attached with innovative technologies for World Health Organization (WHO), International Telecommunication Union (ITU), Rural water supply network, water and sanitation and more.E4C also consult with communities of expert advisor for global development and its practical approach. They work together to design and apply technical solutions wherever they see the need. Solutions fall into seven categories on the organization's Web site, and they can include big infrastructural projects such as community water purification and bridge building, or smaller, personal technologies such as bicycle-powered electricity generators and cell phone applications for healthcare.

Education is an important part of Engineering for Change. It is the best way to achieve the desired changes in the technologies so that these technologies becomes helpful for organizations as well as people. It can also be achieved by using appropriate technology. Appropriate technology is a movement (and its manifestations) encompassing [technological](https://en.wikipedia.org/wiki/Technology) choice and application that is small-scale, [decentralized](https://en.wikipedia.org/wiki/Decentralization), [labor-intensive](https://en.wikipedia.org/wiki/Labor-intensive), [energy-efficient](https://en.wikipedia.org/wiki/Efficient_energy_use), [environmentally sound](https://en.wikipedia.org/wiki/Environmentally_sound), and [locally autonomous](https://en.wikipedia.org/wiki/Localism_(politics))

Main Thrust:

Engineering for change can be achieved by different ways such as using innovative technologies for improving the quality of work provided to people worldwide, providing proper education to professionals so that they will be able to perform their duty very efficiently, taking advice and guidance from expert of that field for optimum utilization of resources.

Conclusion:

Engineering for change is very important thing for the optimum utilization of resources in the betterment of people. Now a days it is achieved by using innovative technologies, bridging the information gap, providing proper education.

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**Recent trends in broadcasting** **Er. Narendra Kumar Jha, MIE Honorary secretary, IEI MLC Doordarshan Kendra Muz**

**Abstract**

Broadcast engineering has become a major aspect of communication and this can be via video and audio. Broadcast engineering is a very challenging field. In this field technology changes very fast. It is said that when a technology reaches market in the broadcast field it becomes obsolete. There is a very large gap in the technology being used in the broadcast field of developed country and developing country. Till today some countries are using analog transmission but developed countries are doing transmission in High definition and moving towards 4k and 8k technology. Research is going on 16K technology. In some countries, it is more active than others due to some challenges in the region or governmental policies. The purpose of this paper is to analysis recent Changes in broadcast engineering.

**Introduction**

In today's fast-paced life, nobody has time to waste. Everyone works under a tight schedule, trying hard to manage personal and professional life. To meet with this pace, technologies have been developed that ensure that individuals miss out no important event, notification or information.

Broadcast engineering involves both the [studio](https://en.wikipedia.org/wiki/Television_studio) and [transmitter](https://en.wikipedia.org/wiki/Transmitter) aspects as well as [remote broadcasts](https://en.wikipedia.org/wiki/Remote_broadcast). It deals with [radio](https://en.wikipedia.org/wiki/Radio) and [television](https://en.wikipedia.org/wiki/Television) [broadcasting](https://en.wikipedia.org/wiki/Broadcasting). Broadcast Engineering involves Electrical Engineering, Electronics and communication Engineering, Computer Engineering, Information technology, Audio and RF Engineering.

**Background**

Radio broadcasting in India began as a private venture in 1923 and 1924, when three radio clubs were established in Bombay, Calcutta and Madras.

In 1936, a radio station was commissioned in Delhi. All India Radio has come a long way since June 1936.

Television began in India way back in 1959 as a part of All India Radio when it was formally commissioned on September 15 as an experimental service.

On August 1, 1975 a Satellite Instructional Television Experiment (SITE) was launched with the help of an American Satellite for a period of one year when 2400 villages in six states - Orissa, Bihar, Rajasthan, Madhya Pradesh, Andhra Pradesh and Karnataka were exposed to area specific programme beamed with the help of the satellite.

In 1990 cable television started in India. Thereafter a great change has been started in broadcasting industry.

**Discussion**

Earlier transmitter was vacuum tube based. The amplification of power for both TV and radio was carried out by valve type amplifier. This was complete analog system. There after solid state TV transmitters and FM radio transmitters were developed. These transmitters were based on analog modulation techniques. Video was amplitude modulated and audio was frequency modulated. High power radio amplitude modulated transmitter, Medium wave and short wave (SW) are working on old valve system because such high power amplification is difficult to achieve in solid state devices. Due to development in digital technology, the scenario in broadcast engineering completely changed. The world is moving towards digital broadcasting. Digital broadcasting improved the quality of video and audio, minimum interference of signal and provides many platform. Some of the video standards are compared below.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Format** | **SD** | **HD** | **Full-HD** | **UHD** | **4K** | **8K** |
| Format name | Standard Definition | High Definition | High Definition / 2K | Ultra High Definition | Hi-Vision System (HV) | Super Hi-Vision System (SHV) |
| Resolution in pixels | 720 × 576 | 1280 x 720 | 1920 x 1080 | 3840 × 2160 | 4096 × 2160 | 7680 × 4320 |
| Mega-Pixel | 0.41 | 0.92 | 2.07 | 8.29 | 8.85 | 33.18 |
| Aspect ratio | We use 16:9. In the past we used 4:3 | 16:9 | 16:9 | 16:9 | 17:9 by cropping to 21:9 | 16:9 |
| Other info |  |  |  |  | Used by Digital Cinemas (DCI) | TV format in Japan from 2020 on |

* The term **16K resolution** (**8640p**), also known as **16K UHD**, **16K Ultra HD**, **Quad Ultra HD**, **Quad UHD**, **16K QUHD**, **16K Quad Ultra high Definition**, or **UHDTV-3** refers to a [display resolution](https://en.wikipedia.org/wiki/Display_resolution) that has 15360 horizontal pixels by 8640 vertical pixels, for a total of 132.7 [megapixels](https://en.wikipedia.org/wiki/Megapixel). It has four times as many pixels as [8K resolution](https://en.wikipedia.org/wiki/8K_resolution), 16 times as many pixels as [4K resolution](https://en.wikipedia.org/wiki/4K_resolution) and 64 times as many pixels as [1080p](https://en.wikipedia.org/wiki/1080p) resolution.
* Currently 16K resolutions can run on [Multi-monitor](https://en.wikipedia.org/wiki/Multi-monitor) setups with [AMD Eyefinity](https://en.wikipedia.org/wiki/AMD_Eyefinity) or NVIDIA Surround. In near future it may be compitable.

Development in broadcasting platforms:

Initially transmission media was only TV and radio transmitters. The quality of video and audio was very poor. The signal to Noise ratio was very low. Technological development has changed platforms have been evolved in this digital era. Some of them are

1. Cable TV
2. DTH.
3. D.T.T
4. IPTV.
5. **Cable TV**: Television Channels uplink their signal from earth station to satellite. In the different parts of the country, Cable operators downlink their signal from satellite and distribute signal to their viewer connected through coaxial cable to the set top box of the consumers. Viewers receives Programme in in television set via set top box. The cable TV technology uses frequency division multiplexing (FDM) to transmit many channels through one cable.
6. **DTH (Direct to Home)**: In this system, signals are uplinked by the DTH operators by multiplexing the all Channels provided by them in Ku-band frequency from their earth station. In the receiving end viewers downlinks signal with the help of small parabolic disc Antenna (PPA) and a set top box. Due to increase in frequency (GHz) the size of PDA decreased and approximately one meter diameter PDA is sufficient to receive the signal. It is easy to tune the proper satellite. PDA is placed on the roof top and a cable is connected to set top-box. There are two types of DTH service-

(a) Free to Air (FTH). In this system consumer has not to pay any money to see the programme. Signal of free to air service is unencrypted so that anybody can received the signal.

