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Editor: Prof. Sasmita Rani Samanta



Rs 100

Sustainable Farming...



Bill Gates

Bill Gates is an American technologist, business leader, and philanthropist, who cofounded Microsoft, the world's largest personal computer software company, with Paul Allen in 1975. Building upon a string of successes that began in the mid 1970s by adapting BASIC, a popular programming language used on large computers, for use on microcomputers, he became the PC industry's ultimate kingmaker by the start of the 1990s. When Bill Gates became a billionaire in 1987 at 31, he was the youngest person ever to join the three comma club. In 1995, he became the world's richest man with a net worth of \$12.9 billion. In addition to his work at Microsoft, Gates was also known for his charitable work. With his then wife, Melinda, he launched the William H. Gates Foundation (renamed the Bill & Melinda Gates Foundation in 1999) in 1994 to fund global health programs. The Foundation has made total grant payments of \$65.6 billion since inception, fighting poverty, disease, and inequity around the world.

Leaders need to provide strategy and direction and to give employees tools that enable them to gather information and insight from around the world. Leaders shouldn't try to make every decision.

Power comes not from knowledge kept, but from knowledge shared.



It's fine to celebrate success, but it is more important to heed the lessons of failure.

Success is a lousy teacher. It seduces smart people into thinking they can't lose.

Money has no utility to me beyond a certain point. Its utility is entirely in building an organization and getting the resources out to the poorest in the world.

Don't compare yourself with anyone in this world. If you do so, you are insulting yourself.

As we look ahead in the next century, leaders will be those who empower others.

Patience is a key element of success.

If you are born poor it's not your mistake; but if you die poor it's your mistake.

Surround yourself with people who challenge you, teach you, and push you to be your best self.

If you want to win big, you sometimes have to take big risks.



Prof. Sasmita Samanta
Editor

- Academician
- Author
- Speaker
- Writer
- Visionary
- Leader
- Social Worker

From
EDITOR'S DESK....



Ancient Indian Credo Offers Hope for a Divided World

During his speech at the World Economic Forum in Davos on January 23, 2018, Prof Klaus Schwab, the president of the Forum, highlighted the significance of India's philosophy of "Vasudhaiva Kutumbakam" or "the world being one family." Little did we know that two years later, humanity would experience the truth of this philosophy as it faced the devastating impact of the Covid-19 pandemic. Today, the world finds itself in a state of disarray, with numerous countries on the verge of bankruptcy and even developed nations teetering on the edge of recession. This dire situation has the potential to escalate into a humanitarian and economic crisis.

Adding to the turmoil, the world remains fragmented along fault lines of expansionist ideologies, ethnic conflicts, religious intolerance, terrorism, and drug wars. Shockingly, statistics indicate that there are currently 32 countries engaged in conflicts, with the full-scale war between Russia and Ukraine posing an existential threat to humanity. These conflicts have resulted in countless casualties, humanitarian tragedies, and a significant displacement of populations. In our interconnected global village, the consequences of any conflict are swiftly felt by all, underscoring the urgent need to move beyond diplomatic rhetoric and take sincere action towards global cooperation and interconnectedness.

The phrase "Vasudhaiva Kutumbakam" originates from the ancient Sanskrit text of the Maha Upanishad, believed to have been composed prior to 1000 BC. This profound philosophy has served as a guiding principle for India's policy throughout history. It encompasses more than just the concept of fraternity; it signifies humanity's interconnectedness with both the living and non-living world, emphasizing the importance of our relationship with nature. Environmental degradation poses as much of a threat as social conflicts do. Embracing "Vasudhaiva Kutumbakam" as the theme of India's G20 presidency presents world leaders with a unique opportunity to grasp this powerful philosophy and implement concrete measures for the betterment of all of humanity.

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IoT-enabled smart farming: In Indian context

Dr. Pradeep Kumar Mallick

Smart Farming is a modern farming concept that involves the use of modern Information and Communication Technologies into farming for improving the quantity and quality of products while minimizing resource inputs significantly. Introduction of Smart Farming is expected lead to what can be called a Third Green Revolution.

The goal of smart farming is to provide the agricultural industry with the infrastructure necessary to take use of cutting-edge technology for automating, tracking, and analysing activities, such as big data, the cloud, and the internet of things (IoT). Precision farming, another name for smart farming, is sensor- and software-monitored. The growing significance of smart farming is influenced

by a number of factors, including the need for climate-smart agriculture, the rising demand for higher crop yields, the requirement to use natural resources more efficiently, the increasing use and sophistication of information and communication technology, and the growing global population.

The contribution of agriculture sector accounts for 14 percent of India's GDP involving nearly 42 percent of total employment as on 2019. Although India has attained the total agricultural growth over the years, the number of agricultural workers has plummeted from almost 72 per cent in 1951 to 45 per cent in 2011 and would further drop to 25.7 per cent by 2050. According to a report, 30,000 hectares of farming land will be lost per annum to other

sectors. At the same time India's population is likely to reach 1.7 billion by 2050. According to estimates, nearly 24 percent of farmers in the Europe and 80 in the USA use some sort of Smart Farming Technology respectively, and picking up fast. The potential of China's smart agriculture value is expected to touch \$26.8 billion by 2020.

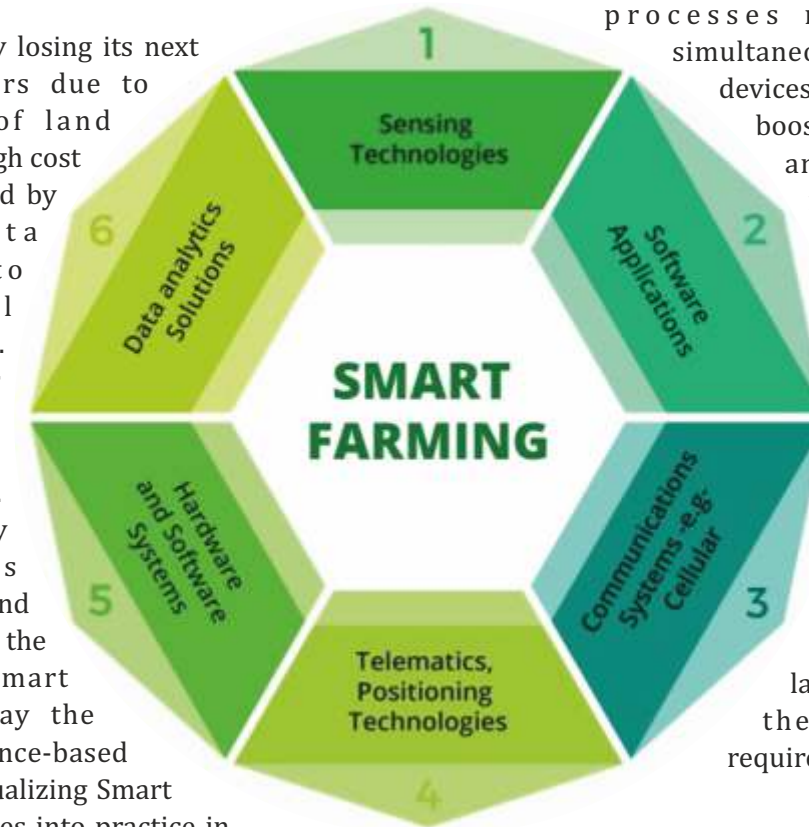
India is increasingly losing its next generation farmers due to fragmentation of land ownership to the high cost farming and plagued by low per capita productivity to insufficient soil management. Farmers prefer migration to other sectors for better paying occupation. There are lot many research works happening in India and around the globe on the technology for Smart Farming, till today the visibility of evidence-based information for actualizing Smart Farming Technologies into practice in India has been scarce or inconclusive. It is matter of fact, the present day situation in India can never be as appropriate as is today to have a concrete plan of action to give concerted thrust for the implementation of Smart Farming Technologies with all vigor.

So, the present day situation in India calls for Smart Farming due to alarming growth of population, climate change, shrinking landscape, declining landholding size and falling number of farmers. Smart Farming can become a reality and thanks to technology availability such as GPS, Data management, Soil testing, Data Science, and IOT.

Benefits of smart farming

By making farming more connected and intelligent, precision agriculture reduces overall costs while also

improving product quality and quantity, agricultural sustainability, and consumer experience. Increased production control leads to better cost management and waste reduction. Being able to monitor anomalies in crop growth or livestock health, for example, lowers the likelihood of output loss. Effectiveness also rises with automation. Multiple processes may be activated simultaneously thanks to smart devices, and automated services boost production efficiency and volume while also improving product quality. Smart farming technologies also enable precise forecasting of demand and prompt delivery of items to markets in order to minimize waste. Additionally, precision agriculture concentrates on controlling the supply of land in order to produce the right crop that is required.



Smart Farming Technologies:

The intelligent farm includes the use of technology for the precision farming such as:

Basically Smart farming focuses the IOT based solutions with Machine Learning techniques.

IOT in Smart Farming:

Long time has gone since the first time sensors were employed in agricultural processes. But the problem with the typical approach was that we couldn't get real-time data from the sensors. The sensors were used to save the information in their built-in memory, from which we could later extract it.

With the introduction of Industrial IoT in agriculture,





the use of far more advanced sensors has expanded. The sensors are currently connected to the cloud through a cellular or satellite network. By giving us access to real-time sensor data, it helps us make better decisions.

Farmers are now more adeptly able to keep track of the water tank levels in real-time thanks to the use of IoT in agriculture. Sensors are now used in agricultural operations at every level, including when determining how much time and resources a seed needs to mature into a fully-grown crop. This is because to the advent of IoT technology.

As the second wave of the green revolution, internet of things in agriculture has emerged. Using IoT in agriculture has two advantages for farmers. By enhancing decision-making with precise data, it has aided farmers in reducing their expenses and increasing yields at the same time.

The following are the major benefits of adopting

new technology - Internet of Things in Agriculture:

1. Climate Conditions:

Climate has a big impact on farming. Furthermore, inaccurate climate information substantially reduces agricultural yield, both in quantity and quality. IoT technologies, on the other hand, inform you of the present weather conditions. Sensors have been put both within and outside the agricultural fields. They collect environmental data that is used to select the best crops for the particular climatic conditions. Sensors that are extremely accurate at detecting real-time meteorological conditions like humidity, rainfall, temperature, and more make up the complete Internet of Things (IoT) ecosystem. If any uncomfortable weather is found, an alarm is sent. It is no longer necessary for people to be present during unfavourable weather, which eventually increases output and helps farmers to benefit more from agriculture.



2. Precision Farming:

Precision farming is one of the most well-known applications of IoT in agriculture. It enhances the precision and control of farming practises by utilising smart farming applications including animal monitoring, vehicle tracking, field observation, and inventory monitoring. The goal of precision farming is to analyse sensor data and take the right action. Precision farming uses sensors to help farmers gather data, analyse it, and make decisions quickly and with knowledge. Numerous precision farming techniques, such as managing animals, tracking vehicles, and managing irrigation, all considerably increase productivity and effectiveness.

3. Smart Greenhouse:

The controlled atmosphere provided by a greenhouse is suited to the requirements of the vegetation being grown there. Smart greenhouses are merging new IoT technology with current agricultural systems for all-encompassing visibility and automation. Modern sensor and communications technology-equipped "smart" greenhouses automatically record and share data about the environment and crop around-the-clock. Collected data is uploaded to an IoT platform where analytical algorithms turn it into insightful knowledge in order to identify bottlenecks and anomalies. Growers can maximize produce rates while cutting labour costs, improving resource and chemical usage efficiency, and using a smart greenhouse.

4. Data Analytics:

The typical database system is unable to accommodate the data collected by IoT devices. The core elements of the smart agriculture system are the end-to-end IoT platform and cloud-based data storage. These systems are believed to be essential in facilitating greater task performance. Sensors are the primary means of bulk data collecting in the IoT era. The data is reviewed and turned into meaningful information using analytics technologies. Data analytics facilitates the analysis of agricultural, animal, and weather factors. By employing predictive analytics, you can obtain knowledge to enhance your harvesting decisions. Farmers can forecast upcoming weather and crop harvesting with the use of trend analysis.

5. Agricultural Drones:

As a result of technology advancements, agricultural drones have almost entirely changed agricultural operations. Drones are used for agricultural spraying, crop monitoring, field analysis, and crop health evaluation. The agriculture industry has undergone a rapid rise and makeover thanks to drone technology, with proper strategy and planning based on real-time data. Drones with thermal or multispectral sensors can find the places where irrigation has to be adjusted. Once the crops have started to grow and reveal their condition of health, sensors calculate the vegetation index. Eventually, drones with intelligence helped to reduce the environmental impact. The



amount of chemical that is now reaching groundwater has significantly decreased as a result of the process.

IoT's advantages in agriculture:

In today's environment, we depend on technology for practically everything we do. And in terms of agricultural, the reliance will only increase in the next years. More and more farmers are utilising smart technology to boost productivity and efficiency thanks to the Internet of Things (IoT). Here are some of the benefits of IoT in agriculture projects:

Data: One of the key benefits of IoT in agriculture is data collection. By placing sensors across the site, farmers are able to keep an eye on everything from crop health to soil moisture levels. Using this information can help decision-makers make better choices about irrigation, fertiliser, and pesticides.

Improved Quality: Farmers can constantly examine their crops since they have access to so much data. This enables them to identify any issues as they arise and take appropriate action before they worsen. Crops are thus healthier and offer higher-quality yield

Risk Reduction: IoT lowers farmers' risk. By keeping an eye on the weather, for example, farmers may more effectively choose when to plant and



harvest their crops. As a result, there is a reduced possibility of crop loss as a result of bad weather.

Remote Monitoring: Farmers may now keep an eye on the progress of their agricultural products using a computer or even a mobile smartphone. Smart farming systems can send messages to farmers' phones if there are problems with the soil, seeds, or other elements of their crop.

Harvesting Automation: The usage of robotics in agricultural harvesting activities is growing. As a result, labour expenses are reduced, and the quality of the final product is improved.

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Crosstalk between global climate and intra-species planktonic behavior

Jayabrata Dhar

The global climate is experiencing the strongest ecological and environmental variations in the last two decades dictated by an increase in atmospheric carbon dioxide (CO₂) and other greenhouse gases owing to rapid industrialization and globalization. Climate change pose far-reaching consequences at the ocean water especially at the surface layers due to their first contact response capability to variations. The ocean surface is fed with various sources of freshwater run-off (melting ice, increased precipitation, and river inflow) that modifies the vertical heat and salt distribution.

The abundant form of life in the oceanic surface, i.e. phytoplankton, is among the first to respond to such changes owing to their fast life cycle, rapid growth rate, and large Net Primary Production (NPP) rate [1]. In addition, their success, survivability and distribution are dictated by the physical and chemical cues from the ever-changing surroundings. Besides being known for as the ocean's biological pump (absorbing large quantities of atmospheric CO₂ during their lifecycle), phytoplankton are known to exhibit harmful algal blooms (HABs) [2], which are perilous to the local marine ecology, industries, and pose the threat of biomagnification. HAB occurrence is becoming more frequent in recent times because of rise in global average temperature, increased productivity, species interactions and long-range dynamics (figure 1).

Among various parameters that affect HAB production, temperature is thoroughly studied being a key factor of identifying climate change. Temperature modulates crucial physiological activities in phytoplankton masses such as growth rates, photosynthesis, nutrient uptake rates to name a few. Temperature further modifies the grazing rate of zooplankton, a threat to sustained phytoplankton production [3]. Higher average temperature warms ocean surface thereby inducing a stable stratification and limiting nutrient transport via mixing with deeper layers. Thus, temperature and freshwater run-off collectively limit the nutrient availability at upper layers of the ocean, which enjoy higher light levels from the sun.

Although these factors would naturally pose a challenge to residing microscopic organisms at such shallow height, phytoplankton exhibit intriguing nutrient uptake approaches. Among these approaches, inter-strain symbiosis, mixotrophy, trace metal acquisition capability, modifying swimming characteristics and augmented macronutrient uptake rates are the conspicuous tactics used by the phytoplankton population. Past research has focussed on experimenting with one of the crucial cues, which inherently neglects the complications experienced in real systems. A need of multi-factorial experiments is, therefore, essential to understand the intricate ecological regulators

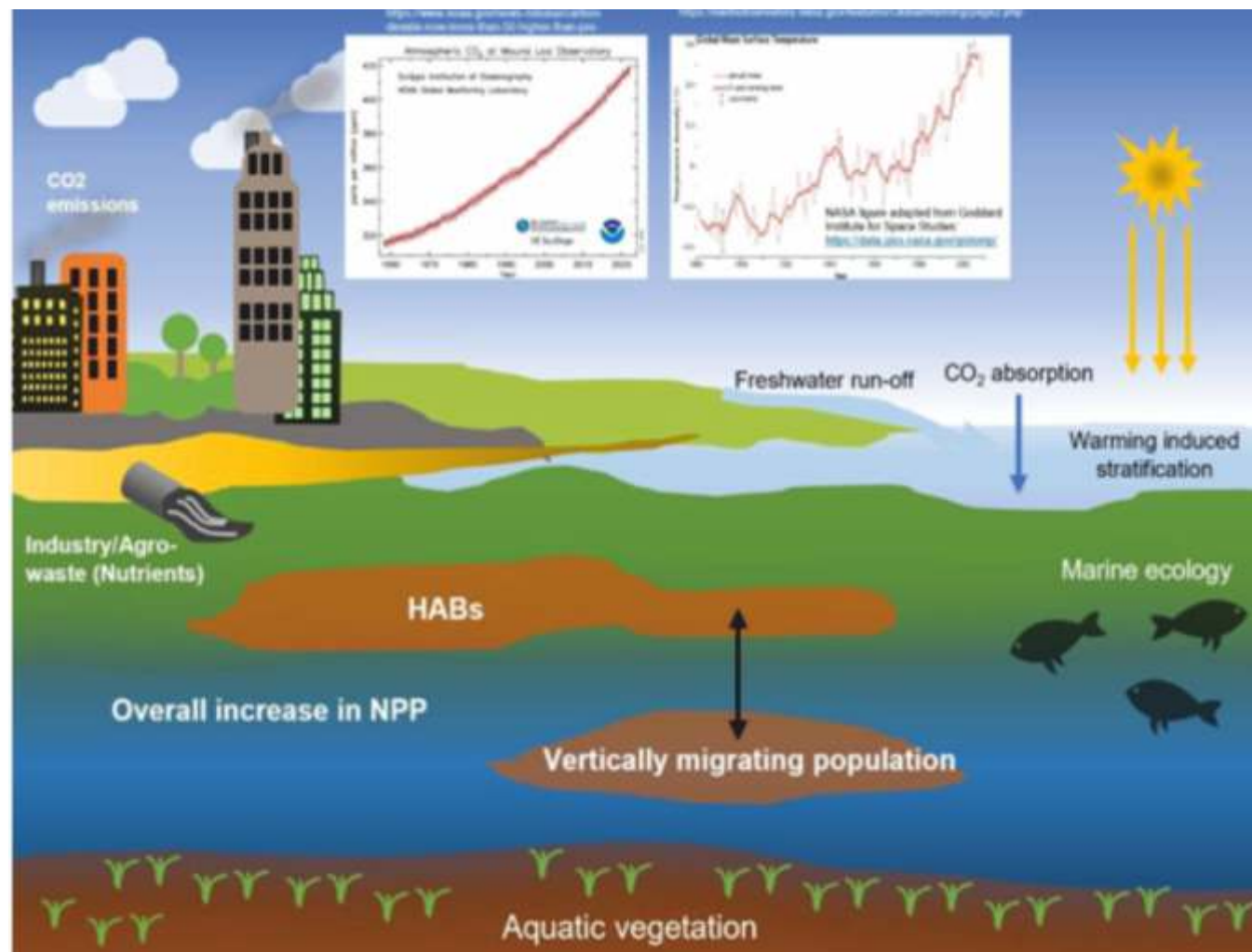


Figure 1: Various factors contributing to enhanced phytoplankton production.

that defines the success of HABs. As a first progress, the inter-strain bet-hedging strategy within a given species under nutrient stress is of particular importance, which is not investigated until recently. Before delving deep on the discussion of inter-strain response to nutrient limitation, here it is imperative to point out other dominant environmental stressors for the sake of presenting a larger overview of the problem: agricultural and industrial waste run-off near coasts, ocean acidification, aerosol deposition and increased ocean surface (fragmented ocean ice).