1. Paid DTH- In this system, consumer has to recharge his set top-box on a fixed interval of time as the package provided by the DTH service provider. Signal of the paid DTH service providers are encrypted so that nobody can receive signal without their permission.
2. **Digital Terrestrial Transmitter (DTT)** – In this system terrestrial transmitter broadcasts its signal and at receiving end, viewer can receive its signal either by an antenna and set top box or a dongle. DTT provides more television channels (6 or 8), better quality video and potentially lower operating cost. Different countries have adopted different DTT standards. In India, we are adopting DVB-T2 (Digital video Broadcasting – Terrestrial System B). DTT transmits its signals using to radio frequency with multiplexing the signals to receiving the multiple channels. The modulation in DVB-T2 is COFDM (Coded orthogonal frequency Division Multiplexing). The biggest advantage of DTT over the other system is viewer can watch TV programme in moving vehicles, train etc. by using a dongle in his set without consuming the internet data.
3. **IPTV (Internet protocol Television)** – It is the delivery of the television programme over the internet protocol. Unlike downloaded media, IPTV offers the ability to stream the source media continuously. The choice of viewers are changing rapidly. Nobody has time to sit near TV set to see the programme. Hence they want to see the favorite programme, live programme on his mobile set, laptops etc. Playback of such programme requires high speed internet connectivity. IPTV programme may be classified into three categories-

(a)Live Television and live media

(b) Time shifted media i.e. Replays of TV shows and

(c) Video on demand.

Many OTT (Over the Top) platforms are getting popularity by using the internal protocol.

Conclusion:

In Summary, we can say the change in broadcasting technology provided many platform to viewers. According to choice, viewer can select the platform. The quality of video is also improving day by day to give real feel. The change in broadcast engineering enables the viewers to get information in minimum time, high quality entertainment, change in classroom method and quality information.

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**Engineering for Change**

**Anjani Kumar Srivastava, FIE**

Ex – Teacher Fellow, BIT Sindri

Ex-Dy. General Manager, HAL Lucknow

Member, Aeronautical Society of India

Chartered Engineer (India), IEI

**“Make in India to Digital India, India’s Engineers have pivotal role in realizing aspirations of 125 crore Indians”--- PM Shri Narendra Modi**

September 15 is celebrated every year in the country since 1967 as Engineer’s Day to commemorate the birthday of the legendry engineer Sir Mokshagundam Visvesvaraya. Due to his outstanding contribution to the society , Government of India conferred “Bharat Ratna” on this legend in the year 1955. This year the 52nd Engineer’s Day will be celebrated all over the country and the Institution of Engineers (India) has selected the theme “Engineering for Change to mark the occasion.

**Introduction**

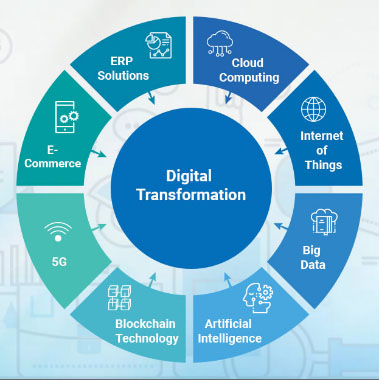
“Change” is the most important challenge faced by the engineers of a developing India. They are further being challenged by the changing climate and ever increasing population. Extensive research is being carried out in all engineering disciplines to cope with such emerging challenges. Information and communication technology and Electronics are playing a key role in several initiatives such as Digital India, Make in India, Start- up India and Smart cities. Keeping in view of the rapid transformation and innovation at international level, engineers of our country should be prepared to cope-up with the changes. The complexity further increases due to environmental concerns and actions needed for sustainable development.

Renewable energy has become the key notion of all Electrical as well as Environment engineers as we have to move away from fossil fuel to save the nenvironment.Wind energy and solar PV energy are now finding place amidst the conventional energy supply of the nation and interconnectivity of those with the main grid is being looked into. To facilitate the mobility of the huge population of our country, ”Green transport” is required to be implemented for all mass transport system.

The theme “Engineering for Change” is chosen for Engineer’s Day 2019 celebrations to address all these aspects.

**Digital India**

Digital India is an initiative that can seamlessly unify the skill sets of the youth creating a digitally-converged society. The government’s impetus on digitising the rural hinterlands, focus on smart cities and commitment to Blockchain technology, are anticipated to encourage the promotion of digitisation across the country, thereby making India digital in the truest sense of the word.

 The launch of the Digital India programme on 1 July 2015, catapulted the nation into the league of countries that are transforming their economics and governance with the power of technology. Since then, Digital India has touched upon nearly all aspects of our lives, be it work, travel and communication, healthcare, education , shopping etc. With the push for e-governance and Digital India being provided by booming telecom sector ,increasing internet penetration and proliferating mobile services, the programmes strives to equally benefit the user and the service provider.

Digital India aims to provide broadband highways, universal access to mobile connectivity, public internet access programme, e-Governance, electronic delivery of services, information for all, electronics manufacturing, IT for jobs and early harvest programmes.

The Digital India plan could boost GDP up to $1 trillion by 2025 and can play a key role in macroeconomic factors such as GDP growth, employment generation , labour productivity, growth in the number of businesses and revenue for the government.

**HIGHLIGHTS OF DIGITAL INDIA CAMPAIGN**

* **Emphasis on e-governance**
* **Spread digital awareness in rural India**
* **Focus to transform India into a digitally-strong society**
* **Making government services available to citizens via electronic mode**
* **High speed internet for all**
* **Transform the ease of doing business in the country**
* **Making broadband services for villages, tele-medicine and mobile healthcare a reality**

The best- known components of India’s digital infrastructure, are JAM trinity. It consists of Jan Dhan bank accounts, Aadhar biometric identity and mobile telephony. Two additional important columns of this infrastructure are Public Finance Management System(**PFMS**) and Unified Payment Interface(**UPI**).

It was on the strength of this system that recently Prime Minister could transfer Rs 2000 each to bank accounts of 10 million farmers under PM-Kisan scheme with a few clicks of a mouse. Today, government transfers can be initiated from PFMS and can directly flow to bank accounts of state governments, vendors and individuals with no intervention whatsoever by banks.

Unlike credit cards such as Visa and MasterCard,UPI –based transactions have minuscule cost .As a result, in the long run ,they have the potential to largely replace credit cards. Already private sector players are helping businesses and customers transact digitally on a vast scale using their own wallets as well as UPI based transfers. Digital wallet Paytm alone has 300 million registered users of which 80 millions use the service actively.

Among other important publicly provided digital platforms in India are digital locker,which allows users to freely store and verify their documents and certificates; e-National Agricultural Market, which allows farmers to electronically auction their produce to the highest bidder; and Unified Mobile Application for New-age Governance or **UMANG**, which packs 350 digitally available services provided by the central, state and local governments in to a single application. Bharat Net has connected 1,24,315 gram panchayats with optical fibre cable to bring Wi-Fi to them. Wi-Fi has been installed in 41,139 of the panchayats.

India has come up with several low-cost innovations such as iBreastExam,which can detect breast cancer with great precision for just $1, and Sanket, which is a matchbox size electrocardiogram machine that sells for less than $100.

**Block chain Technology**



A block chain is a distributed digital public ledger: A block is a record, and a block chain is another word for a chain of records. This chain of records is stored across different computers and is distributed, as opposed to a single database. To change one block would require changing all blocks. Since the block chain is spread across a large network, this becomes an extremely difficult proposition, especially because a unique key encrypts every block. This is the reason for its high security and privacy.

A block chain also contains every version of a record since it was created, which makes tracking changes overtime incredibly simple. Every time another human touches a piece of data, it creates a risk that the data will be lost or used inappropriately--- block chain reduces that risk.

Block chain has the ability to exchange digital assets without the need of a third party ,a distributed ledger to store digital records and a permanent record of all previous transactions. There is no longer need to rely on intermediaries to do such tasks as authentication, identification of people, clearing and record keeping.

**What if a single digital identity was all that was required by an employer to check the educational qualifications, career history and even skill records of a candidate—information that could be sitting across multiple separate database?**

**Though in its early stage of development, block chain will eventually screen such information as educational qualifications, career history and skill certifications, without the need for any human intervention.**

**Environment Protection:--**

**Renewable Energy**

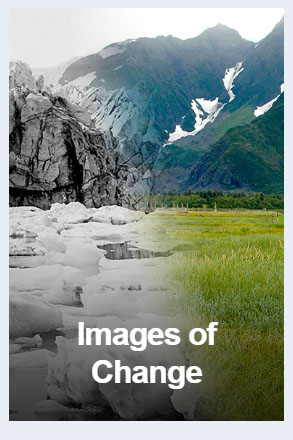
Renewable energy is energy produced from sources that do not deplete or can be replenished within a human’s life time .The most common examples include wind, solar, geothermal, biomass, and hydropower. Most renewable energy is derived directly or indirectly from the sun. Sunlight can be captured directly using solar technologies.

Renewable energy accounts for 13.5%of the world’s energy supply, and 22%of world’s electricity. While renewable energy systems are better for the environment and produce less emission than conventional energy sources, many of these sources face difficulties in being deployed at large scale. They produce neither greenhouse gases—which cause climate change—nor polluting emissions.

**Renewable energies** received important backing from the international community through the **Paris Accord signed at the World Climate Summit** held in the French capital in December 2015.

The agreement, which will enter into force in 2020, establishes, for the first time in history, a binding global objective. Nearly 200 signatory countries pledged to reduce their emissions so that the average temperature of the planet at the end of the current century remains “well below 2 degree C, the limit above which climate change will have more catastrophic effects. The aim is to try to keep it to 1.5 degree C

The transition to an energy system based on renewable technologies will have positive economic consequences. According to the International Renewable Energy Agency (IRENA), doubling the renewable energy share in the world energy mix , to 36% by 2030, will result in additional global growth of 1.15% by that year (equivalent to 1.3 trillion dollars). A increase in wellbeing of 3,7% and in employment in the sector of up to more than 24 million people, compared to 9.2 million today.

**CLIMATE CHANGE**

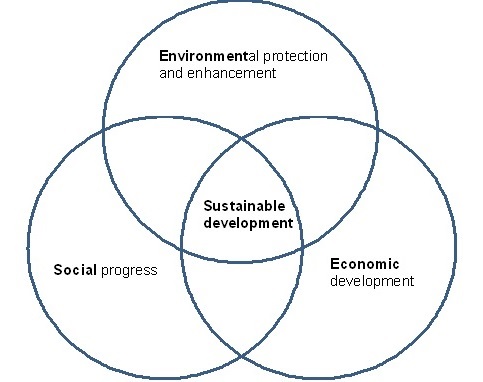
Renewable energy do not emit greenhouse gases in energy generation processes, making them the cleanest, most viable solution to prevent environmental degradation. As the climate warms, it changes the nature of global rainfall, evaporation, snow, stream flow and other factors that affect water supply and quality. Global sea level has risen by about 8 inches since 1880,and it is projected to rise another 1 to 4 feet by 2100. This is the result of added water from melting land ice. Higher global temperature melt glaciers such as the one in Greenland, which flow into the oceans, adding to the amount of sea water.

**Climate Change mitigation strategies** consists of actions to limit the magnitude or rate of long term global warming and its related effects. Climate change mitigation generally involves reductions in human emissions of greenhouse gases or enhances the removal of these gases from the atmosphere (through carbon sinks)

**GREEN TRANSPORTATION---An Eco-friendly Travel**

Green transportation is a low-carbon initiative, thus very environmentally friendly. The promotion of green transportation is not only good for the use of road resources, the ease of traffic congestion, the decrease of energy consumption and the improvement of air quality, but also , as a return to health and leisure lifestyles, good for the improvement of human health. Public transport, walking and cycling play key roles in green transport. Developments in technology and fuels can effectively reduce emissions.

At the United Nations Framework Convention on climate change, India has committed to reducing the emission intensity of its GDP by 33 to 35% by 2030 as compared with its 2005 levels. About 23% of the global CO2 emissions from fuel combustion is produced by the transport sector, which is both the fastest growing consumer of fossil fuels and the fastest source of CO2 emissions.

Each of us need help to cut emissions and improve air quality by using public transport, cycling and walking. Carpools, car sharing, combined transport, economical driving and use of low –emission vehicles. The world now aims at combining energy –efficient technologies with clean fuels to enjoy the benefits of vehicles while being sensitive to the environment. Hybrids, electric cars, and biofuels are some examples in this regard; however, there is still a long way to go.**CONCLUSION**

India is finally on a journey of technological transformation and the likelihood of realising any vision pivots tightly on the efforts and commitment of all stakeholders. With proper planning and execution, India could serve as an example for countries with emerging economies that are seeking inspiration and a democratic model for accelerated development. In order to increase the speed of development and adoption of digital services, the government needs to encourage public-private partnership for enhanced efficacy along with best ideas and technology. However, all this requires steep up-gradation of the digital infrastructure and maximisation of internet connectivity besides strengthened cyber security.

Engineers now cannot restrict themselves to a particular discipline. Good understanding of interdisciplinary innovation, design, planning and undertaking of researches and projects on that is the need of the hour.

Therefore, the theme “Engineering for Change” calls upon the engineers to be harbinger for the change by exploring the disruptive technologies in all engineering sectors to enable India to lead the crusade of mitigation of climate change.

**“Science can amuse and fascinate us all, but it is engineering that changes the world”---------Issac Asimov**

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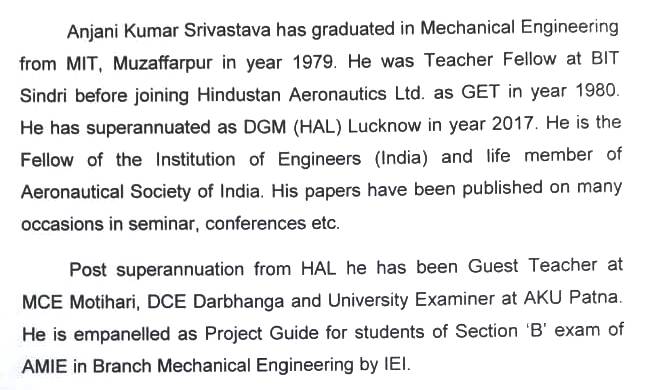
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**About the Author**

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**Engineering for Change**

**Prof. C.B RAI, FIE**

**H.O.D. Civil Engg.**

**M.I.T Muzaffarpur**

Engineering for change is a knowledge organization to deliver solution that improve the quality of life of underserved communities around the World.

It is an online platform and international community of engineers, scientists, Non-Governmental organizations local community advocates and other innovator working to solve global developmental problems.

Engineering for change was founded by an alliance of global engineering organizations.

1. **American Society of Mechanical Engineering (ASME)**
2. **Engineers without Borders – USA (EWB-USA)**
3. **Institute of Electrical and Electronics Engineers (IEEE) with a host of other reputed collaborators**

It Is a hybrid organization with three integrated arms: An online academy, innovation lab, and a media platform. It facilitates the development of affordable locally appropriate and sustainable solutions to the most pressing humanitarian challenges and share them freely online as form of open source appropriate technology

**AREA OF FOCUS** - It focuses on International development, Sustainable development appropriate technology, open source, Health, water sanitation and hygiene, Architecture Aid, Infrastructure and education.

In 2009, the American Society of Mechanical Engineers created a website to pull together the disparate source of information on appropriate technology and solutions in global development. The site aggregated information, hosted a library of offen little known technologies and offered tools to enable collaboration among development teams worldwide. Throughout 2010, the site operated in alpha and then beta with a mostly closed groups of users. IEEE and EWB-USA signed on as partners in time for the public launch on January 2011.

Members to this organization is free and provider access to news and thought leaders, insight on hundreds of essential technologists in Solutions Library, professional development resources and current opportunities such as jobs, funding calls, fellowships and so many more. The members also enjoy a unique user experience based on their site behavior and engagement.

**Solutions Library** – Engineering for change can post projects they are working on and challenges they are having to gain insight from wide community. They can use an open source archive of solutions to development projects, tested devices, and other information gleaned from global organizations. The members can learn how to use their skills in developing countries and resource-poor areas from experts in their fields. They can also track the project that interest and contribute their own device and information.

Education is an important part of Engineering for change. The website providing educational materials on how to design and implement solution, and an archive of relevant academic programs.