Nutrient depletion causes physiological changes within a phytoplankton cell. Such changes have an influence on their photosynthetic characteristics, mechanical stability and swimming pattern, toxin production as well as intra-cellular metabolism and

feeding pattern. Among these, modulation in cell swimming pattern apparently seems to possess the weakest connotation. However, in the population-level scenario, collective dynamics of the cells imposes a stark discrepancy across the strains of the same species. Recently, intelligent collective dynamics is studied for bacterial colonies wherein a stochastically growing cellular colony can induce a statistically determinant behaviour across colonies which are physically distant from each other [4]. Collective dynamics is key to understand cellular dynamics in a population and leads to synergism, thereby circumventing the stressors and inducing a conducive ecology for a stable bloom formation.

For the phytoplankton species experimented (a bloom forming species known as *Heterosigma akashiwo*) [5], the cells are naturally gravitactic-

swimming towards the ocean surface in the day and away from the surface during the night. Nutrient deficiency is related to the generation of lipid droplets (LDs) within the cell. The LDs actively transport themselves below the nucleus and away from the flagella, making the cell unstable as upward swimmers. In such a case, the cells become less ballistic (more diffusive) and enhance the probability to scan horizontally larger area for search of a nutrient-rich patch. In association to their variation to the swimming pattern, the cells active downgrade their photosynthetic machinery and save precious energy. The intriguing part of the story lies in the fact that such an

intuitive behaviour is exhibited by a particular strain (say S1) in the species. The other strain (say S2), which induces similar LD formation and swimming instability, enhances their ballistic swimming (swimming upward) against the cost of expending higher energy. The active inter-strain behavioural bifurcation within a given species lends an enhanced survivability to the community.

While S1 swims in deeper waters and relies on finding a nutrient-rich patch to retrieve their normalcy, S2 still expends energy to swim up to shallow waters, where light is abundant, and can therefore instantly divide on access to low nutrient concentrations, thereby relieving the accumulated cellular stress due to nutrient- limitation. Overall, with the contrasting inter-strain behaviour, the species enjoys a higher probability of success over other competing microorganisms.

The enormous number of variables in phytoplankton study and their inter-dependencies makes the system complicated to analyse. Understanding and demarcating the dominant effects that helps the success of the species against given cues / stressors will further enrich the present knowledge related to the lifecycle of phytoplankton-one of the significant microorganisms responsible to maintain the present environmental balance.

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Road Crashes: A Burden on Indian Economy and Role of its in Combating Them

Dr. Malaya Mohanty

I am a Civil Engineer and during our engineering days we were taught there are 3Es of traffic engineering; Engineering, Enforcement, and Education. In fact, even today the books contain the same line. However, there has been an additional E which has been added to meet the need of time. And that E is Emergency to save the lives of people involved in road crashes. The question is why the fourth E has been added? What is the necessity to add Emergency among these pre-existing Es?

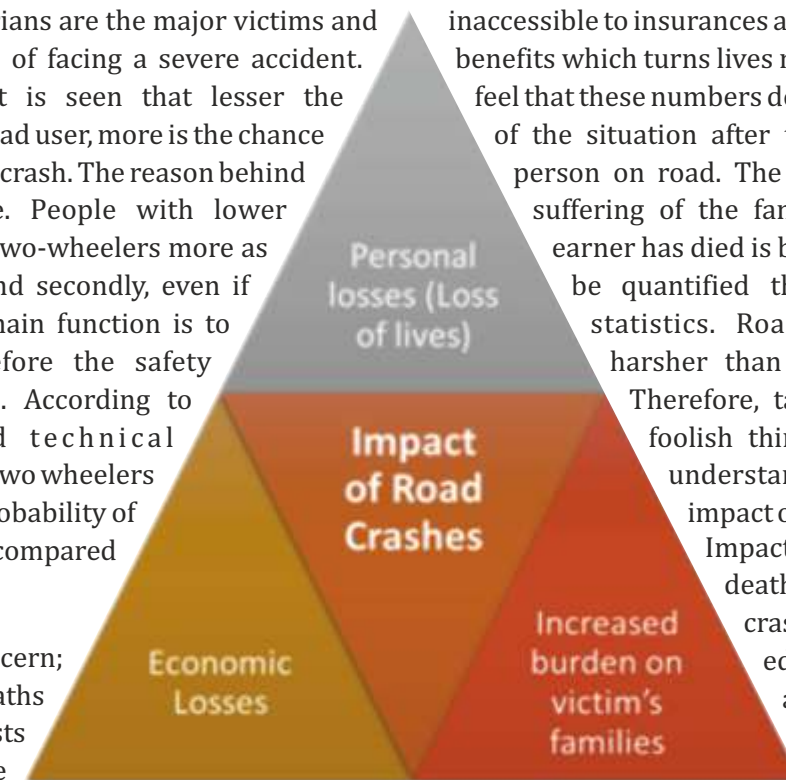
Although it won't be a fair comparison, still I would like to put a lens to an important statistics which will

clearly define as why this 4th E was imperative. According to Ministry of Health and Family Welfare (MOHFW), 5.3 lakhs people died in covid in India from 2020 to 2022. Guess what? During the same time, more than 4 lakhs people have also died on roads due to various road crashes. In addition, more than 9 lakhs people have suffered from some kind of injury due to road crashes. According to Ministry of Road Transport and Highways, every year 1.4 lakhs people get killed on roads with around 4 lakhs getting injured with some facing severe disabilities and deformities. While generally, all road users have some probability of facing an accident, it is usually



observed that pedestrians are the major victims and have a higher chance of facing a severe accident. Socio-economically, it is seen that lesser the financial stability of road user, more is the chance of facing a severe road crash. The reason behind this is quite simple. People with lower economic status buy two-wheelers more as compared to a car and secondly, even if they buy a car, the main function is to commute and therefore the safety aspect is overlooked. According to MORTH data and technical independent studies, two wheelers have a much higher probability of facing a fatal crash as compared to cars.

Clearly, death is a concern; but it's not only deaths and injuries that costs us a nation, but the overall impact of road crashes on our economy and society is too high. According to an analysis by Bosch India, India's socio-economic cost of road traffic accidents for the year 2019 was in the range of \$15.71 billion to \$38.81 billion, which amount to 0.55-1.35% of the GDP. Isn't it too high to be worried about or take some steps to reduce the deaths due to crashes? We all know that India tops in number of road crashes in the world with more than 400 fatalities per day. What's more important is India has 1% of the world's vehicles but accounts for 11% of all road accident deaths and 6% of total road crashes (MORTH, 2018). In the last decade alone, more than 13 lakhs people have died, and more than 50 lakhs people have been injured. These are some startling facts. According to a report by World Bank, there is a decrease in the annual income by 55% to 75% in urban and rural households in India due to someone's death in road crash. It directly impacts the caregiver/female member of the victim families. As mentioned earlier, economically backward people are prone to more accidents, and therefore the death of an earning member leads to stress and chaos in many families. Moreover, the lack of knowledge and education in rural areas make them



inaccessible to insurances and other eligible financial benefits which turns lives miserable. Many a times, I feel that these numbers don't justify the complexity of the situation after the untimely death of a person on road. The emotional and financial suffering of the families whose sole bread earner has died is beyond words which can't be quantified through mathematics or statistics. Road accidents are much harsher than they sound or appear. Therefore, taking it lightly is just a foolish thing and our government understands the gravity of the impact of road crashes.

Impact and long-term effects of deaths and injuries due to road crashes is well known to educators, policy makers and to public at large. To curb the road fatalities, Government has passed many laws to safeguard the interest of road users. According to Motor Vehicles (Amendment) Act, 2019, where 93 amendments were done to create an enabling framework to improve road safety in India. Guidelines and acts have come up to reduce road crashes. In this aspect, the following rights have been provided to road users like:

- Right to life
- Right to safe roads
- Rights of vulnerable road users
- Rights of children to safe commute.
- Right to seek redressal.

Further, there are many sections which protect these rights. For example, Section 162 (1) directs insurance companies to provide for treatment of all road crash victims under the Golden Hour. Section 162 (2) gives powers to the Centre to make a scheme for cashless treatment of victims of crashes during golden hour (the first critical hour after a road crash). Similarly, 198A ensures that any designated authority, contractor, consultant, or concessionaire responsible for the design or construction or maintenance of safety standards of roads shall comply with design, construction, and maintenance standards. However,



although the acts and laws have been established, they are still unknown to much of public who are driving on roads. Proper dissemination of these laws to public is somewhere missing and that's where ITS comes into picture.

Along with these rights, many laws and guidelines have also been made stricter in lieu of making driving a safer experience. The penalties for over

speeding, non-usage of sit belts, and helmets have been increased and they have large safety implications on road user. It is estimated that in hilly areas not using helmets increase the chance of a fatal road crash by 350 times as compared to someone who wears a helmet. Similarly, over speeding is said to be the cause behind 60-70 percent of road crashes in our country.



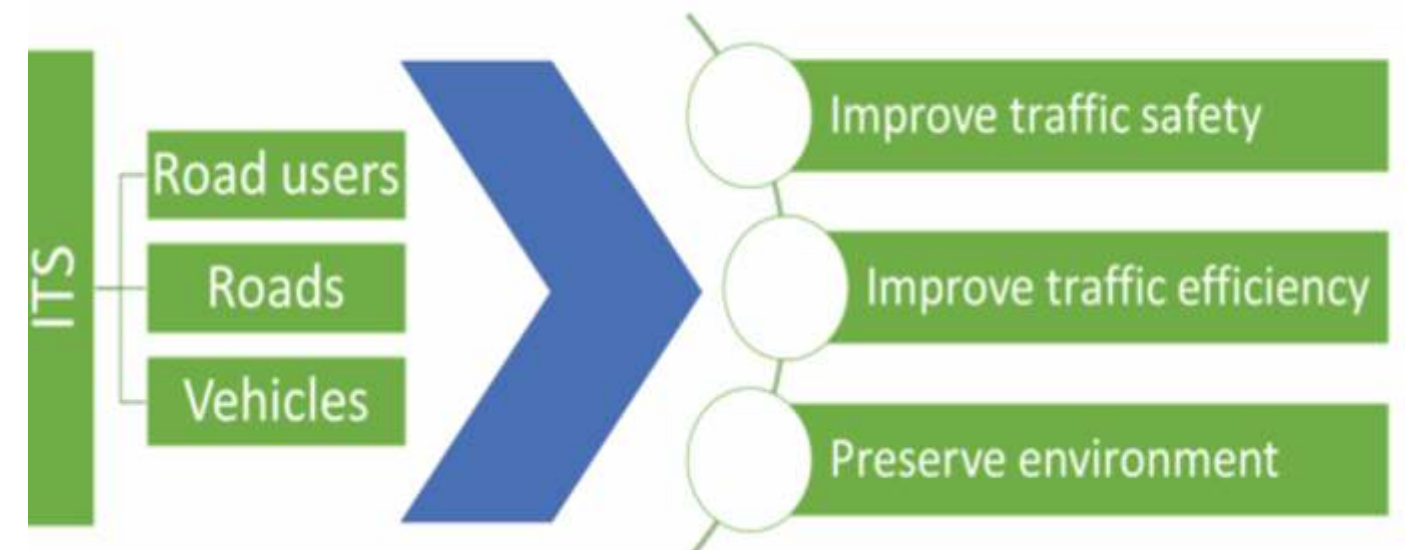
Intelligent Transportation Systems, aka ITS is one of the buzz words used in road safety now-a-days. A one line answer for definition or understanding of ITS would be it aims at increasing traffic flow efficiency by

educating traffic problems. ITS usually helps in enriching users with prior information about traffic, local convenience, real-time running information, etc. which decreases travel time of commuters as well as improves their safety and comfort. Majorly the benefits of ITS includes: a. Health, safety and environmental benefits; b. Public transport benefits; c. Driver and traffic management benefits; and d. Economic benefits.

In India, one of the most valuable applications of ITS is in travel and traffic management. Intelligent signalling (controlled by video sensors) is used in Smart Cities. BEST in Mumbai and UPSRTC in Uttar Pradesh are two prime examples where ITS is being used in public transportation for better operation management. Integrated fare management is one of the latest trends in the field of ITS that offers solutions to both commuters and transportation system operators. Smart parking is also becoming more popular, and it typically obtains information on available parking spots in a geographical area. This has aided common users in obtaining real-time information and status on available parking spots, thereby saving time. Further, connected vehicles are also being introduced, in which a driver can communicate with other drivers on the road using a variety of technologies. This can help in improving energy efficiency and lowering crash risk on the road. Another evolving trend of ITS is autonomous vehicle

technology, which is assisting a lot in the reduction of crashes, energy consumption, and pollution. In India, MORTH has implemented a variety of ITS projects with the goal of achieving a minimum of 50% reduction in road accidents and fatalities by 2025. This new project is a novel method to improve road safety by providing drivers with real-time information about prevailing traffic conditions on road, thereby improving the reliability and safety of the road network during the journey. All required information related to traffic, unfortunate accidents, slope failures, soil conditions, and more is provided to drivers in real time before they begin their journey through a specific route – this not only improves safety measures but also reduces costs and saves time. All these measures, if properly implemented can make travelling much safer and enjoyable.

With a country of more than 100 crore population, commuting via various modes with limitless dreams in their eyes for themselves, and their families, the least that can be done is to protect them from indulging in road crashes that shatters families. ITS is the latest technology and a positive hope that can change our status of being the country with highest accidents and accident-related deaths to a road accidental death-free nation in near future. Hopefully, in the years to come the number of crashes shall decrease in our country with effective use of ITS in vehicles and road environment.





Exosomes: Small packages of hope for Duchene Muscle Dystrophy patients



N S Raja



Varsha Singh



Archana Rajavel

Abstract:

DMD (Duchene Muscle Dystrophy) is a rare type of muscular dystrophy that affects males from 3 to 15 years. It results in early mortality by age 20-25 due to cardiac and respiratory failure. Although there is no cure for this disease, appropriate treatment and contemporary medications can help DMD patients improve their health. Most scientists are concentrating on exosome therapy, a new and emerging therapeutic. These nano-lipid vesicles not only aid in painless therapeutic operations but also in diagnosing DMD. Along with all these diagnoses and treatments, prevention and management are key factors that can be made known to the general public through increased awareness and understanding.

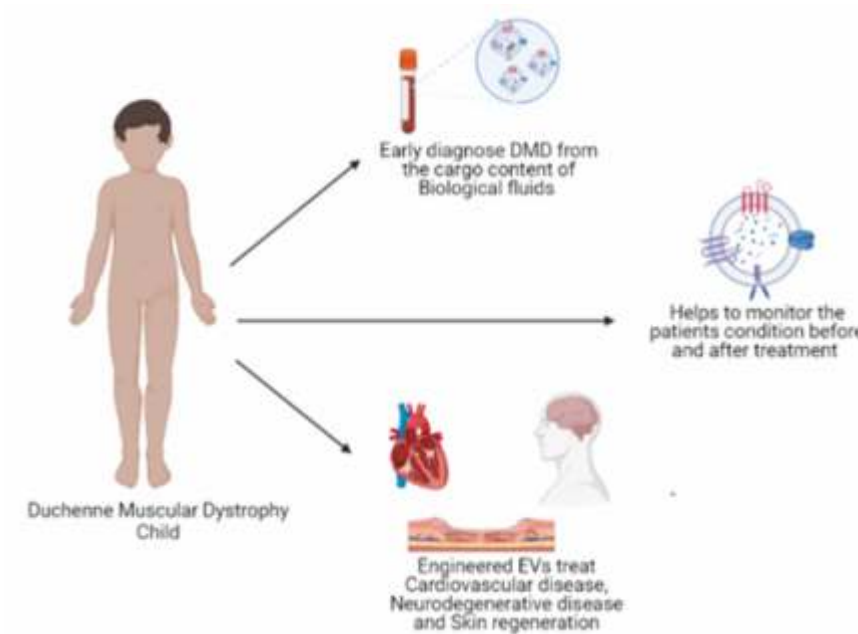
Introduction:

Rare disease (RD) is a diverse and complicated field. The landscape of rare illnesses is constantly changing as new rare diseases and syndromes are regularly found and documented in medical journals. Except for a few rare diseases, where significant work has been done, the discipline is still in its infancy. Nearly 7,000 rare diseases have been identified, affecting an estimated 8-10% of the world's population. DMD (Duchene Muscle Dystrophy) is another rare condition for which there is currently no cure. DMD is X-linked recessive muscle dystrophy caused by various DMD gene mutations, the majority of which are frame-shifting massive deletions and duplications, with point mutations occurring seldom. Growing weakness, skeletal, muscular atrophy, and later-onset

cardiomyopathy are key clinical indicators in DMD patients, leading to cardiac and respiratory failure and early death by age 20-25.

Diagnosis:

Clinical examination, family history, signs, and symptoms are used to identify DMD in young boys, and genetic tests such as multiplex PCR (mPCR), Multiplex Ligation Dependent Probe Amplification (MLPA), and Next Generation Sequencing are used to confirm the diagnosis (NGS). A muscle biopsy is a procedure in which a tiny portion of the muscle is removed and examined under a microscope. Muscle injury is detected by blood tests that search for elevated amounts of specific unique proteins known as muscle enzymes. Early detection of DMD children allows doctors to examine available treatments, establish a standard of care, and reduce disease consequences. Carrier testing helps identify whether the woman is a carrier and all carriers in the extended family. If the woman is the carrier, she has a 50% chance of having DMD/BMD offspring. If the DMD mutation is known in the family, two types of prenatal tests to identify the dystrophin gene mutation include chorionic villus sampling and amniocentesis. Muscle biopsies are a more intrusive and unpleasant procedure that the DMD patient does not handle well. Exosome research is a less invasive liquid biopsy and a more reliable way to track a patient's status during and after therapy. When compared to muscle biopsies, the hazards are fewer.



Prevention:

- ⊙ Sperm sorting Technology - Allow sperm to be selected by weight, with X-bearing sperm chosen to increase the chances of having a girl while reducing the risk of having a DMD boy.
- ⊙ Preimplantation Genetic Diagnosis (PGD) – In-vitro fertilisation (IVF) and genetic testing are coupled to implant only unaffected embryos into the mother's uterus.
- ⊙ Egg and sperm donation – Getting healthy eggs and sperm from donors lower the risk of producing a kid with Duchenne to that of the general population.