How Engineers Change the World-From all the time, technology has been the main key that helped the development of industrialization and Civilization of the world. During this process, scientists have made a great contribution. However, engineers were the ones that put all the theories in the reality such that they could actually benefit the society.

Besides the development of economics, massive deduction, place and freedom of religion are important symbols of civilization. And engineers have contributed to the society’s needs for that.

Engineers from different fields corporate to solve all the technical problems met during the process of satisfying the society’s needs for education. They work together to build comfortable environment for students to learn. Meanwhile they also consider about the safety, cost and practicality. Civil engineers design and construct Schools, Colleges, Universities such that citizens have places to accept different levels of education. In order to 1st Students have a better understanding of knowledge, mechanical engineers and electronics engineers help with the multimedia devise such as projects and Computers so that professors can use power point and other software. Now U.K is on a mission to tackle the skills gap in engineering by inspiring the next generation to take up the profession.

STFC Mechanical Engineers and Head of ISIS Neutron and Muon Source Instrumentation Division, Debbie Greenfield says.

“Engineering plays a part in almost everything we do and underpins the work STFc while att the ISIS Neuron and Moon Source, we work on Solutions to many of today’s global problems including energy, environmental change, lifelong health and wellbeing, and Nano science, Being part of the management team for something which is having such an amazing impact on there World-wide problems in incredibly rewarding.

**Thanking You.**

**“Engineering for change”**

**Prof. Sanjay Kumar Chaudhary Head, Dept. of Leather Technology**

**M.I.T. Muzaffarpur**

Engineering for change is an approach that provides an orderly, structured process for making change within an organisation by change management tools and software to speed up the process. Once you understand how it works you can create a process of your own. Change management process in system engineering is the process of requesting, determining attainability, planning, implementing and evaluating of change to a system. All engineering change management procedures in change management process is Software development, Industrial plants, manufacturing domain and Information technology domain share the same goals, control, document and enable efficient changes. Change management is also of great importance in the field of manufacturing, which is confronted with many changes due to increasing and worldwide competition, technological advances and demanding customers. In the process below with some steps, it is arguable that decisions should be as prioritization basis, which influences how change requests are batched for good starting and understanding the process.

1. **Identify the issue that needs to be changed. : -**

It depending on the context ofinitiating a change request is to identify the process to be changed. This could be related to a product, a business system, technology and so on.

1. **Create an engineering change request: -**

This term used for the official request, co-ordinate the change request throughout its life cycle by including participants or supporters throughout the process. It ensures the change is made effectively, efficiently and successfully.

1. **Build a “case” inside the change request:-**

Case means description of expected outcomes, reason for the change, expected cost and potential obstacles can help to create a case for the request.

1. **Discuss with peers and seek approval: -**

Feedback from participant or supporter helps to refine in the change request and make it more likely to be accepted. It is also helpful to seek inputs in the change order to create the best outcome possible. A change request without input may end up falling shorts of its potential.

1. **Upon approval the request is transformed in an engineering change order.-**

Engineering change order should be an actual order that is in the change process pipeline**.** Enlist the help of participants or supporter and continue to co-ordinate the change efforts throughout.

1. **Change order’s status is switched to open, and begin implementation:-**

Until this point, the change order can be considered pending, laying the ground work and preparing changes for implementation can take extensive efforts.

1. **Release Changes:**-

Release changes in stages to ensure maximum success. Work with relevant department accordingly for organizational development upon the nature of the change request.

1. **Document and communicate status update throughout:**-

Documentation and communication enables more effective change implementation. Document status update constantly in whatever change management tool are using.

1. **Close the change order: -**

Upon completion the engineering change order cannot be changed further.

1. **Document the result: -**

Finally prepare documentation of the changes as well as its result and communicate these results to the relevant parties.

**Conclusion:**-

All corporation frequently use engineering change management system, it reduce error rates, maximize the success rates and keep issues to a minimum. For organisational change and business transformation, there are a variety of digital tools that can increase productivity. For digital transformation, manage IT services and examine the nature of the change. The process mentioned above revolves around documentation, cases and procedures. One can choose a change management system that fits according to need.

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**Engineering for Change**

**Er. V.N Sahu, FIE**

Retd. E.SE. (B.S.E.B)

From under centers to remote corners of Earth, the depths of the oceans to space, humanity has always sought to transcend parries, over come challenge, and create opportunities that improve life in our part of the universe. In the last century alone, many great Engineering achievements become so common place that now take them mostly granted Technology allows on abundant Supply of Food and safe drinking water for most of the world. We rely on electricity for many of our activities. We can travel the globe with relative case and bring goods and service where they needed. Growing computer and communications technologies our opening up vast store of knowledge and entertainment. As remarkable as there engineering achievement certainly just as many more great challenge and opportunities remain to be realized. While some seen clear, many other are auditiret and many more surly lie beyond most of our imaginations.

With input from people around the world an international group of leading technological thinkers were asked to identify the grand Challenge for Engineering in the 21st century. They announced 14 Game Changing goals for improving life on the planet in the year 2008. Renewable energy in one of them. I have worked for 33 year in different thermal Power station and I know well the pollution caused by them in form of Co2, So2 Co, Coal and ash dusts in addition to addition of heat in the atmosphere in form of chimney exhaust. So I will there some light on the solar energy in short due to space limitations, which is the great challenge for the engineering to serve this planet from the fast growing pollution of the environment.

**Why is Solar Energy Important?**

Clemently, Solar Energy provider less than low percent of the world total energy. But it has the potential to provide much more. As a source of energy, nothing match the Sun. It out-power anything that human technology could ever produce only a small fraction of the Sun’s power output starkers’ the Earth, but even that providers 10,000 times as much as all the commercial energy that humans use on the planet.

Already the solar electricity generation is growing multibillion dollar industry. But soar share of the total energy market remains rather small well be low one percent of total energy consumption compared with roughly 85% from oil, natural gas and col. Those fossil fuels remain the dominant sours of energy for ever. Whatever the precise timetable for their depletion, oil and gas supplies will not keep growing energy demands. Coal is available in abundance, but its use increase air and water pollution problems, and coal contributes even more substantially than the other fossil fuels building of carbon dioxide in the atmosphere.

For long term, sustainable energy source a solar power offer an attractive alternative. Its availabilities for exceeds any conceivable energy demands. It is environmentally clean, and its energy is transmitted from the sun to Earth free of charge. But exploring the sun’s power is not without challenges. Overcoming the barriers to wide spread solar power generation will require engineering inn ovation in several arenas for capturing the suns energy, converting it le useful forms and storing it for use when the sun itself is obscure.

Many of the technologies to address those issues are already in hand. Dishes can concentrate the sun’s rays to heat fluids that drive engines and produce power, a possible approach to solar electricity generation. Another popular avenue is direct production of electric current from captured sunlight, which his long been possible with solar photovoltaic.

**Efficiency of Solar energy Technology.**

Commercial Solar cells most often made from silicon, typically convert, Sunlight into electricity with an efficiency of only 10% to 20% although some test cells do a little better. Given their manufacturing cost modules of today’s cells incorporated in the power grid would produce electricity at a cost roughly 3 to 6 times higher than carent prices. To make solar economically competitive engineers must find ways to improve the efficiency of the cells and lower their manufacturing costs.

**How to Store Solar Energy:**

However advanced solar cells become at generating electricity cheaply and efficiently a major barrier to widespread use of the sun’s energy remains and that is the need for storage. Cloudy weather and night darkness interrupt solar energy’s availability At times and locations where sunlight is plentiful, its energy must be captured and stored for use at other times and places. New martials could greatly enhance the effective nes of capacitor, superconducting magnets or fly wheels, all of which could provide convenient power storage in may applications, another possible solution to the storage problem would mimic bio logical capture of sunshine by photosynthesis in plants, which store the sun’s energy in the chemical bands of models that can be used as food. The planets way of using sunlight to produce food could be duplicated by people to produce fuel. For example, Sunlight could power there electrolysis of water, generating hydrogen as a fuel. Hydrogen could there power fuel cells, Electricity-generating devices that produce virtually no polluting products, as the hydrogen combines with oxygen to produce water again. But splitting water efficiently will require advances in chemical reaction efficiencies, perhaps through engineering new catalysts. Nature’s catalysts enzymes, can produce hydrogen from water with a much higher efficiency than current industrial catalysts. Developing catalysts that can match those found in living cells would dramatically on hence the attractiveness of a solar production-fuel cell storage system for a solar energy economy. Fuel cells have other advantage. They could be distributed widely, avoiding the vculnerbities of centralized power generation.