Management of DMD:

- ⊙ **Glucocorticoid Management:** Decreases the deterioration in muscular strength and function in DMD, lowering the risk of scoliosis, and ambulation loss, stabilising pulmonary and cardiac function. E.g., Prednisone and deflazacort.
- ⊙ **Psychosocial management:** A DMD patient's medical care and his family are inadequate without support for their emotional well-being. Psychotherapists and genetic counsellors assist them in overcoming emotional issues.

Therapies:

Despite substantial efforts in gene replacement therapy, gene editing approaches, cell-based treatments, and smaller pharmacological medicines, DMD treatments are hampered by the massive size of genes and the vast number of muscle tissues. Hot spot exon skipping and suppression of premature stop codons are two of the

most exciting approaches for recovering a functioning DMD product, dystrophin protein. Aside from these treatments, muscle integrity can be improved by enhancing the integrity of the muscular membrane utilising exosomes, an extracellular membranous vesicle that can show functional improvement. Exosomes are nano-sized membranes (20-200nm) produced by endosomes and released by all cell types to aid cellular communication. Exosomes are vesicles with a complex payload of proteins, lipids, and nucleic acids. They can deliver these cargos to target cells they come across while also altering the recipient target cell. Exosomes are gaining popularity among researchers due to their bioavailability (generated by all eukaryotic cells), cost-effectiveness,

biocompatibility, and low immunogenicity. These contribute to exosomes remaining in systemic circulation for more extended periods. Exosomes isolated from stem cells derived from DMD mice models exhibit cardioprotective properties. One study found exosomes from the myotube to improve muscle function and reduce muscle damage in dystrophic animals. EV can be used to convey medicine's benefits—in this example, HDAC inhibitors (HDACi) to cure DMD. Antisense oligonucleotide-loaded engineered exosomes are feasible candidates for drug delivery techniques for muscle regeneration. Exosomes produced by Cardiosphere-Derived Cells (CDC) have been proven to improve cardiac function in DMD patients.

Conclusion:

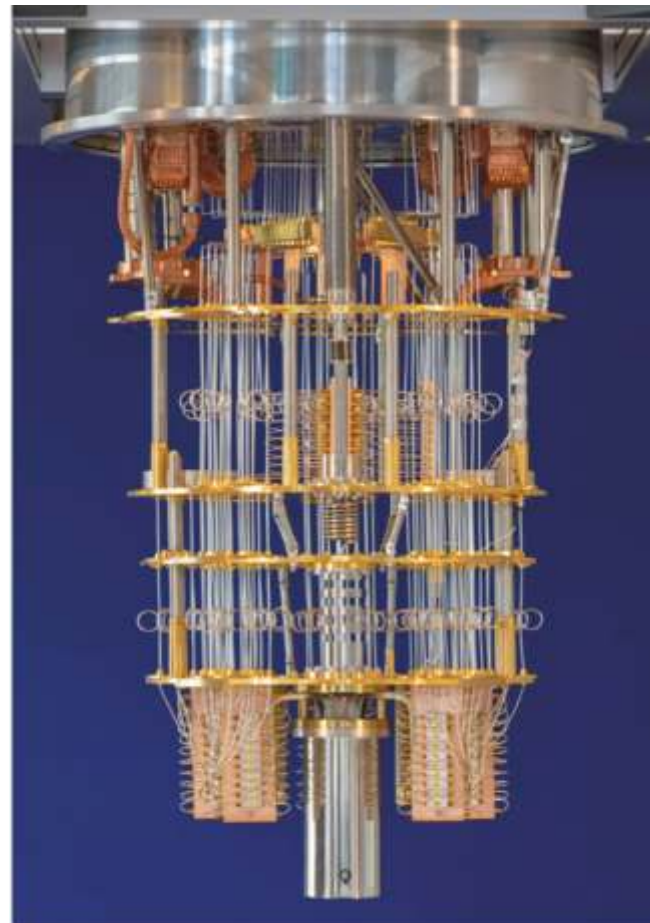
DMD is impacting male children in India, with the disease affecting boys aged three to fifteen. Patients frequently die before they reach the age of 20 because the existing treatment available in the country is expensive and hospitals lack sophisticated facilities, exactly why DMD is currently untreated. Although there is no cure for DMD, proper management and appropriate prevention strategies could minimise the number of patients until a more effective medicine is developed. Studies have also shown that exosomes from placenta-derived mesenchymal stem cells (PL-MSC) exert a therapeutic effect in DMD mice by improving muscle differentiation and reducing muscle inflammation and fibrosis.



Quantum Computing a Rapidly Developing Field of Information Science

“Computing using the most energy-efficient methods: Quantum Computing is the only solution”

Dr. Neeraj Kumar Misra



age of quantum computing has arrived, and with it comes the ability to easily solve exponential problems. As we progress to more fundamental aspects of quantum computing, we notice that it possesses two incredibly powerful states: entanglement and superposition. Within the realm of quantum computing, entanglement refers to a feature that is responsible for the correlation between quantum particles. Within the realm of quantum computing, the concept of superposition refers to a property that describes the simultaneous existence of several states that can exist everywhere and can be combined. In the realm of quantum computing, entanglement and superposition are two features that, when combined, can conduct a large number of calculations concurrently while also being incredibly quick.



Fig. 1. Quantum Computer
(Source: <https://www.sciencealert.com/watch-quantum-computing-explained-in-less-than-2-minutes>)

Quantum Computing: In the field of information science, quantum computing refers to a subfield that focuses on the creation of technologies according to the fundamentals of quantum theory. Quantum phenomena such as tunnelling, entanglement, and superposition are used in quantum computing. As a result of its properties, quantum computers have a major advantage over traditional computers. The

Quantum Properties

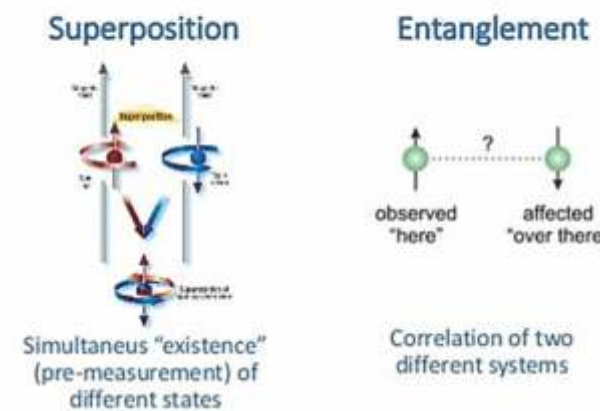


Fig. 2. Quantum Properties
Source: <https://www.c-sharpcorner.com/article/future-with-quantum-computers/>

Quantum/reversible concept: The development of more reliable quantum devices, as well as advanced fault tolerance nano-electronics circuits and error detection and correcting codes, will be necessary to achieve the level of Ultra-large Scale Integration circuitry that would be required. On the other hand, quantum technology is already a reality in such companies as IBM, AWS BRAKET, ALIBABA GROUP, ATOS QUANTUM, INTEL, Google, Microsoft etc. The advent of the world's first commercial quantum computer, IBM's Q System One, has demonstrated that advancements in the field of quantum computing have reached a level that was unimaginable only five years ago. In quantum computing, quantum circuits are created by deploying reversible quantum gates, which are used to perform operations on "qubits." Entangled qubits are utilised up until the point at which they enter the quantum gate to retrace information, and the entangle is kept even after the qubits leave the quantum gate. Because quantum gates are reversible because they retrace and restore information.

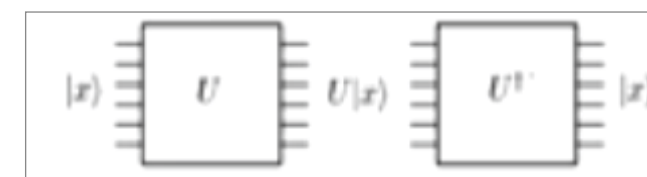


Fig. 3. Quantum gates are reversible: Forward and backward computation with no information loss

Qubit concept in Quantum Computing: Qubits are used in quantum computing. A qubit can be either a 1 or a 0 or it can be both at the same time as a combined 1 and 0 with the vector coefficient delegacy the probability for each other. This is a more formal explanation, if we look at the field of physics, we find that a qubit can be projected by the spin of an electron, which, depending on orientation, can be either +1/2 or -1/2. There are two possible states for a qubit, denoted by the numbers 1 and 0, which correspond to the two eigenstates of the spin of an electron.



Fig. 4. Qubit in Quantum computing
Quantum gates: Application of quantum computing such as DNA, optical computing, nanoscience and Nano-technology, and the field of reversible computing are all examples of fields in which quantum technology can be applied. The quantum logic gate is responsible for the implementation of the reversible logic gates. In contrast to the characteristics of the reversible gates, they have an equal number of inputs and outputs and no feedback path. This is one of their distinguishing properties to hold the reversibility properties in reversible gates. In the construction of quantum logic circuits, many types of quantum gates, such as Pauli gate, Hadamard gate, Phase gate, Controlled NOT gate, Controlled-controlled NOT (CCNOT) gate, Z gate, and Swap gate are utilised to perform qubit computation in quantum circuits.

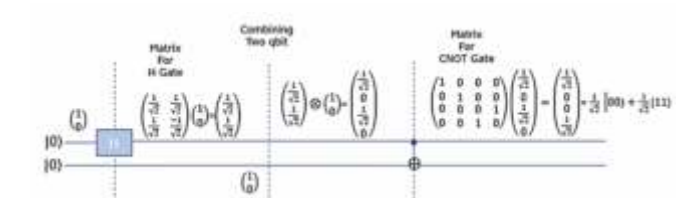


Fig. 5. Hadamard gate Qubit computation

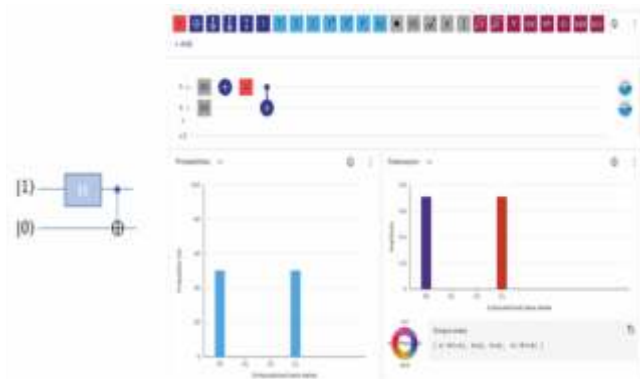


Fig. 6. Hadmard gate Qubit computation using IBM Composer

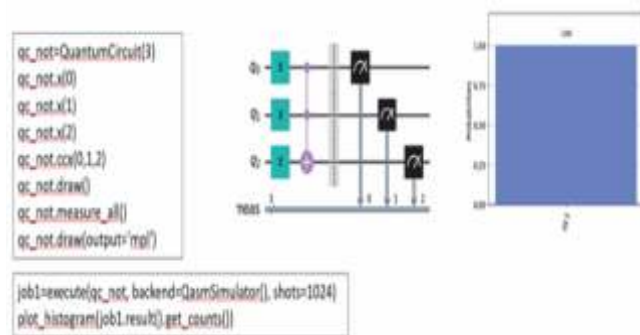


Fig. 7. Measurement of Qubit using IBM Composer

Quantum Programming Tools: In quantum programming need basic reversible gates and tools that can design from a point of view. To design any quantum circuit and compute the qubits for quantum computers, the most up-to-date tools are available, such as Qiskit (IBM), pyQuil (Google), ProjectQ (ETH), Revkit, and RCViewer +, etc.

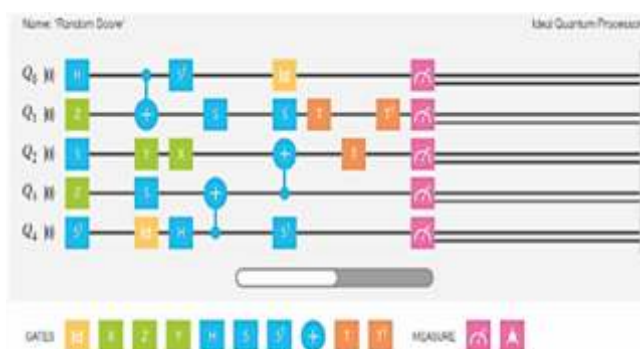


Fig. 8. Simulation with quantum gates
Reversible logic: Quantum gates are capable of

performing complicated information calculations safely and without loss at fast speeds while consuming less energy. However, because quantum gates have a higher tolerance for error, the design of quantum gates is a more challenging endeavour. The entire quantum logic circuit can operate in either direction forward or backward direction. In the physical reversibility of a computing system, the following is presented: If it is possible to perform computing while retracting the input logic without causing a loss of energy or power, the system architecture satisfies the requirements for physical reversibility.

The importance of quantum technology in the development of smart cities: The application of quantum computing is open to any industry and smart cities that seek to maximise efficiency, whether that means improving the output of a particular energy source or working toward the creation of a 'smart city' in which residents use the bare minimum amount of energy dissipation. The use of quantum computers to help manage traffic flow and ease congestion is an excellent illustration of how quantum technology can be used to validate smart technology systems within a city. This is especially relevant given that we are now living in an era in which autonomous vehicles are our new reality. The use of a quantum computer to regulate traffic and congestion in a city is something that many authorities around the world would like to implement, but they are seeking for financial incentives to do so.



Fig. 9. Quantum Technology in the development of smart cities
(Source : <https://medium.com/@riyamehta9001/merging->

technological-phenomena-the-era-of-quantum-computing-and-smart-technology-1ef8aaa5e30c)

The application of quantum computing to health care: The diagnosis and treatment of diseases are speed-up gradually with to use of quantum computing, which in some applications can dramatically cut computation times. There are numerous ways that quantum computing can be used in healthcare such as Radiotherapy, Molecular simulations, Precision medicine, diagnosis assistance, studies of drug interactions, and pricing of diagnosis etc.



Fig. 10. The application of quantum computing to health care

Source : https://www.techrxiv.org/articles/preprint/Quantum_Computing_for_Healthcare_A_Review/17198702

Quantum computing companies: The Perspective of the industrial sector, regarding Quantum Computing: Like traditional computers, quantum computers are capable of doing calculations fast. The idea of quantum computing has already been established. Quantum computing having an emerging area of computing. All the efforts of companies such as Google Quantum AI, Microsoft, AWS Braket (Amazon), Alibaba Group, ATOS Quantum, Baidu, INTEL, IBM etc to develop more advanced quantum computing devices and which are discussed in more detail as follows :

Leading quantum computing hardware companies such as

ALICE & BOB (Working towards Error-corrected and fault-tolerant quantum computers etc),

ALPIN Quantum Technologies (Working towards Trapped ion quantum devices etc),

ANYON (Working towards Quantum computer based on superconducting qubits etc),

ATLANTIC QUANTUM (Working towards Scalable quantum computer etc),

ATOM COMPUTING (Working towards Building scalable quantum computers etc),

BLEXIMO (Working towards Superconducting application-specific quantum computers etc),

C12 QUANTUM ELECTRONICS (Working towards Quantum processors etc),

COLDQUANTA (Working towards Laser-cooled and ultra-cold atom-enabled quantum technologies, develops and designs instruments, components, and systems for scientific and industrial quantum applications such as cold atom experimentation, quantum simulation, quantum information processing, atomic clocks, inertial sensing etc),

D-WAVE (Working towards Quantum computing and superconducting electronics etc),

DIRAQ (Working towards Fault-tolerant quantum computers etc),

EEROQ (Working towards Quantum computer chip that uses electrons on superfluid helium),

IQM (Working towards Scalable hardware for universal quantum computers),

IONQ (Working towards Trapped ion quantum computer etc),

NORD QUANTIQUE (Working towards Fault-tolerant quantum computing etc),

ORCA COMPUTING (Working towards Modular quantum computing platform using photonic technology etc),

ORIGIN QUANTUM (Working towards a Two-qubit chip based on quantum dot technology, as well as a six-qubit chip that relies on superconducting technology etc),

OXFORD IONICS (Working towards High-performance quantum computers by combining trapped ions qubits with proprietary noiseless electronic qubit control technology etc),

PASQAL (Working towards Quantum computer using



arrays of neutral atoms etc),

PHOTONIC INC (Working towards Silicon-based, high-quality, quantum technologies. etc),

PSIQUANTUM (Working towards Qubits with photons etc),

QUDOOR (Working towards Quantum key communication terminal equipment etc),

QUANDELA (Working towards Photonic quantum computing software platform, Perceval etc),

QUANTUM CIRCUITS (Working towards Superconducting devices and a modular and scalable architecture etc),

RIGETTI COMPUTING (Working towards pyQuil, the Rigetti Quil Compiler (quilc), and the Quantum Virtual Machine (qvm) etc),

SILICON QUANTUM COMPUTING (Working towards:10-qubit quantum integrated circuit prototype in silicon by 2023 etc),

DIRAC (Working towards New software and algorithms for quantum computers),

HQS QUANTUM SIMULATIONS (Working towards Quantum algorithms to predict molecular properties for performance materials, speciality chemicals and pharmaceutical companies etc),

The year 2023 is shaping up to be a very busy one for the field of quantum computing. As a result of the possibility that quantum computers will provide a significant competitive advantage to the nation that develops them first, many governments, including those of the United States of America, the European Union, and China, are providing financial support for research and development and more jobs in this field. As a result of this, we believe the present moment to be the most perfect time to educate everyone on the most recent developments in quantum computing.



Fig. 11. Quantum computer



Sustainability Approach in Road Construction: Cold Mix Technology

Siksha Swaroopa Kar

Abstract:

About 66% of India's total population lives in rural area as per the 2018 census. Therefore, improved connectivity and accessibility to rural areas will provide a vital force to the country's economic growth. In the search of better technique for construction of rural roads in terms of environmental and social impact, bitumen emulsion based cold mix technologies are found to be promising to serve the intended purpose with environmental safeguard. This article summarizes the technically feasible method and its tangible benefits known as cold mix technology for rural road constructions.

Introduction:

Sustainability is the ability to meet our needs without compromising the ability of next generations to meet theirs. Sustainable development includes the three dimension as approach i.e environmental, social and economical development. This has gained attention worldwide after conceptual of document "Our Common Future" (1987 by the World Commission on Environment and Development; WCED), wherein the term sustainable development is described as enhancing quality of life and thus allowing people to live in a healthy environment and improve social, economic and environmental conditions for present and future generations.

Vollenbroek (2002) stated that sustainable development is a balance between the available technologies, strategies of innovation and the policies of governments. The improving social,

economic and environmental indicators of sustainable development are drawing attention of the construction industry, which is a globally an emerging sector, and a highly active industry in both developed and developing countries (UNEP, 2003; CSIR, 2004).

In India, the honourable Supreme Court has restricted the use of Hot Mix Plants (HMP) to reduce CO2 emission. With environmental emission laws forever being tightened, the time may be right for India to tilt its way towards environment friendly technologies. A lot of research work has already been done to develop new processes and technologies to construct roads in an environment friendly way. Technologies like warm mix asphalt and cold mix asphalt work at significantly low temperatures as compared to hot mix asphalt and hence lowers down the emissions from the road construction process. Green Road Concept is the philosophy of promoting energy efficient and clean construction practices in road sector of our country and to look at opportunities to educate and promote such technologies which have immense impact on the socio environmental and economic conditions of road building stakeholders involved like engineers, contractors, labourers, skilled workmen, technicians and the villagers/communities who participate together to create and use these assets created by the Central, State authorities and private agencies in their localities. This paper deals with development of specifications, outcome of pilot studies of cold mix technology in India and its effect on the society and environment.



Rural Road Network:

In India, over 850 million people live in rural areas. Due to lack of connectivity and road access, millions of villagers are suffering from isolation and prolonged economic and social deprivations. They are not shared with the recent developmental benefits. Symptoms of deprivation due to lack of access are many such as high mortality of pregnant women, children missing school and education, perishable agricultural produce not reaching market timely, non availability of quality drinking water, unemployment, poverty and so on. Rural connectivity is key component of rural development as it provides access to economic as well as social goods besides services generating higher agricultural income and employment opportunity in rural areas. As per many literatures and documents, rural access is central to the alleviation of rural poverty and improved road connectivity in rural areas has led to substantial reduction in freight cost, increase of income, and improvement of employment opportunities.

Rural Roads programme popularly known as Pradhan Mantri Gramin Sadak Yojana (PMGSY) was launched in December 2001, which is a 100 percent centrally funded scheme. This programme ensure connectivity of habitations above 500 population to be provided with all weather roads. However, in case of hills and tribal area, threshold is relaxed to habitations with 250 population. The estimated number of villages to be connected under PMGSY was about 1.79 lakhs, which need construction of 3,75,000 kms new roads and upgradation of 3,72,000 kms existing roads in rural areas (Roads, 2017).

Road Construction and Emissions:

Conservation of non-renewable resources and energy, together with reduced environmental pollution and working conditions are global issues that are becoming increasingly important to civil engineers. As a result, authorities in various countries are creating legislation and authorities to reduce energy consumption by using cold mix construction and recycling of pavement. Hot mixed laying techniques using hot and melted bitumen as binder are used at large scale in construction and maintenance of bituminous roads, though it causes emission of green house gases.

Bitumen is heated to 160–170 °C and aggregates are heated to 150-160 °C consuming enormous amount of energy. Further, implication of hot mix is very hazardous for both workers and public in general. These hazards have drawn considerable attention of researchers, practicing engineers and specification designers towards more usage of alternative cold-mix technology in construction and maintenance of roads. GHG emission data base says production of one tonne of hot mix emits about 5.25 kg of carbon (Kar et al., 2014). Studies show that for the production of aggregate includes the quarrying, hauling, crushing and screening, the GHG emission range is 2.5 to 10 kg CO₂/t and for asphalt it is 221 kg CO₂/t. New construction, major rehabilitation and thin surfacing using hot mix technology have the highest energy use and range from 6.3- 12.6 MJ/m² per year (Kar et al., 2014).

In this article, the focus is on cold mix technology produced in field at temperature greater than 10°C, environmental impact, and advantages of cold mix recycling. Bitumen emulsion based cold mix technologies are alternative to traditional hot mix to serve the intended purpose. Public awareness to pollution caused by hot mixes laying techniques and imposed environmental restrictions have drawn attention of researchers, practicing engineers and specification designers towards more usage of bitumen emulsions and cold mix technologies in construction and maintenance of roads. The present usage of emulsion in India is about 6 % of total bitumen usage. MoRTH and IRC specifications for Road and Bridge Works (5th Revision) recommended use of cold liquid bitumen like bitumen emulsion as binder for tack coat in bituminous road construction and use of emulsion based technologies for road maintenance. In view of the need of the country, Green technologies for construction and maintenance of roads have been developed and implemented nationwide with the help of Government.

Technical Description

This is a simple process of mixing unheated mineral aggregates with suitable cold mix binder (most widely cationic bitumen emulsion) maintaining the proper moisture and binder content with desired workability for bituminous road construction in rural areas. The key ingredients of cold mix are

mineral aggregates and tailor-made cold bitumen emulsion binder developed with special additives (surfactants) leading to Green Rural Road Technology. The mechanism of interaction is illustrated in Figure 1.

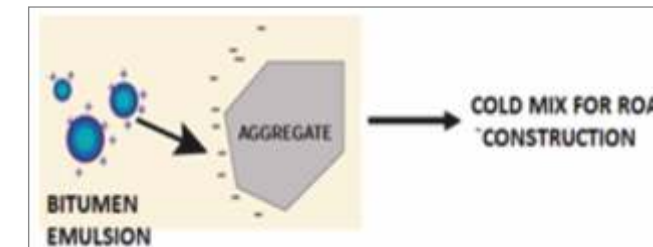


Figure 1 Mechanism of Interaction between Aggregate and Binder

Before construction of the rural road using cold mix technology, it is required to carry out laboratory mix design for further field execution. From this design dosage of binder (by weight % of aggregate), workability of the mix, breaking time, setting time and coating ability of binder on aggregates are obtained. The process of mix design is illustrated in Figure 2.



Figure 2 Mix Design of Cold Mix for Rural Roads

Aggregates consist of crushed rock or other naturally occurring material, or combination of the both. They shall be clean, hard, durable, dry, and free from dust, soft or friable matter, organic or other deleterious matter. Sand equivalent value, soundness, methylene blue, aggregate impact value, shape, stripping, gradation and coating tests are conducted on mineral aggregates.

A liquid product in which needed amount of bitumen is suspended in finely divided form of the size 5-15 microns in water in presence of cationic emulsifiers is known as bitumen emulsion. It is chocolate brown colored liquid in free flowing condition at ambient temperature. Once it breaks color changes to black from brown. An emulsion is said to break, when the hydrocarbon and the aqueous phase separate, or a stable dispersion of bitumen in water in continuous phase. The bitumen globules are positively charged due to the NH⁺3 group cover, which is formed around tiny bitumen droplets and provide stability for emulsion by electrostatic repulsion. This bitumen droplet has affinity with the negatively charged aggregates surface. Dispersion is obtained by processing heated bitumen (130-140°C) and water base solution (60-70°C) under controlled condition through a three stage colloidal mill (>3000 rpm) in presence of scientifically selected surfactants/emulsifiers. Reaction of amine group of emulsifier with HCL is shown in Figure 3.

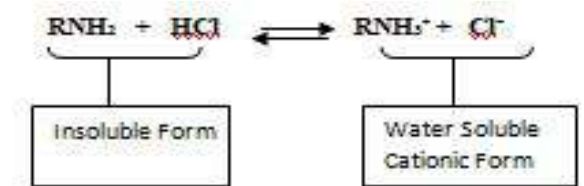


Figure 3 Reaction between amine and acid

Specified cationic bitumen emulsion binder and graded aggregates are proportioned and cold mixed in a concrete mixer or a mixing plant, transported to site laid and compacted by conventional roller which is known as Green Road or hot mix plant switching off heating system (Figure 4 and 5). Final view of rural road constructed with Cold Mix Technology is shown below in Figure 6.



Figure 4 Production of cold mix by concrete mixer and hot mix plant (without heating)



Figure 5 Laying of Green Roads by Cold Mix Technology



Figure 6 Final View of Rural Road by Cold Mix Technology

Quantifiable and tangible benefits

Cold Mix Technology is highly energy efficient, environment friendly, pollution free technique, which can be executed throughout the year, saves fuel, time as well as construction materials. Faster work progress is achieved in comparison to traditional hot mix technology. GHG emission is calculated for Premix and Seal Coat using both traditional hot and new cold mix technologies are presented in Table 1. Results show that cold mix technology saves about 310 tonne of eqCO2 emission of greenhouse gases energy per construction of one kilometer rural road network.

Table 1 Comparison of GHG Emission for Cold Mix and Hot Mix Technology (1 Km rural road)

Input Material	CO ₂ Emitted (in Tonne CO ₂ eq)			
	Premix		Seal Coat	
	HMA	CMA	HMA	CMA
Bitumen/Emulsion	40.2	21.4	43.5	18.2
Crushed Aggregate	8.2		2.7	
During Construction	141.5	7.5	141.5	7.5
Total	189.9	37.1	187.7	28.4

Summary

Cold mix technology is a viable option even in a geographically uncertain, economically under developed and politically unstable parts of the country, as it offers non hazardous, eco-friendly, acceptable to local construction workers. After a decade full of continued research and efforts, more than 8000km of green rural roads have been laid. Now aim is to achieve objective of sustainable development and harness the socio-economic and environmental benefits of cold mix technology for rural roads and state roads to help the country benefit from prospective earning of carbon credits.

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Identity Politics & Racial and Class Ideologies

Suchitra Mahapatra

to hear about developments and know about different subjects, our opinions and thoughts are subject to change.

Race can be defined through ethnicity and certain physical attributes.

Haider, 2018, "The ideology of race claims that we can categorize people according to specific physical characteristics, which usually revolve around skin color. But this is an arbitrary form of classification that only has any meaning at all because it has social effects."

Racism, on the other hand, is discrimination or a narrow set of rigid beliefs toward another race. The Black Lives Matter movement highlights racism and discrimination against black people by unprovoked incidents of police brutality and violence against black people, which is also stated in the book; Mistaken Identity by Haider, 2018.

Haider, 2018, "Racism equates these social effects of the categorization of people with biological qualities. Such a reduction of human culture to biology is generally rejected and viewed as abhorrent. But it is possible to reject racism while still falling victim to the ideology of race. Taking the category of a race as a given, as a foundation for

The relationship between race, class, and identity politics is distinct but also intimately intertwined and intersected at several levels within a societal structure.

Race and class are connected subjects of identity that define an individual.

Identity, in general, can be defined by race, personality, thoughts, etc. In a political sense, identity is formed by current political situations and the requirements of the liberal state.

The ideology of identity politics, from what can be comprehended, is just individuals, regardless of their race and class, having the right to define political theory or an opinion just as they are, as people, as individuals.

A suitable example is by quoting Haider, 2018, Mistaken Identity, "This political rationalism offered a certain kind of comfort. It confirmed that I did not have to rely on my identity to argue that the solution to the violence and suffering that assaulted us in our daily news was an end to American imperialism, and therefore global capitalism."

Asad Haider, the author of "Mistaken Identity", was born in Pennsylvania but is from Pakistan; he could not fit in at either place but found a way to express himself through political rationalism.

Political identity is also subject to change. As we get





political analysis, still reproduces this ideology. This is not innocent, because in fact the ideology of race is produced by racism, not the other way around."

The response to individuals of color who reject identity politics is one of the most puzzling examples of its shakiness. For instance, Haider regularly appears on lists of "white socialists" who disregard racial issues. Of course, identity politics aren't the only ones that do this. As Joe Biden said about Barack Obama, white people tend to think that anyone who is socially associated with them and is "clean" and "articulate" must also fall within the "white" category.

A white individual once informed Haider that it was troubling how all the "people of colour" were separated into the other room at an Ethiopian pub in Philadelphia but the contradiction here is another personal experience of him reaching the JFK airport and how every man with a Muslim name was taken to a separate room to be questioned about their travel plans, this shows how whitewashing is not consistent, and the ideology of race is indefinitely produced by racism.

In order to move forward collectively as a group, we need to move past race or even reject identity to attain even a sliver of equality.

Class is a collective group of



people who form a socioeconomic status in a society, which is racialized as well.

To prove my point, I would quote Ignatiev and Allen's argument, which is included by Haider, 2018 in *Mistaken Identity*, "which was that the legacy of slavery was the imposition of white supremacy by the ruling class as an instrument of class division and social control."

The complexity and sensitivity of all these terminologies show a weird juxtaposition, an imbalance in society, yet somehow we manage to make sense of it and try to move forward with all the inconsistencies and contradictions of the people living in a society.

No matter how challenging the process may be, identity and class can be changed, but not someone's race.

Global Warming & Human Civilization



Prajay Samui



Ritaparna Samui



Pijush Samui



Figure 1. Effect of global warming.

Today, global warming has become a threat for mankind. Global warming is a process where the Earth's average temperature rises due to increase amounts of greenhouse gasses such as carbon-dioxide, methane, ozone gas etc. It has harmful effects on living organisms. The results of global warming are widespread and unspecific (figure 1).

Science is trying to determine exactly when the warming trends that the earth is perceiving started. It is found that in the tropical oceans and over Northern Hemisphere continents the first signs of warming appeared around the 1830s to 1850s. In 1896, Swedish

scientist Svante Arrhenius first predicted that changes of carbon dioxide levels in atmosphere could substantially affect the surface temperature through the greenhouse effect. In 1938, Guy Callendar announced that increasing carbon dioxide in Earth's atmosphere to global warming.

The major causes for global warming are deforestation, burning fossil fuel, use of plastic, transportation, construction etc. At the time of photosynthesis plants and trees takes carbon-di-oxide and releases oxygen. Deforestation means decrease in number of trees leading to accumulation of carbon



dioxide in the atmosphere leads to global warming. When we burn fossil fuel, large amount of carbon-dioxide, a greenhouse gas releases in the air leads to increase temperature in the air causing global warming. There are also many more reasons for global warming.

We all know 1°C average global temperature has already increased. So, it's necessary to stop global warming immediately. Government has already taken lots of actions. 196 Parties at COP 21 in Paris, made one agreement, called Paris Agreement (figure 2) on 12th December 2015. In this agreement it was decided to limit the global warming by 1.5 to 2 degrees Celsius. In spite of this we all should try from our side also.

To overcome the major problem the following steps should be taken by us.

1. Plantation should be done in a large amount. For plantation we can take oath to ourselves that we will plant a new tree (figure 3) in our every birthday, every special moment, every occasion and so on.
2. To stop global warming, public transport will not only be used but also, battery operated transports or the transport with solar energy will be used more. We also can use CNG in our vehicles.
3. Uses of plastics be limited and taking plastic bags from shopkeepers should be denied while buying something. Moreover, we should reuse and recycle plastic items as much as possible.
4. We should start using solar energy and wind energy as much as possible.
5. Sea wave can be used as a renewable energy to reduce global warming.
6. CO₂ can be stored underground as a supercritical fluid (figure 4). In supercritical condition, volume of CO₂ is less than if was at standard condition.

So many problems have started for human beings for global warming. Ice is melting in the polar region rapidly (figure 5); the nature of the weather became very erratic. Chances of flood and tsunami are increasing day by day.

Marine life is also being impacted; marine species are becoming extinct day by day. We need to prevent these for emergency basis otherwise our future generations will suffer a lot. No one should take this problem lightly.



Figure 2. Paris Agreement.



Figure 3. Plantation.



Figure 4. CO₂ storage.



Figure 5. Melting ice.



Cybersecurity- A Big Challenge

Chittaranjan Pradhan

The protection of data is the main objective of cybersecurity. However, one of the following rules has been broken whenever a security compromise is discovered:

Confidentiality: Information is shielded from unauthorised access by confidentiality. It makes sure that only authorised individuals can access the data. Processes of encryption and decryption can be used to accomplish this.

Integrity: This guarantees that the data is protected from being altered without authorization by threat actors. Certain precautions should be taken to safeguard the sensitive data from loss or corruption if any updates are made.

Availability: Information is always made accessible to authorised users. It ensures that system failure won't obstruct these accesses.

CYBERSECURITY RECOMMENDATIONS

The following are some well-known cyber safety advices to guard against cyberattacks:

Conduct cyber security awareness training: To prevent security infractions, every corporation must educate its employees about company regulations, cyber security, etc. through seminars and workshops.

Update software and operating systems: To take advantage of the most recent security patches, all computer software and operating systems should be updated.

Use anti-virus software: It is advisable to make use of antivirus programmes that can identify and get rid of hazards from the device.

Conduct regular security reviews: To discover security issues early and take the appropriate action, every firm makes sure to conduct regular security inspections of all installed software and networks.

Wi-Fi networks should not be used if they are not secure: Doing so could leave you open to attack.

Use strong passwords: It is recommended to use long passwords that contain both characters and symbols. It renders the passwords impossible to guess.

All of our activities are dependent upon electronic devices, computer networks, and software applications in this era of digitalization. As part of their regular operations, all critical infrastructures rely heavily on internet-connected devices, including the government, banking, and manufacturing. There are many instances where unauthorised access or disclosure of data can occur. The term cybersecurity refers to methodologies, techniques, and processes for protecting systems, networks, programs, electronic devices, and data from cyberattacks. Protecting computer systems from unauthorized access is the basic purpose of this technology. Data breaches continue to increase at a rapid rate every year. Therefore, governments around the world are working on implementing effective cybersecurity practices to address the international cyber threat.

TYPES OF CYBER THREATS

Security against cyber threats can be divided into three categories:

Cybercrime: The term cybercrime refers to a crime that involves a computer or a computer network. The term is used to describe single actors or groups who target systems for financial gain or to disrupt them.

Cyberattack: It is an activity that involves the gathering of politically motivated information. Attempting to disable computers, take data, or make use of an infiltrated computer system to initiate more attacks.

Cyber terrorism: Any planned, politically motivated attack against information systems, programmes, and data that poses a threat of violence is referred to as cyberterrorism. It is meant to interfere with electronic systems and induce dread or panic.

CYBER SECURITY GOALS



The Interconnection of Water Crisis and Women's Rights in India

Dr. Pramodini Jena

Introduction

India is expected to overtake China as the world's most populous country in 2023. Despite having more than 15% of the world's population, India has less than five percent of the world's freshwater resources. Rising temperatures, heavier rains, harsher storms, and extended droughts have only exacerbated India's water crisis. The Central Ground Water Board of India states that out of the 700 districts, 256 have been reported of having critical or over-exploited groundwater levels. And it is not a surprise that today's worst sufferers of the water crisis in India are women. An example of this is women walking for miles in the scorching heat of 41 degrees Celsius to fetch water in Odisha's Mayurbhanj district. Women have always been on the frontline taking down the pressure whenever there has been a crisis. The impact of climate-related risks is different for men and women. The pre-existing inequalities and unequal access to resources expose women faster to the physical



Women collecting water from unsafe

hazards of climate change and slow their capacity to cope with the risks. Even after 75 years of India's independence, women in the country have to struggle to get equal access to resources. This further results in increasing the restrictions on Indian women from complete participation and contribution towards planning and decision-making processes. It is a phenomenon in most of third-world nations that women have the burden and responsibility of fetching water in their households. Women in these countries spent hours and hours every day walking for miles to collect water. The National Women Commission report states that a woman in rural areas of India walks nearly three kilometres to reach a water source. According to UNICEF, women, and girls altogether lose 266 million hours every day in search of water.