If the engineering challenges can be met for improving solar cells, reducing their cost and providing ways to use their electricity to create storable fuel, solar power will assert its superiority to fossil fuel as a sustainable motive force for civilization curtained prosperity.

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**Engineering for a Changing World: A Review**

Lok Ranjan,AMIE

**Abstract**:

Engineering for change is very important thing for whole world. The required change can only be achieved by using modern technology, improving the existing technology as well as providing the change in education according to requirement of present days and predicting future requirements. Engineering leadership should have to provide environment for transformation and research to meet the future requirement.

Key words: technology, innovation, research, optimization.

**Introduction:**

We live in a time of great change, an increasingly global society, driven by the exponential growth of new knowledge and knitted together by rapidly evolving information and communication technologies. It is a time of challenge and contradiction, as an ever-increasing human population threatens global sustainability; a global, knowledge-driven economy places a new premium on technological workforce skills through phenomena such as out-sourcing and off shoring; governments place increasing confidence in market forces to reflect public priorities, even as new paradigms such as open-source software and open-content knowledge and learning challenge conventional free-market philosophies; and shifting geopolitical tensions are driven by the great disparity in wealth and power about the globe, manifested in the current threat to homeland security by terrorism. Yet it is also a time of unusual opportunity and optimism as new technologies not only improve the human condition but also enable the creation and flourishing of new communities and social institutions more capable of addressing the needs of our society.

The Challenges to Worldwide Engineering During the past several years such considerations have led numerous groups, including the National Academies, federal agencies, business organizations, and professional societies to conclude that new paradigms in engineering practice, research, and education that better address the needs of a 21st-century nation in a rapidly changing world (e.g., see Augustine, 2005; Duderstadt, 2005; Clough, 2004, 2005; Sheppard, 2008; NSB 2003, 2007). Among the many concerns these studies have raised about American engineering are the following. Engineering Practice The implications of a technology-driven global economy for engineering practice are particularly profound. The globalization of markets requires engineers capable of working with and among different cultures and knowledgeable about global markets. New perspectives are needed in building competitive enterprises as the distinction between competition and collaboration blurs. The rapid evolution of high-quality engineering services in developing nations with significantly lower labor costs, such as India, China, and Eastern Europe, raises serious questions about the global viability of the United States engineer, who must now produce several times the value-added to 3 justify wage differentials. Both new technologies (e.g., info-bio-nano) and the complex mega systems challenges arising in contemporary society (e.g., massive urban, transportation, and communications infrastructure) require highly interdisciplinary engineering teams characterized by broad intellectual span rather than focused practice within traditional disciplines. As technological innovation plays an ever more critical role in sustaining the nation’s economic prosperity, security, and social well-being, engineering practice will be challenged to shift from traditional problem solving and design skills toward more innovative solutions imbedded in a complex array of social, environmental, cultural, and ethical issues. Yet, despite the growing importance of engineering practice to society, the engineering profession still tends to be held in relatively low esteem in the United States compared to other learned professions such as law and medicine. Perhaps this is not surprising, both because of the undergraduate nature of its curriculum and the evolution of the profession from a trade (a “servile art” such as carpentry rather than a “liberal art” such as law, medicine, or theology). Yet today this is eroding prestige and influence is intensified by the tendency of many companies to view engineers as consumable commodities, discarding them when their skills become obsolete or replaceable by cheaper engineering services from abroad. Students sense the eroding status and security of engineering careers and increasingly opt for other more lucrative and secure professions such as business, law, and medicine. Today’s engineers no longer hold the leadership positions in business and government that were once claimed by their predecessors in the 19th and 20th century, in part because neither the profession nor the educational system supporting it have kept pace with the changing nature of both our knowledge-intensive society and the global marketplace. In fact, the outsourcing of engineering services of increasing complexity and the off shoring of engineering jobs of increasing value threaten the erosion of the engineering profession in America and with it our nation’s technological competence and capacity for technological innovation.

Engineering Research :There is increasing recognition throughout the world that leadership in technological innovation is key to a nation’s prosperity and security in a hypercompetitive, global, knowledge-driven economy (Council on Competitiveness, 2003). While our American culture, based upon a highly diverse population, democratic values, free-market practices, and a stable legal and regulatory environment, provides an unusually fertile environment for technological innovation and entrepreneurial activity, history has shown that significant federal and private investments are necessary to produce the ingredients essential for innovation to flourish: new knowledge (research), human capital (education), infrastructure (e.g., physical, cyber), and policies (e.g., tax, property). One of the most critical elements of the innovation process is the long-term research required to transform new knowledge generated by fundamental scientific discovery into the innovative new products, processes, and services required by society.

Engineering Education: In view of these changes occurring in engineering practice and research, it is easy to understand why some raise concerns that we are attempting to educate 21st-century engineers with a 20th-century curriculum taught in 19th-century institutions. The requirements of 21st-century engineering are considerable: engineers must be technically competent, globally sophisticated, culturally aware, innovative and entrepreneurial, and nimble, flexible, and mobile.

A Framework for Change :So what should our nation seek as both the nature and objectives of engineering in the 21st century, recognizing that these must change significantly to address rapidly changing needs and priorities? Here we need to consider the implications for American engineering from several perspectives: i) as a discipline (similar to physics or mathematics), possibly taking its place among the “liberal arts” characterizing a 21stcentury technology-driven society; ii) as a profession, addressing both the urgent needs and grand challenges facing our society; iii) as a knowledge base supporting innovation, entrepreneurship, and value creation in a knowledge economy; and iv) as a diverse educational system characterized by the quality, rigor, and diversity necessary to produce the engineers and engineering research critical to prosperity, security, and social well being.

Main Thrust :

In summary, we believe that to meet the needs of the nation, the engineering profession must achieve the status and influence of other learned professions such as law and medicine. Engineering practice in our rapidly changing world will require an ever-expanding knowledge base requiring new paradigms for engineering research that better link scientific discovery with innovation. The complex challenges facing our nation will require American engineers with a much higher level of education, particularly in professional skills such as innovation, entrepreneurship, and global engineering practice. To this end, we set the following objectives for engineering practice, research, and education:

1. To establish engineering practice as a true learned profession, similar in rigor, intellectual breadth, preparation, stature, and influence to law and medicine, with extensive post-graduate education and a culture more characteristic of professional guilds than corporate employees.

2. To redefine the nature of basic and applied engineering research, developing new research paradigms that better address compelling social priorities than those methods characterizing scientific research.

3. To adopt a systemic, research-based approach to innovation and continuous improvement of engineering education, recognizing the importance of diverse approaches–albeit characterized by quality and rigor–to serve the highly diverse technology needs of our society.

4. To establish engineering as a true liberal arts discipline, similar to the natural sciences, social sciences, and humanities, by imbedding it in the general education requirements of a college graduate for an increasingly technology driven and -dependent society of the century ahead.

**Conclusion:**

India’s leadership in engineering will require both commitment to change and investment of time, energy, and resources by the private sector, central and state governments, and colleges and universities. Bold, transformative initiatives are necessary to reshape engineering research, education, and practice to respond to challenges in global markets, national security, energy sustainability, and public health.

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**Engineering for change**

**Er.Prabhat Ranjan Bhardwaj, AMIE**

From all the time, technology has been the main key that helped the development of industrialization and civilization of the world. During this process, scientists have made a great contribution. However, engineers were the ones that put all the theories into reality such that they could actually benefit the society. Besides the development of economics, massive education, peace and freedom of religion are important symbols of civilization. And engineers have contributed to the society’s needs for that.