The deepening crisis of water in India

India's water crisis in recent years has become critical and significant. It has been affecting millions of people across India. Three-fourths of the population in India's rural regions are amidst the issue of the water crisis. Families in these regions do not have access to safe and hygienic connections for drinking water and are coerced to be dependent on unsafe and contaminated sources. India today does the largest groundwater extraction in the world. It accounts for nearly 25% of the world's groundwater extraction. More than seventy percent of water sources in the country are contaminated with the majority of rivers being infiltrated with waste and pollution. According to a report by NITI Aayog, Bengaluru soon will be among one of the eleven cities in the world to run out of groundwater. The



Untreated sewage into Ganga

growth in India's population has resulted in insufficient water per person. According to data in India, the total amount of usable water per person per year is 950 billion cubic meters on average. A water-stressed nation is one that has per person less than Seventeen Hundred cubic meters every year. Due to pollution and untreated sewage discharge, water in most rivers in India is largely unsuitable for drinking. Such degraded quality of water is the result of delayed and insufficient investment in urban water-treatment facilities. Moreover, due to a lack of sufficient technical resources the industrial effluent standards are not adequately enforced. There are dwindling groundwater supplies due to over-extraction. Deficient and erratic rain in the majority of areas are also reasons for depleting groundwater. Wells, tanks, and ponds are parching up as groundwater water gets more exploited due to

unsustainable consumption. Unequal distribution of water, depletion, and contamination of local water bodies due to pollution, and lack of adequate water treatment facilities augment the water crisis in India. Gender remains among the foremost reason in India for discrimination when it comes to accessing clean water. Women are the worst affected population when it comes to the issue of water scarcity in India. They are affected due to the unavailability of clean water, sanitation, and a functional washroom with a water connection. It is natural that women are in requirement of more water and even more when they are in menstruation or for pregnant women. When women are unable to access these basic needs, they are limited from participating freely and equally in society. Despite having unequal access to usage of water in the house, it is women in Indian households who have to ensure equal and unbiased distribution of water among other members of the family. Because of these differences in accessing a basic need such as water, women in India face health, psychological, and security vulnerabilities when there is an unavailability of water for meeting the daily needs of the household.

Multi-dimensional impacts of the Water Crisis on Indian women

From ancient times, collecting water is perceived as a woman's job in India. Each day women are put on duty of gathering water for use in their lands and homes. Despite fetching the water after miles of walk, the amount of water rarely meets the needs of the



Women standing in queue for water



household. The irony being the woman who collects the water is put last on the list when it comes to usage of the same water. The water from such distant sources is often contaminated and no doubt it is women who are the most affected due to poor sanitation. Indian women are thus at a higher risk of getting infected due to their frequent contact with unsanitary water. Women collecting water from such unsafe sources are susceptible to deadly diseases like Trachoma, diarrhea, leptospirosis, hepatitis A, etc.

A 22% increase is reported in the rate of dropping the school mid-year in Indian districts affected by droughts. The majority of these are female students. Girls as young as ten are burdened with the responsibility of collecting water. Gradually, they miss their classes and lag in their studies which forces them to abandon their education. Difficulty in access to clean water during menstruation and private toilets are also major reasons for girls dropping their education in India.

Another more staking reality of Indian women dealing with the water crisis is the plight of water wives. Marriages that happen for water have turned into a custom in many Indian villages. The woman who gets married under this custom is called a water wife who is normally the second wife of the man. This arrangement is to ensure that the household duties are divided between the wives so that one can certainly go to fetch the water.

The burden of the collection of water on women is not limited to rural India only. In urban areas like Mumbai, and Chennai, long lines of women standing with their buckets and containers are striking. This highlights the problems of water in cities that lower- and middle-class women endure. Women thus easily become the “pipes” connecting the household needs and the water tankers. It is even more difficult for transwomen to stand in these lines to collect water because of the social stigma and gender stereotypes. In some areas, water is supplied at odd hours of midnight or early morning which means that the women standing in queues at this unusual hour are deprived of their sleep and this affects their health and productivity.

The Road ahead in mitigating the water crisis and meeting the rights of women

United Nations CESC has recognized access to water as a basic right of a human being. Access to water is a fundamental right under Article 21’s Right to Life of the Indian constitution. Several policies have been initiated by the central government to safeguard universal access to water in the country. This includes programs like the National Rural drinking water program, Atal Bhujal Yojana, AMRUT, etc. The Indian judiciary through cases like Subhash kumar versus state of Bihar, 1991 has put the obligation on states concerning fulfilling and protecting the individual right to safe water in the country. The Indian government launched the Jal Jeevan Mission in 2019, one of its objectives being to relieve the women from the burden of the collection of water and in turn strengthen their access to piped drinking water. The Jal Shakti Ministry is in process of implementing the schemes "Nal Se Jal" and "Har Ghar Jal" which are projected to be achieved by 2024. These schemes focus on taking a bottom-up approach and are beginner’s steps at addressing the water crisis in the country which is multi-layered. Women being the frontline bearer possess ground-level knowledge of the issue. It thus becomes imperative to include these women in the policy-making process. Paani Samitis, where women and men have equal representation is a welcome step in this regard. The 6th Sustainable Development Goal includes a crucial direction in connecting water with sanitation and hygiene through target 6.2. This emphasizes the availability of safe water for the needs of women and girls.

The need of the hour is to address women’s water and sanitation requirements that would further help in revealing the potential of half of the country’s population and attaining gender equity.

To cover the issue of water scarcity in the country in long run, the water levels of the floodplain aquifers

Sustainable Development Goal 6
ENSURE AVAILABILITY AND SUSTAINABLE MANAGEMENT OF WATER AND SANITATION FOR ALL.

6 CLEAN WATER AND SANITATION

TARGET 6.2
By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations.

INDICATOR 6.2.1
Proportion of population using safely managed sanitation services, including a hand-washing facility with soap and water.

INDICATOR 6.1.1
Proportion of population using safely managed drinking water services.

need to be monitored scrupulously. Floodplains can be secured by the plantation of trees that don’t consume or demand much water. Corporations must play a more active role in water management; they can use their Corporate Social Responsibility (CSR) efforts towards the conservation of water and innovation for harnessing water recharge. The call of the Swachh Bharat Mission campaign has resulted in a significant change in sanitation habits in India. The next phase of this campaign should envision exploring solutions for addressing the water requirements of women in the country

Indian women can play a vital role in tackling the crisis of water among other climate change issues. They have knowledge of resource management and sustainable practices. Incorporating these women’s unique knowledge can strengthen the design and implementation of adaptation plans to mitigate the water crisis in India. For example, in Sudan women have actively become involved in dialogues over natural resource disputes and they have come up with better and sustainable solutions for the long run. In India where women make up over 65% of the agricultural workforce, a sector that has the highest usage of groundwater, it is thus highly significant that Indian women are integral to the water crisis dialogue in the country.

Conclusion

India has completed its 75 years of attaining Independence from colonialism and there have been countrywide Azadi Ka Amrit Mohatsav celebrations. This is the result of the struggle and sacrifice of

millions of brave Indian men and women. The Founding Persons of Independent India had certain objectives and ideals which are reflected in the Preamble of the Indian Constitution. One of these ideals is that all people of India shall be guaranteed justice on grounds of political, economic, and social arenas along with ensuring equal status and opportunities. Decades later today where the Indian women among other vulnerable groups continue to face challenges in access to minimum resources like safe water and unequal place in the decision-making procedure shows there is a long way to be covered for the fulfilment of the founding principles. With the increasing threat of climate change-driven disasters, water scarcity could soon be an irretrievable issue for everyone in Indian society. The recent case of 150 women in the Mangarajpur village of Odisha who revived a cyclone-hit pond and turned it into a freshwater source supports the fact that women’s constructive involvement can provide faster solutions to the issue of the water crisis in India.

It is imperative to identify that involvement of both women and men is integral to sustainable water management. Women taking the role of leadership and having equal say in the process of decision-making for the management of water resources is crucial and critical. Therefore, bringing in policies, schemes, and frameworks where women and men equally make the decision and equally contribute towards mitigating the challenge of the water crisis in India will be vital for India’s recovery journey towards sustainable water resources.



150 women in Mangarajpur received a cyclone-hit pond



Cardiovascular diseases current epidemiology & future directions in the health sector



Dr. Neelamadhab Padhy

Heart disease is one of the leading causes of death around the globe nowadays. It occurs suddenly and without any significant symptoms. Its high mortality rate causes nearly 17 million deaths worldwide [1]. Coronary heart disease could be a variety of CVD that accounts for four out of 5 CVD deaths [2]. Heart diseases are frequently used as an exchange for cardiovascular diseases. More than 75% of CVD deaths occur in low- and middle-income countries, where high blood pressure is one of the most critical risk factors for CVDs. In 2016, India reported 63% of deaths due to NCDs, with CVD accounting for 27%. CVDs also account for 45% of deaths in the 40-69 age group. Due to rapid lifestyle changes, cardiovascular disease has become common in India. Older age people are mostly affected by CVD. According to recent studies, nearly 1/4th of heart attacks are affected at 40. Stress, a sedentary lifestyle, and diseases like diabetes are the causes of CVDs. According to recent studies, In the Asian continent, CVDs are the leading cause of death. Ischemic heart disease and stroke are the leading causes of CVD deaths, accounting for more than 80% of all CVD deaths [3]. The Global Burden of Disease study estimates an age-standardized CVD death rate of 272 per 100 000 population in India, which is higher than



Mr. Siboprasad Patro

the global average of 235 per 100 000 population.

Cardiovascular diseases (CVDs) are a group of disorders of the heart and blood vessels, peripheral arterial disease, and rheumatic heart disease, including coronary heart disease, cerebrovascular disease, congenital heart disease, deep vein thrombosis, and pulmonary embolism. These diseases primarily refer to conditions defined by blocked or narrowed blood vessels, which can result in a stroke, chest pain or angina, or a heart attack. Other heart conditions, such as those affecting the heart's rhythm, valves, or muscles, are classified as heart diseases.

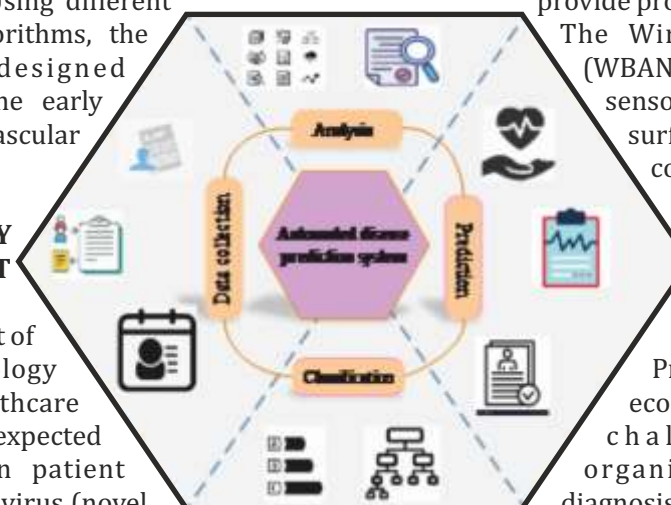
- To identify the sign of CVD in a patient's body, the patient is instructed by the physician to have a specific test termed an angiogram, blood test, blood pressure monitoring, chest X-ray, echocardiogram, electrocardiogram, stress test, etc.
- The electrocardiogram reports contain the heart's electrical activity, which is one of the standard and noninvasive diagnosis tests. This kind of test performs rapidly and efficiently, but it may miss the asymptomatic patients. It has a

limitation as a predictive tool for predicting future CVD.

- This drawback can be overcome by angiogram. An angiogram is a rule of thumb for CVD disease detection and diagnosis. But it is uneconomical and calls for specialized technical competence.
- Other than regular medical diagnosis methods, there are different kinds of computational techniques available. Using different machine learning algorithms, the researchers have designed various models for the early prediction of cardiovascular disease.

NEED FOR TECHNOLOGY DEVELOPMENT IN HEART DISEASE PREDICTION

With the rapid development of technologies IoT technology combined with the healthcare industry. Because of the unexpected and massive increase in patient numbers during the coronavirus (novel COVID-19) pandemic, it is critical to continuously monitor patients' health conditions before any severe disorder, or infection occurs. According to transferring the massive volume of produced sensitive health data of patients who do not want their private medical information revealed, dealing with IoT data security issues remains a significant concern and a complex problem. Aside from traditional diagnostic methods, numerous computation techniques, such as data mining, machine learning, and deep learning algorithms, are used for heart disease prediction and diagnosis. Aside from traditional diagnostic methods, numerous computation techniques, including machine learning, are used to identify individuals in danger. Therefore, it is essential to regularly check up on one's health and seek medical attention if necessary. Finding health advice online has dramatically increased over the last ten years due to expanding e-health applications. In the traditional approach, the health records are generated by analyzing by physicians [4]. Due to more expensive, these treatments become a barrier for the general public to receive medical care. As a result, in the modern world, people focus on e-health systems that are affordable, trustworthy, and effective. People in the modern community are starting to admire automated disease prediction systems genuinely.



AUTOMATED DISEASE PREDICTION SYSTEM

An automated system collects the patient's data remotely. Then, it performs automated analysis, clustering, and processing, and finally, it visualizes the predicted results to the concerned user. Additionally, the system can identify the required features to predict and categorize diseases. Further, the disease's high-risk and low-risk factors are to be categorized to provide proper support to the individuals. The Wireless Body Area Network (WBAN) offers this facility, where sensors are built over the body's surface to monitor people's health conditions and predict diseases earlier. These life-saving measures are unavoidable in day-to-day life with a high risk of disease [5].

Providing quality services at an economical cost is a significant challenge for healthcare organizations. Correct patient diagnosis and effective treatment are necessary for quality service. Poor clinical judgments can result in catastrophic outcomes, which are unacceptable. Such problems can be avoided by using computer-based information and/or decision support systems.

Problem Statement:

- Q1: How to monitor an accurate heart rate for an aged person?
- Q2: Can it be possible to detect heart issues at an earlier stage and inform the patient to improve their health?
- Q4: How to monitor a heart disease patient remotely the physician and alarm at a critical stage?

Remote Health Care Monitoring using the Internet of Things (RHMIoT) is becoming more popular globally. Human physiological parameters, such as blood pressure, body temperature, breathing rate, heart rate, blood oxygen saturation, and various electrophysiological signals, represent the operation of a human body and are thus useful as reference values in human health monitoring. Using various IoT medical device sensors, such parameters are collected continuously remotely through multiple sensors. IoT technology serves as a critical acquisition component for a wide range of real-time applications that encourage object-individual interaction. The massive



amount of data produced by IoT devices presents a significant challenge to the healthcare system regarding data processing, storage, and management.

In the RHMIoT system, the healthcare system gathers information from two primary data sources. Patient's physiological data, such as blood pressure (BP), heart rate, blood sugar/glucose level, respiration rate, blood oxygen, cholesterol level, activity, electrocardiogram (ECG), electromyogram (EMG), and electroencephalogram (EEG), are collected as part of routine health monitoring. These data are transmitted via Bluetooth/Zigbee to associated remote gateway devices and then to a cloud data center for preprocessing and disease prediction. The other data source is electronic clinical data (ECD), which includes the patient's medical history (including smoking and diabetes history), observation reports, and comprehensive clinical (lab) report that provide valuable information on disease prediction and are stored in a cloud database.

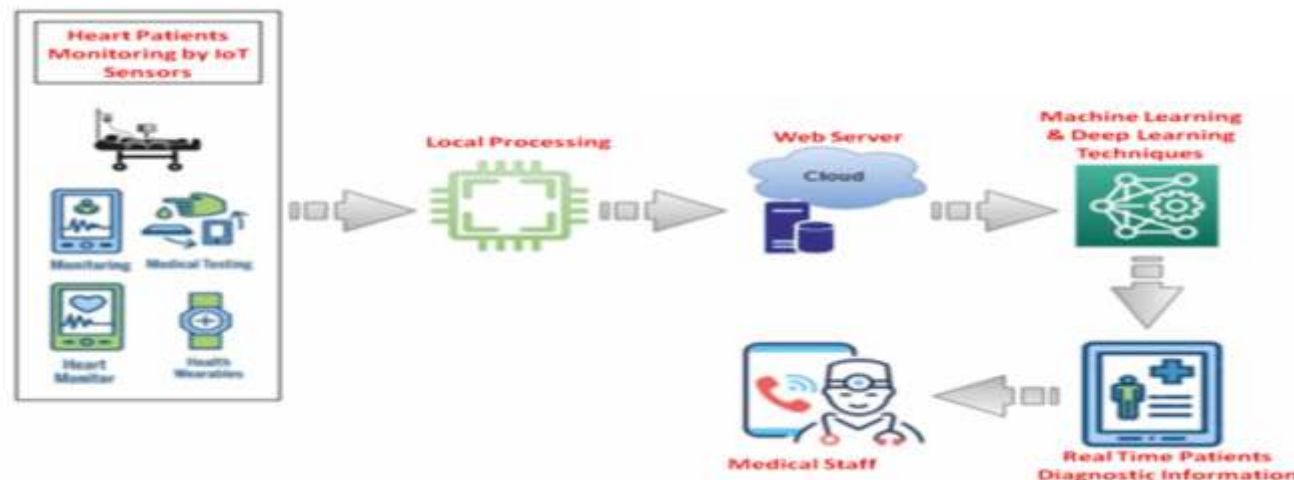
Wearable fitness trackers are devices that record and improve users' physical activity. Photoplethysmography (PPG) devices that use optical heart rate sensors to detect heart rate in real-time have recently gained popularity and assist in monitoring and controlling exercise intensity. Although research findings have highlighted the benefits of using optical heart rate monitors, the accuracy of the readouts generated by these commercial devices has not been widely assessed for different age groups, particularly for the East Asian population with Fitzpatrick skin type III or IV.

An intelligent healthcare framework for cardiac disease prediction incorporates IoT technology and various machine learning algorithms. IoT medical

sensors are used to collect the patient's physiological parameters. The collected data are sent to the cloud with encryption to make the data more secure. Before sending the data for analyzing data preprocessing and normalizing techniques are enforced. With the help of machine learning and deep learning algorithms, the system determines the presence of CVD. For categorization, an effective IOT-based modified deep learning network is highly appreciated.

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‘A Story of a Merchant’s House in Shekhawati’

Akhila Agrawal

What could be more exciting than gazing at the colorful frescos in the land of sun and sand, Shekhawati in Rajasthan as we know it. A quaint little town of Nawalgarh in the very heart of this

desert boasts of old painted havelies that take you in the past where one gets lost in the mysterious alleys and passages speaking thousands of stories from the centuries gone by.

SHEKHAWATI

Shekhawati known as open gallery museum of India lies as a triangle between Delhi, Jaipur & Bikaner. The name derives from Rao Shekha, a baron of the Kachhawaha clan of Rajput related to the rulers of Jaipur. Shekha conquered and held considerable territories in this part of Rajasthan in 15th cent. That retained and subdivided by his Heirs, the Shekhawats is known as Shekhawati.

However, by 1837 the region was under the firm control of the British. With this came the time of stability and rise of the new merchant class called the ‘Marwaris’. Gigantic mansions or havelis are testimony to the business acumen of a community that was always able, by its timely moves, to amass substantial fortunes.

Even when the trade rivalry with the British had pushed the Marwaris from Shekhawati to the port towns of Calcutta & Bombay, they never ceased to think of Shekhawati as their home land. This explains the enormous structures that they raised in nostalgia with nouveau riche pride.

NAWALGARH

Nawalgarh is one of the heritage cities in the region of Shekhawati, founded by Nawalsingh in 1737 AD. He built a fort, the Gopinath temple and surrounded the town with a fortification wall. The city prospered and quickly became the focal point of the culture in the region and is still amongst the biggest towns of Shekhawati.

Many of the better known merchant families came from here, prominent among who are the Birlas, Poddars, Murarkas, and Khandelwals. One such Marwari family was of Koolwals. The family not only added many important havelies in the town but also constructed Dharmshalas, hospitals, rest houses, johras (wells) for the needy and the benefit of the community.



THE KOOLWAL KOTHI

The Koolwal Kothi is an impressive heritage building in Nawalgarh, with its monumental façade and combination of traditional and European elements; it is a good representative of the British colonial architecture in India. It was constructed during the times of Sh. Anandi Lal Koolwal in 1924. It has a

magnificent frontage with stucco decorative colonnades and a series of rooms organised around a central hall. It deviates from the traditional courtyard house planning of the region. Stylistically also it has more stucco work with very few external fresco paintings which are otherwise typical to this region. In this respect it is very unique in its own respect.



View from KoolwalKothi



AnanadiLal Koolwal



During Restoration



KoolwalKothi :Before Restoration



KoolwalKothi : After Restoration



KoolwalKothi :Before Restoration



KoolwalKothi :Before Restoration

The main building is a two storied structure with frontal triple arched verandah openings and crowning parapets with decorative urns which is in a very renaissance element. The interiors are simple with very little decorations in the room; however, the emphasis is on bold and bright colors, and openings are extenuated with multicolor borders or floral motifs, at times emulating tile or stone wall patterns.

The Kothi is currently owned by Sh. Praveen Khandelwal, one of the descendants of the Koolwalfamily. The place was mostly locked for the last 40 years since no one from the family used to reside in the building. This neglect had led to the deterioration of the heritage building. Mr. Khandelwal decided to put the building to a better use by converting it into a heritage hotel, for not only its long term survival but also with a view to generate revenue for its upkeep.

FROM KOTHI TO A HERITAGE HOTEL



Guest Room Restored

STAMBH a specialized architectural firm for heritage restoration and planning co-owned by the author was commissioned by Mr. Khandelwal to restore and then reuse the building as a heritage hotel. A multidisciplinary team comprising of conservation architects, surveyor, structural engineer, estimator, landscape architect, hotel planners etc. took up this prestigious project.

When we started the process of building restoration we found that while overall the building was in reasonably good condition, there were however some problems within the building that had begun to jeopardize its structural integrity. Problems had also arisen mostly due to lack of maintenance and neglect like leakages in roofs; cracks were also visible in certain parts of the buildings. At places there were damages to ceilings, decorative plasterwork, and architectural elements like Jaalis, Pilasters, arches, parapets and Chajjas.

The surveys included measuring the entire site and the structures, making detailed building plans and sections along with photographic documentation. This kind of documentation of the building did not exist beforehand. After the initial survey, the building was structurally examined to document its condition; subsequently an analysis was done to establish various issues and causes of decay. The task of converting the building into a heritage hotel was quite challenging as the original building was not designed with attached toilets and adding new structures for them would have compromised with the heritage character of the building.



Lobby Restored



Restaurant Restored

Thus all intervention to the fabric of this heritage structure, especially related to reusing it as a heritage hotel with extensive service requirement, was carefully weighed through a systematic process of conservation. For this, a comprehensive conservation strategy based on minimum interventions was established, followed by specialised tasks of sensitive restoration and reuse, using methods that were appropriate for this heritage structure and sensitive to its architectural and aesthetic integrity. All the ten rooms were individually designed where one could witness the lifestyle of the Marwari merchant's family at the turn of the century.

The conservation strategy worked out remedies to improve the present condition and prevent further deterioration. Spatial analysis of the building in view of its proposed reuse as a Heritage Hotel incorporating guest rooms, facilities, services and other activities was also done. However all this was done in accordance with heritage conservation principles. The authenticity of the building was maintained by retaining the original stucco and decoration while using traditional materials and

local skills like the extensive use of lime in the restoration process.

"Today the Kothi is a successful heritage hotel run by ITC Welcom heritage, where the gracious living, charming traditions and hospitality of a Merchant's House in Shekhawati still survives



Restaurant Restored



Community-based Resource Management Practices at Heritage site of Temple of Preah Vihear, Cambodia

Prof. Divay Gupta

Keywords : Disaster Risk mitigation, Cultural Landscape, Heritage management, Community participation.

Abstract : Several World Heritage sites like that of Koh Ker and Temple of Preah Vihear, Cambodia, face several disasters periodically. Located in dense tropical forest with limited access these sites have been managed by local communities who consider these sites sacred. There is much to learn from their resource management practices, which have been integrated within the management plan and policies adopted for these sites.

INTRODUCTION

Cambodia, a small nation located in mainland South Asia, has fascinated people across the world especially since the re-discovery of its archaeological sites of Angkor in 1863 by French



General View of Preah Vihear

travelers. Historically Cambodia was a staging post along the trade route between India and China since 1st Cent AD. It is during that period that strong influence of Indian culture and religion gradually made its impact on the people of Cambodia.

Angkor Empire (834 AD-1431 AD) is considered as the glorious period of Cambodia. It is during that time the Khmer empire was consolidated and reached its peak in terms of artistic and cultural achievements. The famous temples of Angkor are a fine example of this.

The Khmer artisans were highly influenced by the Indian architecture and Hindu religious belief and the same is reflected in their temple construction. According to the Hindu Mythology the god resides in Mount Meru located to the north of Himalayas surrounded by water. Thus the Khmer temples were conceived as a mountain and the adjacent water ponds represented the water body around the temples. One such example is the temple of Preah Vihear, which represent a unique cultural landscape in the World.

Situated on the edge of a plateau that dominates the plain of Cambodia, the Temple of Preah Vihear is dedicated to Lord Shiva. Preah Vihear Temple is perched on the edge of a giant cliff, about 625 meters above sea level. It is located slightly east of the mid-section of the Dangrek Mountains in the northwest of the Preah Vihear province some 414 kms north from Cambodian capital Phnom Penh close to the international border with Thailand.



HISTORICAL EVOLUTION

Inscribed as a World Heritage site in 2008, PRASAT PREAH VIHEAR (the temple of the sacred mountain) is considered to be a triumph of art and architecture, a cultural jewel in Cambodia, with a history spanning millennia of Khmer empire. The story of Preah Vihear goes back to the 9th century, when prince Indrâyudha, son of King Jayavarman II began work on the original temple dedicated to Shiva as Shikarshwara (lord of the summit).

He installed there a portion of the great lingam from Vat Phou, Laos at Preah Vihear probably a hermitage at that time. With increased political prestige and economic growth of the Khmer empire; the temple underwent more than 300 years of construction with great deal of remodeling under subsequent Kings.

This increased patronage naturally changed the original small sanctuary into one of the greatest Khmer temples of all times. Unlike many other Khmer temples where temples were abandoned when the king who built them died, Preah Vihear received continuous patronage for more than four centuries (9th – 12thcent). This illustrates that Preah Vihear was the center of cultural and ritual network in the largest sense of term and attaches a special significance to the site as a sacred and spiritual sanctuary.

Unlike many other Khmer temples in Angkor planned concentrically, Preah Vihear, responding to the natural context, is planned in a linear progression of levels. The temple has four levels and four courtyards which comprise of five Gopuras (entrance pavilions). Each level has a different architectural character and experiential quality while one progresses towards the inner temple sanctum.

Ownership of the temple was the subject of considerable negotiation in the 19th and early 20th centuries between the French and later Cambodian and Thai Governments. Subsequently following the decision of the International Court of Justice at The Hague the Preah Vihear temple site was handed over to Cambodia by Thailand.

ARCHITECTURE OF PREAH VIHEAR TEMPLE

The Preah Vihear temple located on the height point of Dangrek is defined by steep cliffs. The southern extremity of the promontory juts out to form a natural recess that is a sacred place, commanding a vast panorama, the wide expanse of land lying to the south up to Mount Koulên, the cradle of the Khmer civilization. The northern part of the property is an almost horizontal sandstone platform, c.100m long north-south and 50m wide, which gives access to the Temple.

The Temple is composed of a series of sanctuaries linked by a system of pavements, staircases and Gopuras (gateway pavilions), over an 800- meter long axis aligned north-south axis which is somewhat unusual considering that other Angkorian temples are facing the east.



Though the part of the building is rock-cut itself, the sandstone blocks that were used were quarried locally from the site.

This temple has one of the finest in situ carving that depicted the highest standards of unique Khmer architecture.

SYMBOLIC COMPOSITION

The sanctuary opens to the sky and the mastiff projects onto the territory it dominates. To the north, the landscape is quickly blocked as if wedged against a series of hills. The staging of the site is specifically meaningful, as it has a symbolic and religious dimension. It is believed that entire mountain range of Dangrek is representative of the in the Himalayas with Preah Vihear as Mount Kailash, thus providing it with the spirituality and holiness associated with the abode of Shiva.

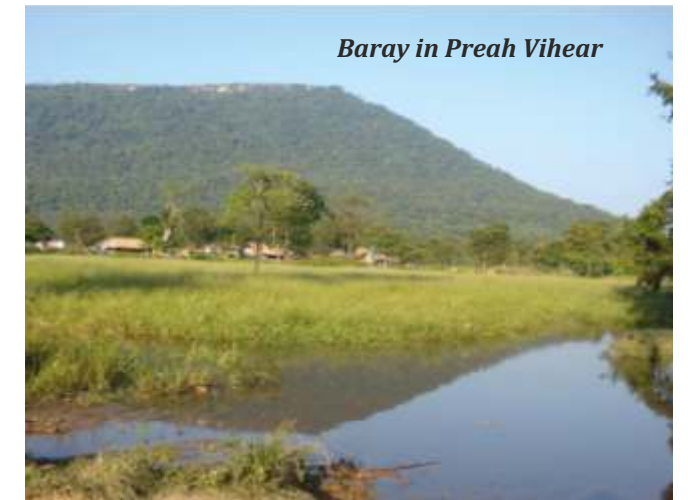
Culminating at 600 meters high, the naturally spectacular distribution of the three nearest summits overlooking the plain could have - according to some experts - recalling the beliefs of the ancient Khmers and Hindu, divine trident of Vishnu, Shiva and Brahma. Moreover the trident is also associated with Shiva as his primary weapon according to the Hindu mythology. The landscape thus seen contributes towards the symbolic value of the site and would thus be meaningful.

THE LANDSCAPE

The Preah Vihear temple is built on a rocky spur projecting to the South. The temple crowns the rocky massif dominating the plain. The view from the Preah Vihear spur opens to the south onto the plain. The panorama, opening infinitely from the site reveals the whole plain.

The panoramic view stretches infinitely to the south. It is limited to the east and west by the rocky massif framing it. The staging of the site extending the visual boundaries of the monument to the plain includes the plain landscape more meaning. The five mountains of the site can only be seen from the village of Saèm 17 km away. From 5kms, the site perception is limited to the hill of Preah Vihear.

The natural landscape of the plain is characterized by a native rainforest which in several areas has been cleared due to logging or agriculture. Beside the



historical reservoirs and barays (rectangular ponds), several other ponds or concrete reservoirs, built during the war for the troops occupying the site are scattered along the plateau.

NATURE CULTURAL LINKS



The Preah Vihear temple site represents a unique example of the integration of a temple complex with the natural landscape. It is especially significant because of the complex planning necessary to situate the temple in relation to the mountain topography for maximum effect. The architectural and artistic design with the majestic location of the temple on top of the mountain in a magnificent landscape setting reinforces its role as a supreme expression of royal power coupled with Buddhist and Hindu cosmology. The significance and greatness of the Preah Vihear site lies not only in the architectural and artistic grandeur, but also in its enduring sacredness. The



temple and its associated landscape will always stand as an important spiritual and religious site, as the abode of the Gods and a centre for faith and pilgrimage for people through the centuries. This complex is one of the largest sloping mountain architectural ensembles and has, no doubt, one of the most remarkable sites of all temples in Southeast Asia.

The Preah Vihear ensemble also consists of the functional connection between the built and natural environment. The position of the temple on the cliff edge is particularly impressive. The construction system, stairs, (which are partially rock cut), the water system and historical access surviving for over a thousand years show a sophisticated technological understanding of the Khmer builders. The stepped planning of the complex on a hill slope also required a sophisticated water management system at this tropical site. This can be seen in an elaborate network of water channels as well as a series of water ponds at different levels, providing a good source of drinking water at all levels of the hill. This hydrological system culminating into a large reservoir at the foothill.

The study and discovery of the hydrology of the site in archaeological excavations has led to the revival of this water system. This has drastically reduced the flooding of temples and has also reduced the risk of landslide at site. Moreover, revival of this water system also led to the discovery of the eastern and western barays at the foothills. Water from these barays now continues to be used for agriculture by the local communities. Considering the dual function of this nature cultural link at site the local communities take great interest in maintaining the channels in ensuring protection to the site from disasters like flooding and landslides.

The site also embodies within it some intangible heritage aspects; many traditions and rituals are performed at the site especially by the local communities. Worship is still performed at the central sanctuary and the hermitage cave at the rear of the temple. Local people put sticks in the rock under the cave in the belief to prolong their life. The sacred history and continual religious practice at the site are central intangible qualities of the Site.

MANAGEMENT & CONSERVATION OF THE SITE



Gopura



Carvings showing Sagar Mantan

After its nomination and inscription as a world heritage site by UNESCO in 2008, the Government of Cambodia and UNESCO has made concerted efforts towards the conservation of the site. To this effect the Cambodian government was established a National Authority for the protection of Preah Vihear (NAPV), largely constituting staff from the region. A management plan has been developed by NAPV with the help of Ad-hoc international experts group, with a view of long term conservation of the site. The plan proposes a framework for the effective management and conservation of the site involving local communities in a coordinated and comprehensive manner.

The management plan promotes comprehensive conservation and management of the

archaeological, architectural, natural and cultural heritage of the site. It focuses on the connections and interrelationships between historic sites within their wider context, both physical and symbolic, for example visual experiences, environmental systems and associated cultural linkages and values. The plan helps define what heritage resources are in their inclusive sense, to include built, natural and cultural heritage aspects and indicates measures to conserve, document, interpret, sustain and enhance them with minimum intervention.

An important aspect of the plan is the involvement of the local communities and local participation in the management of the site. This has led to not only retaining the spiritual quality of the site but also given socio economic opportunities to the local communities. at the foot hill an Cultural museum on



Cultural Museum



Cave Shrine

the indigenous tribes like Kui has been established, besides functioning as a repository of their traditional knowledge this centre also gives opportunity for the visitors to understand and appreciate the same. Eco-Global village has also been established to rehabilitate the displaced families by providing them with proper infrastructure and facilities and most importantly land holdings for farming.

To monitor the implementation of this plan the Government of Cambodia has constituted an Ad-hoc international experts' group. Under the aegis of UNESCO an International Coordination committee is also proposed to be set up for the conservation and management of the site. These efforts have not only help in the conservation of the site but is also bringing considerable prestige to the site and enhancing the quality of life of the local communities.

As the above examples show there are three lessons in traditional knowledge systems for today's problem related to climate change and that local communities are the real custodians of heritage sites. Thus there is a need for Integration of formal and informal management practices for risk mitigation and better conservation and management of heritage, especially in our Asian Context.

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Towards a Theory of Literature as Media in the Digital Age

Nidhi

In the Socratic dialogue Phaedrus (370 BC), Plato remarks on the usefulness of letters. Letters, says Socrates, will create 'forgetfulness' because the learners will trust 'external characters' and no longer use their memory (36). Fast forward to the inception of Google in the late 1990s and these words can be read as displaying an anxiety towards information technology. In our digital age, information is a few clicks away such that one rarely needs to jog one's memory. Moreover, information can no longer be contained within geographical boundaries.

In *Twenty-First-Century Fiction: A Critical Introduction*, Peter Boxall writes that in our present age, the "cardinal points that orient global cultures are shifting" and digital communication has produced a "new set of cultural and technological protocols for the organisation of [global] space and time" (7-8). According to Boxall, in the digital age, it is the novel which is a "vehicle for investigating this shift, and for producing new perspectival forms with which to picture the world" (7). Boxall's statement about the novel is quite generalised. However, it is worth interrogating how digitalization provides new and innovative ways of reading literature and culture.

This paper attempts to formulate a theory of literature as media in the digital age by using the arguments made by the British novelist Tom McCarthy (1969-) in the essay *Transmission* and

the *Individual Remix: How Literature Works* (2012) and their application in his two novels *Remainder* (2001) and *Satin Island* (2015).

McCarthy's arguments are supplemented by those made by Roland Barthes, Martin Heidegger, Julia Kristeva, and Maurice Blanchot in various works. The second part of the paper applies the formulated theory to a brief reading of Herman Melville's *Moby-Dick* (1851).

I

In McCarthy's *Satin Island*, the protagonist, U., is invested in writing 'The Great Report', a book that would be the "First and Last Word on our age" (56). U. is a corporate anthropologist working for a Company that deals in 'narratives', that is, advises other companies on how to "contextualize and nuance their services and products", cities on how to "brand and re-brand themselves", and governments on how to "narrate their policy agendas" (13-4). U's job is to study behavioral patterns of groups of people, collect information in the form of dossiers, and "lay bare some kind of inner social logic, which can be harnessed, put to use" (21).

'The Great Report' is one such project, except it is much larger in scope; it attempts to sum-up the human tribe in the digital age and speak its secret name (57). U. contemplates, "It was all a question of form... What medium, or media, would it [the

report] inhabit? Would it tell a story?" (73). By the end, the novel, *Satin Island*, itself becomes 'The Great Report', a trash-heap of data and seemingly unrelated information; it becomes, as McCarthy writes in *Transmission*, "a question of broadcasting technology" (sec.v).

In *Transmission*, McCarthy attempts to rethink literature "along the lines of transmission and reception, signal and noise" ("About the Book"). McCarthy writes that "we are always not just... in medias res, i.e. in the middle of events, but also simply in media" (*Transmission* sec. ii). In order to argue that literature 'works' like information broadcasting, McCarthy posits three short questions: Who speaks? Who listens? What is said? To these, one may add a few elaborate questions of one's own: What is a 'signal' and how does it travel? Is 'literary broadcasting' a simple matter of speaking and listening or are there more complex elements and processes involved? Who is a 'writer' and what is a 'text'? How does one determine the 'meaning' of a text?

McCarthy answers the question of who speaks by considering the arguments made by Roland Barthes in the essay, "The Death of the Author". Barthes writes that all writing is a "special voice, consisting of several indiscernible voices" and that literature is an "invention of this voice, to which we cannot assign a specific origin..." (2).

McCarthy calls this voice, the signal; in effect, the signal is 'narrative code' or simply, language. Barthes writes that "it is language which speaks, not the author" (3). McCarthy urges the readers to listen to "a set of signals that have been repeating, pulsing, [and] modulating in the airspace of the novel, poem, [and] play..." (*Transmission* sec. i). He uses the example of Aeschylus' *The Oresteia* (458 BC) in which the first play opens with a signal crossing space.

It is a coded signal, created by sophisticated Greek beacons comprising "elaborate contraptions with moveable parts, attendant encryption systems and so on", that contains the information that Troy has fallen (*Transmission* sec. ii). Clytemnestra, in her

monologue, emphasises the means by which the signal travels from Troy to Argos; she sketches out "the nodes and relays of a communication network" (*Transmission* sec.ii).

In 'literary broadcasting', these 'nodes' and 'relays' are the historical, cultural, and ideological frameworks that language interacts with; they are significant to the broadcasting process as language is a "manufactured, mediated and material regime in which we find ourselves, the precursor and precondition to our agency and action" (*Transmission* sec. ii; original emphasis).