Engineers from different fields cooperate to solve all the technical problems met during the process of satisfying the society’s needs for education.They work together to build comfortable environments for students to learn. Meanwhile they also consider about the safety, cost and practicality. Civil engineers design and construct schools, colleges and universities such that citizens have places to accept different levels of education. In order to let students have a better understanding of knowledge, mechanical and electronics engineers help with the multi-media devices such as projectors and computers so that professors can use PowerPoint and other software.

Electrical engineers help with electricity such that students can learn at night. Hydraulic engineers make sure that the water supply is sufficient and sustainable for all students of schools. Without engineers, massive education would not be possible all over the world.

Not only education, but Peace within and across communities also depends on engineers. Within the community, engineers produce weapons such as guns, so that police can stop criminals and keep the society secure and peaceful. Across communities, engineers develop defense systems for their countries to resist and more importantly prevent the invasion from other communities or countries. The most famous example is the America space protection system built by NASA. This system is able to monitor the US territorial air space, detect any unidentified objects and destroy them if needed, no matter aircrafts or meteors. Such defense systems actually can warn whoever wants to invade the country to stay within the line and such that the peace of the country can be achieved. Without weapons and defense systems, the country will be vulnerable and there will be no peace.

Engineers are technically skilled professionals who are responsible for solving problems. Their main focus is on making things work efficiently and effectively by applying the theories and principles of sciences and mathematics to research, and develop economic solutions to technical problems. The Engineer differs from the scientist by the nature of their training. While the scientists try to explore the natural world and discover new knowledge about the universe and how it works, engineers apply that knowledge to solve real problems, often with an eye toward improving cost and efficiency. The purpose of engineering is to innovate, design, create and maintain products, system and equipment for the benefit and wellbeing of humans. Their works are the link between the perceived social needs and economic applications. They are the bridge between science and art. Engineers are the backbone of nation building and the purpose of engineering is to innovate, design, create and maintain products, systems and equipment for the benefit and wellbeing of humans.

Collapse of buildings and structures under construction are no longer breaking news in Nigeria. One might be patriotic enough to ask, is a building under construction supposed to collapse if it was well designed and executed? When you look further, you might be tempted to extend the question a bit; Are we supposed to be witnessing power failures and other failures in a region blessed with abundant natural and human resources? Why are the products from Nigeria not competing in the international market? Who then has a solution to these challenges? The government? The citizens? When things fall apart according to Prof. Chinue Achebe, its center can no longer hold. If a country fails to realize the role of engineers in her nation building and the engineers are leaving for better opportunities abroad, then the country will continue to experience collapsed buildings and bridges, substandard products, failed roads, communication failures, environmental hazards, epileptic power supply to mention but the few as it is in Nigeria today.

Role of Engineers in Nation Building:

Meanwhile, as nations in the world are undergoing reformation and the economy is getting more modernized, consumption patterns have expanded and demand is constantly on the increase. There is therefore a growing consciousness of quality control at every level of production. The engineers have to realize their responsibility and play an effective role in tackling today’s complex issues in the nation building. To build a nation is to make it habitable for the citizenry by providing social amenities, infrastructural facilities, job creation and security and many more; the engineers therefore have a serious role to play. Thus, they are duty bond to design products, machineries and plants to manufacture these products, and systems to ensure quality and efficiency. They are to design, plan and supervise construction of buildings, and ensure their safety and stability against hazards; design highways, bridges, railways and transit systems, dams, irrigation canals, power system, ports, harbors as well as off-shore structures.

Engineers should equally know that it is their duty to develop and implement improved ways to extract, process and use raw materials; develop new raw material that can improve product performance and take advantage of advances in technology to harness the power of the sun, the gas, the earth, atoms and electricity to supply the nation’s power needs; analyze the impact of the products they develop or systems they design on the environment and the people; design ways of managing the nation’s waste, converting or recycling them to useful products. Parts of their functions also include determining the cause of component failures, estimating the time and cost of completing new projects as well as maintaining the existing ones.

Some should move into engineering management and sales. In sales and management, an engineering background enables one to discuss the technical aspects of projects/products and assist in the planning, installation and product use. With such a vast and varied nature of their job, they are really the backbone of a nation’s building and development, and their role should not be neglected in a nation’s development. The engineers on their part should be proud of what they do and contribute effectively towards the growth of their country and the world at large.

**Engineering for Change**

**Er.Krishna Kanhai, AMIE**

Introduction :

Engineering initiates the use of laid down scientific theories and laws attached with extensive practical works. To solve his basic needs by attempting to produce practical tools to enhance his life on earth. The urge for a better life forced the early scientist to dive into real engineering inventions that has eventually changed our world today.  
  
As years went by, the Engineering community began to develop greatly that   in the early 19th century, so many changes on production techniques began to take place. As the British engineers then able to design a simple machine that was powered by steam. i.e the steam engine. This simple evolution in British technology brought about great benefits to the government as a whole. So many aspects of productions were improved. Which in turn boosted the economic strength of the nation. All industries soon grew up as labor was now assigned to their new machine. The transportation, power and other basic sectors of the nation’s economy soon diverted to the steam engine which brightened their economy in return. The engine was used to create electricity and also used to move caravans to aid transportation. As time went by, this evolution was spread all over the world and then Engineering found larger grounds for exploitation. Everywhere you look you’ll see examples of engineering having a positive effect on everyday life. Cars are safer, sound systems deliver better acoustics, medical tests are more accurate, and computers and cell phones are a lot more fun! You’ll be giving back to your community  
  
About Engineering :  
Engineering is much like the other fiels , it is also often Broken down into several Sub-disciplines. These all Sub-discipline have their own importance in our society ,Historically the main branches of Engineering are :  
  
Aerospace Engineering- The design of aircraft, spacecraft and every thing concern with the flying stuffs .  
  
Chemical Engineering – The exploitation of chemical principles in order to carry out large scale chemical process, as well as designing new specialty materials and fuels, without this fields ,any of these fields cant procede.

Civil Engineering – The design and construction of public and private works, such as infrastructure (roads, railways, water supply and treatment etc.), bridges and buildings, gives a place to live to our Society .  
  
Electrical Engineering – a very broad area that may encompass the design and study of various electrical & electronic systems, such as electrical circuits , generator, motor,electromagnetic/electromechanical devices, electronic devices , electronics circuits , optical fibre , optoelctronic devices, computer systems,   telecommunication and electronics , as we are depend on this field .  
  
Mechanical Engineering – The design of physical or mechanical systems, such as egines, compressor, powertrains, kinematic chain , vacuum technology, and Vibration isolation equipment , the most popular amongs all of these and so-called the ‘ever green field.For each of these fields there exists considerable overlap, especially in the areas of the application of sciences to their disciplines such as physics, chemistry and mathematics.  
  
How to use the fields in these application :  
  
Engineers apply the sciences of physics and mathematics to find suitable solutions to problems or to make improvements to the status quo. More than ever, engineers are now required to have knowledge of relevant sciences for their design projects, as a result, they keep on learning new material throughout their career.Constraints may include available resources, physical, imaginative or technical limitations, flexibility for future modifications and additions, and other factors, such as requirements for cost, safety, marketability, productibility, and serviceability. By understanding the constraints, engineers derive specification  for the limits within which a viable object or system may be produced and operated.

Change the World :  
Imagine what life would be like without pollution controls to preserve the environment, life-saving medical equipment, or low-cost building materials for fighting global poverty. All this takes engineering. In very real and concrete ways, engineers save lives, prevent disease, reduce poverty, and protect our planet.  
  
Revolution :  
The first engineers focused on military technology, designing weapons, such as sword and catapults, and sturdy medieval castles.  Later engineers designed roads, bridges, dams, electric lights, internal combustion engines, computers — the conveniences of our modern lives.  The engineers of today are solving the problems of the 21st Century, cleaning the environment with plants and microbes, developing biofuels for cars and trucks, designing the cars and trucks that we drive to work and school, and enhancing the world in which we live.  
  