A transmitted signal has to be received. This brings one to the second question posited by McCarthy regarding who listens. To answer this, McCarthy applies the concept of *Zusage* (translated as 'Saying') given by the German philosopher, Martin Heidegger. In *On the Way to Language*, Heidegger defines *Zusage* as "Saying to which the nature of language is akin" (76). Language, according to Heidegger, pre-exists the individual subject and "the word alone gives being to the thing" (62).

He writes that we speak about language but "[w]hat we speak of, language, is always ahead of us" and "we are continually lagging behind what we first ought to have overtaken and taken up in order to speak about it" (75). "Speaking," writes Heidegger, "is of itself a listening... it is a listening not while but before we are speaking" (123; original emphases). The nature of language that is revealed in speaking-as-listening is language's refusal to express itself in words such that "[w]e speak of language, but constantly seem to be speaking merely about language..." (85; original emphasis).

In McCarthy's analysis, speaking-as-listening is repetition: it requires "that time be first split up (speaking right now, I am inhabiting a previous moment, a moment of perviousness, of which the now, right now, is but an echo), then coiled back into itself in an endless feedback (speaking is listening to speaking, which, as we've just learnt, is listening - round and round)" (*Transmission* sec. iii).



This repetition takes the form of repeated acts in McCarthy's debut novel, *Remainder*. The unnamed narrator-protagonist of *Remainder* meets with an accident described in the opening lines of the book: "About the accident itself I can say very little. Almost nothing. It involved something falling from the sky. Technology. Parts, bits." (ch. 1).

In "Trolling the Global Citizen: The Deconstructive Ethics of the Digital Subject", Ben Staunton writes that the accident to which the protagonist refers "is that of his birth, of the production of a new human subject from within... communication technology of the late 20th and early 21st centuries" (66). In this new digital life, the protagonist spends his eight-and-a-half million pounds, received as part of a 'settlement', re-enacting events from his memory. He decides to purchase a building, fashion it after a location in his memory, and fill it with 'players' who would speak and behave as he would tell them to. As the novel proceeds, the protagonist becomes obsessed with repetition.

Staunton writes that the protagonist of *Remainder* is in pursuit of 'utopian communication' (67). The protagonist describes how the accident had damaged the part of his brain responsible for motor functions such that his body had to undergo a process of 'rerouting', that is, "finding a new route through the brain for commands to run along" (*Remainder* ch. 2).

The process proves to be quite complex and the protagonist desires for effortless movements where one does not have to think about them; that is, he desires a faultless 'transmission' of 'signal' from his brain to his limbs. Perfect repetition would be the end result of a perfect transmission. However, this desired utopian communication cannot be achieved because of the existence of a 'remainder'.

Talking about the settlement, he says, "The eight was perfect, neat: a curved figure infinitely turning back into itself. But then the half... I remember picturing the sum's leftover fraction... as the splinter in my knee, and frowning, thinking: Eight alone would have been better" (*Remainder* ch. 1; original

emphasis). In each of his reenactments, there are always elements that do not go as planned; they are 'remainders' that prevent perfect transmission. "[S]ignal," writes McCarthy, "ebbs away to noise" (*Transmission* sec. vi).

This brings one to the last question posited by McCarthy regarding what is said. In *Transmission*, he announces that no serious writer has anything new to say (sec. I); the writer is not an originating speaker but a listener, a "receiver, modulator, retransmitter: a remixer" (sec. vii). Shakespeare, writes McCarthy, was remixing Ovid, Plutarch, and Holinshed, and Cervantes was remixing Montalvo, Ariosto, and Apuleius (*Transmission* sec. viii). A 'text', then, is a 'remix'. Barthes describes the text as a "tissue of citations, resulting from the thousand sources of culture" (4).

In "World, Dialogue and Novel", Julia Kristeva writes that "any text is constructed as a mosaic of quotations; any text is the absorption and transformation of another" (37). Kristeva considers the 'literary word' as "an intersection of textual surfaces rather than a point (a fixed meaning), a dialogue among several writings: that of the writer; the addressee (or the character) and the contemporary or earlier cultural context" (36; original emphases). In McCarthy's analysis, the text is embedded within media and mediation such that there is a "shift from one-to-one to one-to-many to many-to-many networks in which sender and addressee are simultaneously masked and multiplied..." (*Transmission* sec. vii).

In considering the question of what is said, one must now address the question of the 'meaning' of a text. If literature is a matter of broadcasting technology, then, according to McCarthy, "it can't be separated from the topics of dismemberment and death, of loss, dissolution, vanishing" (*Transmission* sec. v). 'Utopian communication' is impossible and 'signal' always suffers the danger of ebbing away into 'noise'. In *Remainder*, this impossibility is described in terms of 'remainders'; in *Satin Island*, it is described in terms of 'buffering'. U. describes an interrupted video-call: "Her face froze in mid-sentence too. Its

mouth was open.... as though she'd lost control of its muscles following a stroke...

A little circle span in front of her, to denote buffering... a Call Ended message eventually replaced both face and circle" (9). In *Transmission*, McCarthy writes that literature needs to understand and appreciate its own 'interruptedness' and 'disarticulation' (sec. vii). He elaborates on this by using Maurice Blanchot's interpretation of the myth of Orpheus. In "Orpheus' Gaze", Blanchot writes that by looking back at Eurydice, Orpheus betrays the work, yet, paradoxically, he obeys the very demand of the work, which is "an unravelling from within through which the very content that the work purports to convey or recover becomes lost..." (*Transmission* sec. vi). In other words, the 'meaning' of the text is lost and can never be fully recovered. Barthes writes that "writing ceaselessly posits meaning but always in order to evaporate it: it proceeds to a systematic exception of meaning" (5).

To sum up, in this section of the paper, one has attempted to formulate a theory of literature as media. One has argued that language pre-exists the individual and it is language which speaks. Language is the 'signal' in 'literary broadcasting' to which one cannot assign a specific origin. It is 'transmitted' via 'nodes' and 'relays', that is, via historical, cultural, and ideological frameworks. The signal is 'received' in the process of speaking-as-listening which is also repetition. A writer is a 'remixer' and a 'text' is a 'remix' of signals which are never perfectly repeated as 'utopian communication' is impossible; the signal ebbs away to 'noise' and 'meaning' of a text is lost.

II

The best way to test the claims of a literary theory is perhaps to apply it to a reading of a text. In this section of the paper, the formulated theory is applied to a brief reading of Herman Melville's *Moby-Dick* (1851), a novel that itself poses a challenge to its readers. The narrator of the novel, Ishmael, remarks, "I but put that brow before you. Read it if you can" (387). He also warns against an allegorical reading of the novel; he says, "So ignorant are most landsmen... they might

scout at *Moby-Dick* as a monstrous fable, or still worse and more detestable, a hideous and intolerable allegory" (227).

The novel, it must be noted, is prefaced by about eighty extracts (or 'signals') from different sources on the topic of whales. These are collected by Ishmael who is, from the beginning, established as the 'writer' of the text. Ishmael informs the readers that he has perused both libraries and oceans and has taken upon himself to "project the draught of a systematization of cetology" (146). *Moby-Dick* is a fictional narrative interrupted by non-fictional narratives about whales and whaling. One can argue that *Moby-Dick* is a 'remix' and Ishmael, its writer, is a 'remixer'. Ishmael says, "[I] hereupon offer my own poor endeavors. I promise nothing

complete... I am the architect not the builder" (146; emphasis added). In refusing to call himself a 'builder', Ishmael denies being the originating speaker. Instead, he chooses to be an 'architect', one who builds using available material, a 'remixer'. Furthermore, about his research, he says, "But I must be content with... a concluding illustration... that these marvels (like all marvels) are mere repetitions of the ages... Verily there is nothing new under the sun" (233; emphasis added).

This remark finds an echo in one's theorizing of a text as a 'remix', a collection of repeated signals that are 'transmitted' via historical, cultural, and ideological frameworks (in this case, the narratives about whales and whaling are collected from literary, scientific, and religious discourses across ages). These repeated signals, one has noted, are never perfectly repeated; Ishmael, therefore, promises "nothing complete" (146).

Moby-Dick, as mentioned above, is an interrupted text where the fictional story of Ahab's hunt for the White Whale is interrupted by Ishmael's scholarly articles about whales and whaling. Does the text have a 'meaning'? If it does, then, does the 'meaning' lie in Ahab's story or Ishmael's scholarly articles? For Ahab, the White Whale is an allegory of all evil; Ishmael says that the White Whale "swam before him



[Ahab] as the monomaniac incarnation of all those malicious agencies... [t]hat intangible malignity which has been from the beginning; to whose dominion even the modern Christians ascribe one-half of the worlds..." (202).

However, as already mentioned, Ishmael warns against such an allegorical reading of the text. In fact, the purpose of the prefatory extracts and the scholarly chapters is to highlight the diversity of whales as against Ahab's reductive allegorical reading. Ahab, it must be noted, is also associated with 'dismemberment'; his ivory leg, lost in pursuit of the White Whale, is fashioned out of the jaw of the sperm-whale. Is 'meaning', then, to be found in Ishmael's scholarly research? At a point in the narrative, Ishmael remarks, "But in pursuit of those far mysteries we dream of... they either lead us on in barren mazes or midway leave us whelmed" (264). Therefore, 'meaning' in Moby-Dick is associated with reduction, dismemberment, and loss. In the latter part of the text, Ishmael acknowledges the 'disarticulation' of the text; he says, "Dissect him [the whale] how I may, then, I but go skin deep; I know him not, and never will" (422).

In conclusion, in this paper, one has attempted to formulate a theory of literature as media in the digital age using the arguments made by Tom McCarthy, Roland Barthes, Martin Heidegger, Julia Kristeva, and Maurice Blanchot in various works. One has also applied the formulated theory to a brief reading of Herman Melville's Moby-Dick in order to test its claims. The premises of this theory, like that of all theories, are neither absolute nor complete in themselves; they have the potential of being extended and contested. However, this analysis highlights how digitalization indeed offers new and innovative ways of reading literature and culture.

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Can we become future ready?

Charu Jain
Sakshi Saxena



"The vast possibilities of our great future will become realities only if we make ourselves responsible for that future." ~ Gifford Pinchot

Introduction

The future is such a time which is ahead of us therefore unseen and unpredictable. Many of the future concepts we read in books and watched on screens, a few years ago, are now a reality. The future is approaching us at a very fast rate. We are experiencing technological advancements at an

exponential rate. Every day, we can witness some new discovery being made somewhere on the earth. There are many prevalent theories and concepts that can help us predict a certain trend as what we have thought of and witnessed from years. However, with the recent corona pandemic, it was made clear by the universe that no plan is final in this world.

The years 2020 and 2021 were enlightening for populations all around the globe. Everything transformed overnight due to and along with the



pandemic of Covid19. Our well-established healthcare systems collapsed in no time. People were dying due to shortage of ventilators and oxygen cylinders. The average life expectancy dropped suddenly on the universal scale. All this led to newfound issues and solutions. We adapted to changes which we could never think of before: Governments announcing sudden lockdowns, offices and schools running from home, mask mandates, social distancing and many others. There was a major economic setback globally as everything seemed to pause indefinitely. Many jobs became “nonessential” and disappeared overnight.

We now constantly hear stories which we could never think of before: extreme weather conditions, excessive flooding, frequent storms, earthquakes, wildfires, air pollution, water pollution, many species on the verge of becoming extinct. The world is becoming so uncertain that every day seems like a continuous challenge.

How can we make future plans in this age of everyday shocks? How can we be at peace with our present in this constantly changing world? How can we be hopeful about the future when we cannot predict what will happen in the next fortnight?

Perhaps this is the right time to rethink and restart with the basics. There are signs everywhere in front of us which we neglect and deny seeing due to negligence. Let’s start making ourselves equipped for the future and become optimistic managers of change. This article will focus on ways to build self-confidence in how much influence we have to determine the way the future will turn out to be as well as to make us equipped to face and accept the changes with a positive attitude. It is much more than predicting the future. It is also about creating a future which we all desire: healthy, happy, sustainable, crime proof, more unbiased. We can sow seeds of imagination in millions of people who will make this world a better place to live.

Signs of the future



Time travel

Recent time travel excursions as described by NASA and other organizations. In 2009, Stephen Hawking, the world-famous scientist held a party for time travelers at his residence and to enhance the twist he sent out the invites a year later, justifying that one can travel into the past easier than traveling in the future. News articles like “A TIK TOK user claiming to be a time traveler has shared a bizarre clip purportedly showing the final of the World Cup, including the teams and score.”

Change in generational behaviour

GenZ, millennial etc. Changes in gender norms and worldwide acceptance of third fourth and fifth gender. For example- nonbinary, bisexual etc. In the midst of a severe socioeconomic change, Gen Z is reaching adulthood. What impact will the epidemic have on the beliefs and expectations of society, governments, and corporations when members of this generation mature and become future leaders, customers, workers, and voters. It looks as if Gen Z were in charge, what would they change? To succeed in the world after the pandemic,



business leaders need to pay attention to these ideas.

Social changes

Every society has undergone change over time. We all acknowledge that change is inevitable and that it has already occurred. Social change, according to sociologists, is the transformation of cultural and social institutions as a result of changes in human interactions and relationships. These alterations take place gradually and frequently have significant long-



term effects on society. Social movements in support of civil rights, women's rights, and LGBTQ rights have contributed to well-known examples of this type of transformation. As a result of these social change movements, relationships, institutions, and cultural standards have all changed.

Built environment

Future chances will be abundant owing to technology improvements. Given that shelter is one of humanity's most fundamental needs, architects and planners will always be needed if human life exists. The demand for designs, urban planning, architectural building, and property development will constantly outpace the number of people available to carry out the same activity, hence there will be a need for architects in the future. The younger generation who desires to pursue architecture may need to completely prepare themselves with a comprehensive skill set and stay up to date on current trends to build a position for themselves in this future competitive business. A significant amount of money has been made and generated by architecture.



However, As the epidemic has already shown, remote and digital working can be advantageous and timesaving for architects, working methods are expected to evolve in the near future. The recruitment process for architects will likely be conducted entirely online in the future, with client meetings occurring almost constantly and employees primarily being thought of as avatars.

Looking for Future Clues in the present

William Gibson, the science fiction author rightly said "The future is here, it just has not been uniformly distributed"

There exist many clues of the future, in the environment around us which we tend to overlook, out of our habit of neglecting things. In order to see the clues, we need to evolve a way to focus on our surroundings; even if something seems a little weird. We have to be continuously trying to understand the strange things which make us wonder.

Rather than always noticing the expected things, information and scenarios, we need to train our brains to see the clues or signals which are strange at first sight. These signs of change are a sample of how our future will be like in the next 10 or 20 years from now. You must be wondering "what are these clues like" but I promise once we start this exercise, we can see the world full of such things. When we watch news, social media and stuff on the internet, there are many instances in which we counter these clues. Some of the clues which we all would have noticed are:

Drones: Although drones have an apparently partial usage in the present world, they can transform our life significantly in the future. People will be using drone camera's aerial recording to document injustice and safeguard human rights. They will capture footage of protests, even genocide without someone risking his or her life to capture it. But a world full of drones will be disastrous, invading

every person's private life and also creating a lot of chaos universally. The terms like "drone infrastructure" and "drone surveillance" and even "sky media" can become common like "social media". Who would have imagined 15 years ago about the key role "social media" could play in the future.

Climate Change: All of us already know that the habitable land is reducing due to climate change and people are forced to migrate due to this. There will be less habitable land in the future. Approximately 20 million people had to leave their home in the last decade. So we will have to learn to live in a smaller area than we are used to.

AI and Tech giants : Early adopters alter the rules of the game with each new technology (e.g., Grewal 2019). Take Amazon as an illustration: In implementing a variety of technological breakthroughs, it sets the bar high. Robotic technologies are used in its fulfillment centers to support employees, boost productivity, and save expenses. Drone delivery is something that Amazon is actively testing (a service it calls Prime Air). Additionally, it leverages AI to create and maintain its advanced personalized recommendation system, is renowned for its predictive analytic capabilities, and has created a unique, patented one-click ordering method.

Across a wide range of application contexts, including not only healthcare but also driverless cars (e.g., Tesla, Waymo), commerce, customer service (e.g., the Pepper robot), and so forth, AI is becoming more powerful to address marketing and commercial concerns (see Table 1 in Davenport et al. 2020). Davenport et al. (2020) provide an AI paradigm that emphasizes its usage for task automation in the near and medium run, primarily for standardized, rule-based jobs, to help us better grasp these advancements (Davenport and Kirby 2016; Davenport and Ronanki 2018).

IPT/ Intermediate public transport: Similar to how ride-sharing companies like Uber and Lyft have

transformed the traditional taxi and limousine sectors, these businesses also offer new job opportunities and give customers more control over their travels. Such revolutionary changes also strongly rely on the technology at hand, such as geofencing and social media rating capabilities. Autonomous vehicles, one of the upcoming alternatives, are likely to disrupt the ride-sharing market and ultimately the entire transportation sector. To benefit consumers and corporate clients, Waymo (Google's self-driving car), Tesla, and Volvo are competing to unveil the first driverless test cars. Looking at the above scenarios, we can notice that these are the clues which are already in the present and we can predict their future possibilities. So the future is not unimaginable, it just needs our attention to see it. We will have to train our mind to think that it is a possibility in future. With their unprecedented effects and unanticipated repercussions, these technical advancements and the ensuing applications and solutions force marketers to stay ahead of the learning curve.

When we start noticing these signs, a sixth sense will automatically develop in our brain; for noticing how life and our society could alter in the coming future. This will eventually become a habit and will urge us to take immediate steps today.

Some tips and tricks to make us more prepared for the future : Excerpts from studies by future researcher



Here, we will discuss some of the tricks suggested by renowned future researchers at the Institute of the future. These tricks are so simple and interesting that they can be easily practiced by even 10 year old kids. So let's begin

Predicting the past

Think about a choice or decision you made last week or even yesterday and also think what if you had done that differently. For example, I went to my office in the morning yesterday but if I had a choice to not to go to the office and go to the airport instead, where would I have gone? How would my today be different in that case? . It can also be a major decision like "what if I had not married my partner?" or " what if I had not taken this job". How would my present life be different in that case?

This thinking is a little exercise which is called "predicting the past" It allows us to see that our present moment could be different if we had made some different choice some years ago. Also it makes us believe that present is not inevitable, we had shaped it through the choices we made. In the similar way, future is also not inevitable; we can shape it by the choices we make today.

This habit makes it easier for us to imagine that in the future, we can be doing something different than today.





Becoming aware

Make a promise to yourself to give only five minutes per week to observe any different sign. A fixed day will be better to remember it; such as calling it Hints Friday.

It can be as easy as quickly going through the news or twitter browsing. Or you can just type “future of” anything which comes to your mind instantly; like it can be “future of homes” or “future of cars”. Other words can be like “new”, “surprising”, “creative”, or “trending”.

Another step would be a little analysis of that sign by asking some questions, such as

1. What type of change is it?
2. What is the reason behind it or why it is happening?

Remembering the future - “taking a one year trip”

Suppose you imagine that one year from now, you are doing something we love to do with the person you love at your favorite destination. Every time you imagine yourself, doing something that you've never done before, it becomes a memory in your mind. Because a memory is created in your head, the event will seem realistic, and also possible.