Problem solving :  
  
 Engineers use their knowledge of science, mathematics, logic, and appropriate experience to find suitable solutions to a problem. Engineering is considered a branch of applied mathematics and science. Creating an appropriate mathematical model of a problem allows them to analyze it (sometimes definitively), and to test potential solutions.  
  
Usually multiple reasonable solutions exist, so engineers must evaluate the different design choices on their merits and choose the solution that best meets their requirements. Genrich Altshuller, after gathering statistics on a large number of patents, suggested that compromises are at the heart of “low-level” engineering designs, while at a higher level the best design is one which eliminates the core contradiction causing the problem.Engineers typically attempt to predict how well their designs will perform to their specifications prior to full-scale production. They use, among other things: prototypes, scale models, simulations, destructive tests, nondestructive tests, and stress tests. Testing ensures that products will perform as expected.  
  
Engineers as professionals take seriously their responsibility to produce designs that will perform as expected and will not cause unintended harm to the public at large. Engineers typically include a factor of safety in their designs to reduce the risk of unexpected failure. However, the greater the safety factor, the less efficient the design may be.The study of failed products is known as forensic engineering, and can help the product designer in evaluating his or her design in the light of real conditions. The discipline is of greatest value after disasters, such as bridge collapses, when careful analysis is needed to establish the cause or causes of the failure.  
  
Computer use :  
Design for our society :As with all modern scientific and technological endeavors, computers and software play an increasingly important role. As well as the typical business application software there are a number of computer aided applications (Computer-aided technologies) specifically for engineering. Computers can be used to generate models of fundamental physical processes, which can be solved using numerical methods.One of the most widely used tools in the profession is computer-aided design (CAD) software which enables engineers to create 3D models, 2D drawings, and schematics of their designs. CAD together with Digital mockup (DMU) and CAE software such as finite element method analysis or analytic element method allows engineers to create models of designs that can be analyzed without having to make expensive and time-consuming physical prototypes.  
  
These allow products and components to be checked for flaws; assess fit and assembly; study ergonomics; and to analyze static and dynamic characteristics of systems such as stresses, temperatures, electromagnetic emissions, electrical currents and voltages, digital logic levels, fluid flows, and kinematics. Access and distribution of all this information is generally organized with the use of Product Data Management software.  
  
There are also many tools to support specific engineering tasks such as Computer-aided manufacture (CAM) software to generate CNC machining instructions; Manufacturing Process Management software for production engineering; EDA for printed circuit board (PCB) and circuit schematics for electronic engineers; MRO applications for maintenance management; and AEC software for civil engineering.In recent years the use of computer software to aid the development of goods has collectively come to be known as Product Lifecycle Management .

Medicine and biology :  
  
The study of the human body, albeit from different directions and for different purposes, is an important common link between medicine and some engineering disciplines. Medicine aims to sustain, enhance and even replace functions of the human body, if necessary, through the use of technology.Modern medicine can replace several of the body’s functions through the use of artificial organs and can significantly alter the function of the human body through artificial devices such as, for example, brain implants and pacemakers. The fields of Bionics and medical Bionics are dedicated to the study of synthetic implants pertaining to natural systems. Conversely, some engineering disciplines view the human body as a biological machine worth studying, and are dedicated to emulating many of its functions by replacing biology with technology. This has led to fields such as artificial intelligence, neural networks, fuzzy logic, and robotics. There are also substantial interdisciplinary interactions between engineering and medicine.  
 Both fields provide solutions to real world problems. This often requires moving forward before phenomena are completely understood in a more rigorous scientific sense and therefore experimentation and empirical knowledge is an integral part of both. Medicine, in part, studies the function of the human body. The human body, as a biological machine, has many functions that can be modeled using Engineering methods.The heart for example functions much like a pump, the skeleton is like a linked structure with levers, the brain produces electrical signals etc. These similarities as well as the increasing importance and application of Engineering principles in Medicine, led to the development of the field of biomedical engineering that uses concepts developed in both disciplines.Newly emerging branches of science, such as Systems biology, are adapting analytical tools traditionally used for engineering, such as systems modeling and computational analysis, to the description of biological systems.

Conclusion  :  
Finally , Engineers contribute considerably to the quality of life in society and it is important that they articulate their role clearly and firmly. We hope that a definition of these principles will enhance this contribution, Without Engineers we cant even think about getting so modernized world , where almost every person depends on Technology . Engineers create new innovation stuff just by their different way of thinking from the common man and by their skills , dedication and hardwork they create some thing new or improve the products

****ENGINEERING FOR CHANGE****

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*****Synopsis:*****

We argue that the practice of engineering does not exist outside the domain of societal interests. That is, the practice of engineering has an inherent and unavoidable impact on society. Engineering is based upon that relationship with society.

An engineer's conduct toward other engineers, toward employers, toward clients, and toward the public is an essential part of the life of a professional engineer, yet the education process and professional societies pay inadequate attention to the area. As professionals, engineers need to internalize their codes and to realize that they have a personal stake in the application of codes as well as the process of developing the codes. Yet, most engineers view professional codes as static statements developed by "others" with little (or no) input from the individual engineer. Complicating the problem, questions of professionalism are frequently viewed as topics outside the normal realm of engineering analysis and design. In reality, professional responsibility is an integral part of the engineering process.

Keyword: *Urbanization, Societal, Scientific, Curiosity.*

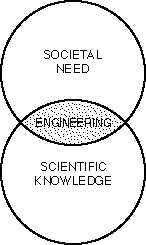
***Introduction:***

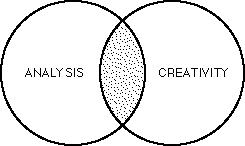
The human population of the world is undergoing unprecedented growth and demographic change. By the end of this century there will be an estimated 9.5 billion people, 75% of them located in urban settlements and striving for increased living standards. Meeting the needs and demands of these people will provide a significant challenge to governments and society at large, and the engineering profession in particular.

The report then looks at what it finds as the four main issues: food, water, urbanization, and energy. In each of these, the pressures of a growing population are going to create enormous problems: food demand, will double the demand for agricultural production by 2050; this will increase even more the demand for water (agriculture uses 70% of water consumed globally) beyond the increase needed for drinking and other use; cities will continue to grow faster than the population growth, producing even greater pressure on infrastructure such as sanitation, transportation, and education. To solve these problems will require governments around the world to recognize that they exist, accept that engineering is the only route to the solutions, and then undertake the long-term investment and support that the solutions will need. The report suggests that Engineering Development Goals should be established.

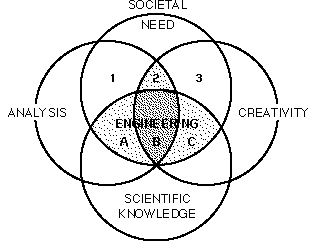
***Discussion:***

This article examines the relationship between engineers and society, and engineers' professional responsibilities given that relationship. This examination is particularly important for engineers in the execution of their professional responsibilities, and for students preparing to enter fields of engineering.

The National Research Council recently recognized the need for improvement in both engineering design and engineering design education. Although there are numerous articles on engineering design, we will concentrate on the interaction between engineers and society.One of the first sources of confusion, particularly among those who are not engineers or scientists, is the distinction between science and engineering. The primary role of science is to develop knowledge and understanding of the physical universe. The direction of scientific research has been described by some as curiosity-based research which is not necessarily driven by the values of society.

Societal values do not necessarily define the bounds, direction or scope of scientific curiosity. It is often not possible to determine relevance of a particular field of scientific inquiry to the future needs of society.  The application of scientific knowledge to the needs of society is the domain of engineering.

Distinction of the creative versus the analytical aspect of the human enterprise can be illustrated by the following picture. One may pursue creative efforts without involving analytical skills, and one may apply analytical skills without entering the domain of creativity

By superimposing these two Venn Diagrams, one may use the resulting diagrams to examine engineering enterprise.

**Sector A** represents the intersection of purely analytical talents with the engineering domain. This may be used to represent engineering science, ability to model complex systems and predict their response to various inputs under various conditions.

**Sector C**, the intersection of our creative capacity with the engineering domain, can be viewed as representing those sudden intuitive leaps often responsible for revolutionary advances in technology as well as those aspects of engineering, not yet fully supported by engineering science, that remain more art than science.

**The third sector, B** (the intersection of knowledge and need with both creative and analytical capability) can be used to represent engineering design and much "real world" problem solving. This sector includes activities ranging from developing innovative products and processes, to creating an innovative bridge design, to developing a new control process.

Current approaches of teaching used in engineering schools have been designed more for developing analytical skills (Sector A) than creative skills. The Accreditation Board for Engineering and Technology (ABET) identifies engineering as "that profession in which knowledge of the mathematical and natural sciences gained by study, experience, and practice is applied with judgment to develop ways to utilize, economically, the materials and forces of nature *"for the benefit of mankind".* ABET further recognizes that "a significant measure of an engineering education is the degree to which it has prepared the graduate to pursue a productive engineering career that is characterized by continued professional growth".

***Conclusion:***

Engineers have the unique role of solving social problems through the use of machines, devices, systems, materials and processes. Engineering has an inherent impact on society that differentiates it from science.

Engineers like librarians and doctors, and teachers have a central role in every community because they understand how to read clearly, think well, and deal with politicians. Engineers have the further role to put people to work as each working engineer provides employment for others in allied trades. Engineers are responsible for dams, bridges, roadways, building safety, architecture, and many elements of agriculture. Engineers in general build what the dreamers dream, and they utilize the products the scientists and inventors have conceptualized. Thus, the engineer serves an important social role. There are many different and diverse specializations of engineering, but they all create solutions for different areas of human life.

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**Engineering for change**

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The importance of Engineering in modern world is very high. The world is changing and this is happening mostly due to impact of Engineering. From all the time Engineering and technologies helped the development of industrialization and civilization of the world. Engineers from different fields involved to solve all the technical problems during the process of satisfying the society need. For example Electrical engineering has helped to solve the problem of electricity in society. Civil engineering helps to design and construct schools, colleges, bridges, roads etc. to speed up the society need and growth. Similarly, software industry contributed significantly. We cannot imagine life without software. Today everyone have smart phone. We can book railway tickets, Cinema tickets, paying of different types of bills online and many more. Now everyone in the world is connected to each other by the help of Engineering and technology.

Despite of these advancements, on the other hand Engineering and technology has created threat for our lives. Pollution, plastics, nuclear and electronic garbage are very harmful for us. Earth is getting hotter and deficit of water level is being observed almost everywhere. But for this situation we cannot blame to engineering. Engineering is just only a tool and this is our responsibility to how to utilize this tool for the betterment of the society. **Now time has come to say not only ENGINERING FOR CHANGE but also ENGIEERING FOR GOOD CHANGE.**

Today, as Telecom Engineer I wanted to discuss on Telecommunication Engineering, its development and changes happening in the world due to this. Telecommunication simply means “exchange of information among communication participants includes the use of technology”. Years ago, there were no suitable methods of communication in the society. Man uses carrier pigeons, handwritten letters send by horses, Light based signals etc. to communicate with each other. These methods were time consuming and there were chances to loss the information. But today everything has been changed. Now telecommunication is the transmission of signals carrying information in digital forms through wire, radio, Optical fiber or any other electromagnetic systems. Such transmissions paths are often divided into channels with afford the advantage of multiplexing. Multiplexing simply means that many people can share a common path for exchange of information purely on time sharing basis. It means resources is shared and is utilized up to optimum level. Advancements in telecommunication Engineering have greatly impacted on the way people interact with one another at the global level. Nowadays individuals and businesses can communicate easily through voice calls, video calls, data sharing applications etc. By adopting a sophisticated telecommunication system many businesses have realized improved productivity.

At present, all are aware about 4G technology in mobile communication. 4G technology builds upon what 3G offers, but does everything at much faster speed. Now we are waiting for 5G with speeds of up to 100 gbps which will be about 100 times faster than 4G. 5G is not just an evolutionary upgrade of the previous generation of cellular, but it is a revolutionary technology envisioned that will eliminate the bounds of access, bandwidth, performance, and latency limitations on connectivity worldwide. 5G has the potential to enable fundamentally new applications, industries, and business models and dramatically improve quality of life around the world via unprecedented use cases that require high data-rate instantaneous communications, low latency, and massive connectivity for new applications for mobile, e-Health, autonomous vehicles, smart cities, smart homes, and many more. Faster speeds and higher capacity networks invite more data to be exchanged over a wider area by more distributed devices. Cisco estimates that by 2022, 12% of global mobile traffic will be on 5G cellular connectivity and the average 5G connection will generate 21 GB of traffic per month globally.

The range of telecommunication applications is broad and is including telephony, video conferencing, broadcast and interactive television, instant messaging-emails, web and internet based communication, data transmission etc.

In general, Engineering affects virtually every aspects of society and engages a sustainable set of the population in carrying out engineers plans. In future, with the growing population and less resources the importance and responsibility of engineering and technology would be very high to meet the need of society.

**Engineering for change**

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For ages, engineering has turned imagination and fantasy into something that is tangible and useful. For instance, consider the invention of the wheel as one of the oldest examples of how engineering has transformed our lives. Since the dawn of the industrial age, the importance and influence of Engineering has grown at a blazing speed.The modern world we live in wouldn’t have been possible without the marvels of engineering - microprocessors, high-speed motors, cellular networks, power grids, automated assembly lines and many others. It wouldn't be too far-fetched to claim that without engineering, our society would have ossified in no time.

Today, the application of engineering spans the spectrum from deep sea exploration to space travel and beyond. In the modern era, it would be extremely difficult to find an avenue where engineering hasn’t left its footprint. From construction to aeronautics, medicine to environment, and even the chair you are sitting in, engineering is everywhere!

Influence of Engineering Across Various Sectors

Let’s take a look at how engineering has contributed to various sectors:

1. Construction

Without Civil engineers, the Hoover Dam, the Burj Khalifa or the Chenab Bridge would have been a distant reality. Engineering has contributed immensely towards the development of infrastructure that is crucial to the sustenance of our civilization. Proper knowledge of civil engineering has not only enabled us to build bridges, dams, tunnels, expressways but also figure out a way to effectively handle traffic congestions, disasters, and other unfavorable circumstances.

2. Medicine

When we talk about the progress in medical science, the image of a biologist or a highly-qualified doctor comes to our mind. But, you will be surprised to know that engineering and medical science goes hand in hand with each other to improve the quality of healthcare. From MRI machines to X-rays and pacemakers to Glucose Level Monitors - engineering has contributed more to medical science than we can fathom.

3. Energy

Have you ever wondered about the technology that powers small household appliances to humongous machines in factories? Of course, it’s the electric current that is conducted by high-tension wires from power stations. But, how are the grids designed? Or, how do you ensure that high-voltage current doesn’t damage your gadgets? Well, you have electric engineers to thank for that. Electrical engineering is helping us generate a massive amount of energy by designing and developing power grids, transformers, commentators, etc. Over the last decade, power generation through sustainable means such as solar and wind energy have been made possible due to the advancements in electrical and other engineering and technology.

4. Environment

Development and deployment of systems that provide drinking water, that is safe for human consumption is one of the major contributions of environmental engineering. Moreover, we also need a mechanism that can reduce pollution and clean up contaminated water bodies, land, and sustain our crops and livestock. Thankfully, the pioneers in environmental engineering are tackling these issues by coming up with new and innovative solutions to minimize pollution making our industrial processes environment-friendly.

Apart from these areas, Engineering has a wide range of applications in automotive, food processing, manufacturing, electronics, avionics, biotechnology, and software industries.

How Engineering is solving complex problems

The basic tenet of engineering has always been about solving complex issues and making our lives simple, safe, happy and productive. If we look through the pages of history, we can see how engineering has solved complex problems. Be it transportation, manufacturing, or even winning wars, engineering has always played a pivotal role in our ventures. Even today, engineering is helping us create devices, machines, and software that can solve some of our most complex problems. For example, robotics and embedded engineers have already developed robots etc.

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