As the impossible is hard to imagine, this simple exercise will turn impossible into possible. Just try it and feel it; You will indeed be able to control the future..

Conclusion

There will always be many challenges as well as opportunities ahead of us in the coming future. Each one of us will be having a role to play in the forthcoming period. Are you now more ready to face the time ahead?

We all have capacity and potential to utilize our knowledge, talents, skills and numerous experiences; to build a future in which we desire to dwell. If you wish to make a better world for yourself and other people in the future; keep practicing the methods, tips and tricks explained above and you will see that you will be living in the future which you imagined. It will seem as if you have created the world which you imagined. Let's always be optimistic and cherish our present as well as the coming future.

There will be a lot of new discoveries and inventions but we need not to bother thinking about it. May what will happen, indeed it will be a great time to be alive. We can always be creative in experimenting with different future scenarios and it will help us to live more happily, generously and meaningfully in the future.

“Any useful statement about the future, should at first seem ridiculous”

Jim Dator

An insight to nature-inspired swarm optimization algorithms



Prof. (Dr.) Suresh Ch. Satapathy



Dr. Junali Jasmine Jena

Heuristics are the practical approaches to solve a problem by using past experiences. Meta heuristics are the heuristic approaches that are not problem specific rather generalized algorithms that can be used to solve varieties of real world problems and hence they have found wide range of applications in the field of AI.

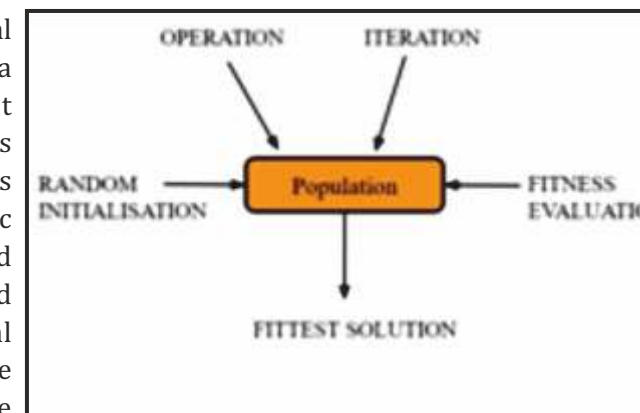


Fig. 1. Working of Swarm Optimization Algorithms

Many real world problems are found to be unsolvable by computational or mathematical modelling. In such problems, meta-heuristics like swarm optimization approaches can be used for finding near optimal solutions because they are intelligent algorithms which follow randomized or stochastic approach to find solutions.

Swarm optimization algorithms are group of such meta-heuristics which are inspired from problem-solving mechanism of various organisms, especially in a group, found in this planet e.g. birds, ant, bacteria, humans etc. Relating this nature inspired mechanisms to solution methodology of complex or critical problems is very interesting to study and analyze.

Swarm optimizations use a population formed of possible solutions and gradually modify them to perform the stochastic search for optimal solution to the problem. First the population is initialized randomly. At each step various operations are performed upon the population. These operations varies from algorithm to algorithm as they are based on the group behavior shown by a particular category of species to solve a problem e.g. group of birds



searching for food, group of ants going in a straight line etc. Then the cost function is used as a measure of fitness. This cost function is estimated based on the problem and how the correctness of the solution to the problem can be measured. Based on the fitness, the initialized population is either modified or selected for next iteration.

Various repetitions or iterations are carried performing the same procedure to search the solution space with the objective that in every iteration we are moving nearer to the solution. The same operations are repeated until stopping criteria is met. This stopping criteria is decided based on the problem. Figure 1, explains the basic working principle of swarm optimization algorithms. The solution obtained after the stopping criteria is met, is not the best solution always, but an optimal solution, whose optimality can be increased, by modifying the control parameters, according to the complexity and scalability of the problem.

One of such nature-inspired swarm optimization algorithm is Social group Optimization (SGO) algorithm proposed by Satapathy & Naik in 2016, which is based on the social behavior of a human to solve complex problems. Each person represents a candidate solution empowered with some information that has an ability level to solve a problem. The human traits represent the dimension of a person that represents the number of design variables of the problem. This optimization algorithm goes through two-phase: Improving Phase and Acquiring Phase. In improving phase each individual's knowledge (solution) level is improved based on the best individual

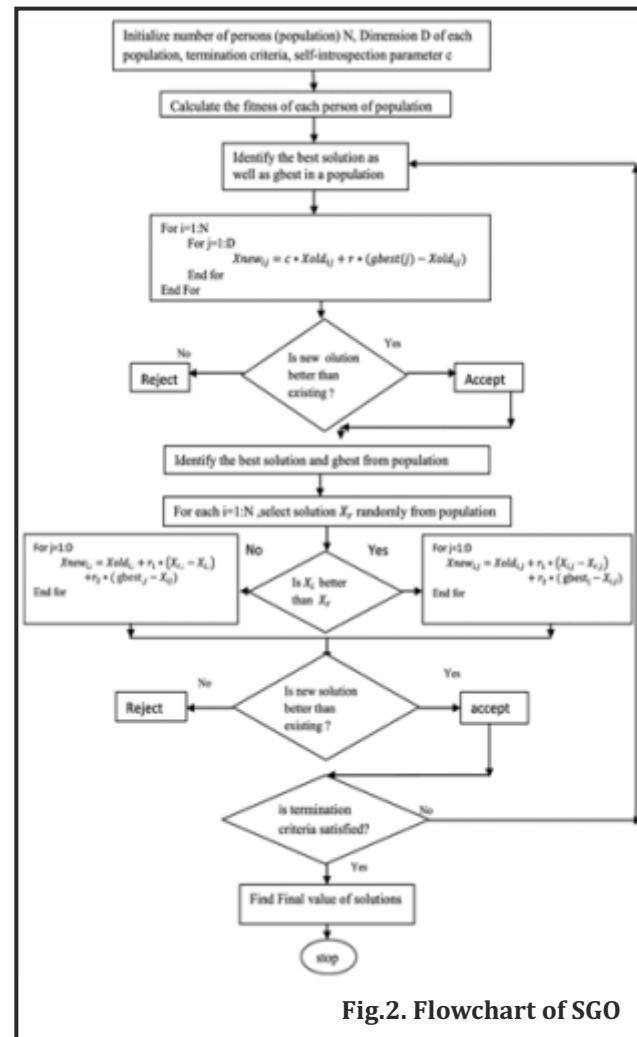


Fig.2. Flowchart of SGO

influence and in the acquiring phase, each individual's knowledge (solution) level is improved by mutual interaction between individuals and also with the best person which one having highest knowledge level and the ability to solve the problem under concern. Flowchart of the SGO algorithm is provided in figure 2.



Fog Computing

Dr Prasant Kumar Pattnaik

INTRODUCTION

Fog computing is a dedicated computing environment wherein some services with

some utilities are handled at the network portion in a smart device. Fog computing is a model which proctors the data and assist to the find an unauthorized access. The imagery of fog computing was presented by CISCO Cloud Index (2013-2018), as an outcome the applications can run on billions of devices attached with the network. Fog computing involves a compact geographical spatial arrangement of network and ply a property of location access. The new Internet of Things (IoT), has a solid range of "smart" gismo and entity (e.g., wearable) are, at present, adjoining to the Internet, bring forth high magnitude of data in every unit of time in seconds. In the IoT domain, the important word "thing" could be everything, pertaining to anything that can link to a network and the group action of data over this network with other stakeholders (like e.g., users, peers, and also the applications). So, Cisco Internet Business Solutions Group (IBSG) figuring that close to 50 billion devices (i.e., things) that will be attached to IoT networks by 2022, and thus do work with the cloud. After this gained some popularity, IBM, coined a similar term in 2015 called "Edge Computing".

BACKGROUND OF FOG COMPUTING

The time period for fog computing turned out to be coined with the useful resource of using Cisco in January 2014. This have become because of the truth fog is referred to as clouds which are near the floor with inside the identical manner fog computing became associated with was the nodes which might be gift close to the nodes someplace in among the

host and cloud. This was intended to bring the computing capabilities of the system closer to the host machine. After this gained some popularity, IBM, coined a similar term in 2015 called "Edge Computing". The aim of fog computing is to apply a processing unit co-located with the data generation device to perform as much processing as possible sending processed data instead of raw data and bandwidth requirements to be mitigated. Another gain of processing domestically instead of remotely in that processed information is greater wished via way of means of the equal gadgets that created the information, and the latency among input and response is minimized.

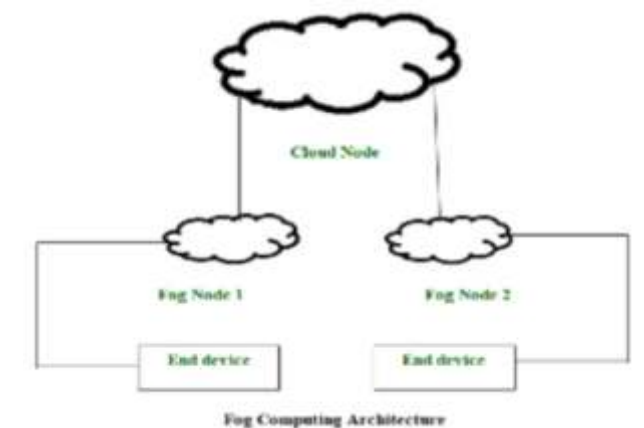


FIGURE 1 – FOG COMPUTING

Fog computing is a completely latest inclusion with inside the area of computing paradigms. In this section, the evolution of Fog computing and its variations with the contemporary computing paradigms are shown in figure 2.

The perception regarding distributed computation has been continuously updating since its origin. As a consequence, distinctive computing paradigms primarily based totally on dispensed computation



have emerged. In 1967, Cluster computing become first added wherein a fixed of computers, tightly coupled with each other through Local Area Network (LAN), work together like a single system to perform the same tasks. In most of the cases, these cluster computers are homogeneous, and they are controlled and managed by software running on a specific entity within the cluster. The further expansion of Cluster computing is made in form of Grid computing during early 1990s.

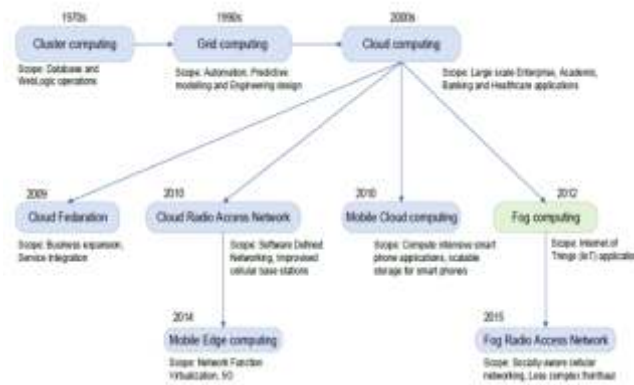


FIGURE 2 – EVOLUTION OF FOG COMPUTING

It connects computers and clusters from different administrative domains to process non-interactive workloads. The computing components in Grid environments are loosely coupled, geographically dispersed and heterogeneous. They are managed in decentralized manner and set to perform different tasks. At the beginning of 2000s, Grid computing is improvised to Cloud computing that offers not only infrastructure services but also platform and software services as utility over the Internet. In Cloud environments, remote data centers host virtualized computing resources, and a centralized system manages their operations and ensures their on-demand access to users. Unlike Grid and Cluster computing, Cloud computing is widely adopted in numerous domains including industry, healthcare, education and research due to its service oriented architecture, high resource availability, scalability, guaranteed services and location..

THREE TIER OF FOG COMPUTING

Fog computing, additionally fog networking or fogging, is described as a pretty virtualized platform that provides software offerings, and network community offerings at the edge of the network, closer to the IoT things. Fog nodes act as middleware and are placed between things and cloud layers. Fog computing is similar to cloud computing, it give quite a few software services, including, large data processing and data analysis with closer storage. However, fog is expected to deliver these services faster, more securely, and more reliably than clouds due to its proximity. The fog layer consists of large, geographical dispersed fog nodes, located at the edge of the networks. Each fog node is equipped with on-board computational resources, data storage, along with network communication facilities to bridges things and cloud within the IoT network.

It is worth noting that fog computing is not a replacement for cloud computing but is a complement it which introduces to lower bandwidth burden along with reducing transmission and processing delays. Fog computing offers an opportunity to improve the cloud storage, networking and computing competencies of the cloud, enhancing its role from the end- point perspective. In general, fog computing can support, operate, and promote services that are not appropriately served by the cloud due to cloud proximity, such as, (i) services that are susceptible to delays (e.g., online games); (ii) geographically dispersed offerings (e.g., pipeline monitoring); (iii) offerings that calls for mobility help with excessive velocity connectivity (e.g., related vehicles); and finally, (iv) offerings in huge scale distributed control systems (e.g., smart grid).

Fog computing is customized to have interaction with the extraordinary forms of sensors and actuators, consisting of camera, wearable, environment sensors. On the aspect side, fogs immediately talk with matters to build up the records through wireless communication connections interfaces (e.g., Zigbee, LoRa). On the



FIG 3 – THREE TIER OF FOG COMPUTING

alternative side, the fogs are interconnected with clouds to leverage the wealthy features and services of the cloud.

CHARACTERISTICS OF FOG COMPUTING

Fog computing has many characteristics, . They are as follows –

- ⊙ **Non uniformity:** Fog Computing is a highly virtualized platform that return compute, storage, and networking services between end devices and traditional Cloud Computing Data Centers, typically, but not selected at the edge of network. Compute, storage, and networking resources are the building blocks of both the Cloud and the Fog.
- ⊙ **Edge position:** The beginning of the Fog may be derived to early proposals to support endpoints with well-fixed services at the edge of the network, including low latency applications (e.g. games, video streaming, and augmented reality).
- ⊙ **Geographical arrangement:** In comparison to the more centralized Cloud, the services and use by Fog need a distributed deployments. The Fog will show spirited utility in handling over heavy first-rate streaming to unsteady vehicles, through agent aboard route and artifacts.
- ⊙ **Large-scale sensor networks:** To bring out the information of the surroundings and the Smart Grid used as built-in distributed systems,

requiring distributed computing and resources for storage..

- ⊙ **Mobility Support :** Many Fog communicate directly with mobile devices, so it is important to detached the host ID from the physical object ID and assist mobility practical applications.
- ⊙ **Real-time interactions :** Fog utilize real-time phenomenon rather than batch processing.
- ⊙ **Interoperability :** Various providers want to work collectively to reinforcement a specific service (streaming) that needs the handshaking of various providers.

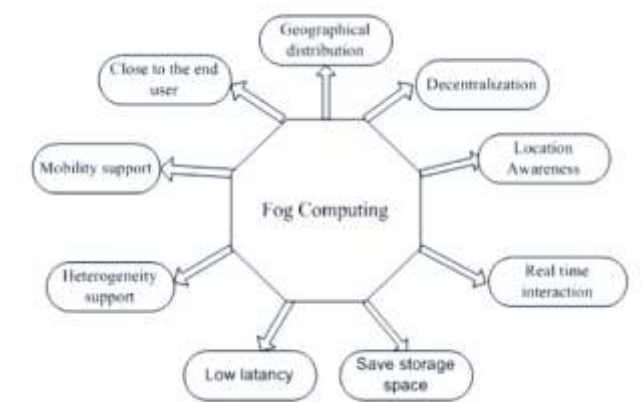


FIG 4- CHARACTERISTICS OF FOG COMPUTING

ARCHITECTURE OF FOG COMPUTING

The Architecture of for computing shown in fig.6.
 ⊙ **IoT Sensors** – IoT Data streams are consist of



signal values emitted by sensors.

- ⊙ **IoT Actuators** - Actuators are generally prepared to respond to changes in environments that are captured by sensors.
- ⊙ **Fog Device** - fog devices are capable to host application modules. Fog devices that communicate through sensors to the gateways.

In addition the architecture defines three main services for Fog and IoT environments that are describes below:

- ⊙ **Monitoring Components** - monitoring components keep record of the applications and services deployed on the infrastructure along with the availability of sensors, actuators, fog devices and network elements. Monitoring components provides this data to any other available services.
- ⊙ **Resource Management** - Resource management includes application level QoS constraints so that wastage of resource is Minimum.
- ⊙ **Power Monitoring** - Fog computing includes a heavy number of physical and logical tools with non homogeneous power use , making energy management is not easy to attain.

APPLICATION OF FOG COMPUTING

The followings are some applications of the Fog Computing

- ⊙ Smart grid - Smart grids comprise

communication lines, substations, transformer etc Smart grid offers an noticeable energy distribution where thousands of smart meters are fitted in the customer home. fog collectors are used to collect process and clean information noise locally and store the data into cloud.

- ⊙ Health care system - Health care aids and programs are the receptive and not to be disclosed facts of the patients. The recorded information consists of highly sensitive and personage data. Likewise, location information can be sensitive in some circumstances. Say example in telehealth and telemedicine applications. Fog computing shows significant role in emergency service associated with medical resources, ambulance transportation to patient files.
- ⊙ Augmented reality (AR)-Augmented truth is the facility to enclose the virtual and digital issue into the real world. AR applications needs device and programs in real-time video frames includes voice, sensors, and content at the display section of device with processingtime within several milliseconds. For that reason, fog computing include augmented reality systems that help to provide better performance and minimize the processing time
- ⊙ Traffic control system -Smart lights that act as fog devices synchronize with green traffic

signal and communicate a caution signal to near by vehicles. Traffic control system is helpful in, accident preventions, continuation of stable traffic and gathering of data to estimate the performance of the system.

- ⊙ Video streaming system - In fog computing video streaming application allows mobile users to watch the recent video available on screen. The role of fog computing in the efficient processing and quick decision making is very important. For example, subsequently many targets in a drone video stream, explained in where the live video stream is going to nearest fog node instead of sending to the cloud application. Like cloud computing, fog computing also gives services to the end users with data processing.

HOW DOES FOG COMPUTING WORK

Fog networking complements doesn't replace cloud computing; fogging permits short time period analytics on the side, at the same time as the cloud plays resource-intensive, longer time period analytics. Although side gadgets and sensors are in which facts is generated and collected, they from time to time do not have the compute and storage sources to carry out superior analytics and device gaining knowledge of tasks. Though cloud servers have the strength to do this, they are regularly too a long way away to procedure the facts and reply in a timed manner.

In addition, having all endpoints connecting to and sending unknown facts to the cloud over the net could have privacy, protection, and legal applications, especially whilst managing sensitive facts concern to rules in special countries. Popular fog computing packages encompasses smart grids, smart cities, smart buildings, vehicle networks and software-defined networks.

EXISTING SYSTEM WORKING

Cloud computing has furnished numerous possibilities for enterprises who are presenting their users a range of computing services. Currently, "pay-as-you-go" Cloud computing turns into an vital important opportunity towards owing and

managing private data centers statistic facilities for users who are facing Web applications.



FIG 7 - EXISTING SYSTEM

ISSUES WITH EXISTING SYSTEM (CLOUD COMPUTING)

- ⊙ Existing data protection mechanisms like encryption they failed in securing data from the attackers.
- ⊙ Bandwidth is needed for transmitting and processing of data
- ⊙ High Latency.
- ⊙ This will take some time.
- ⊙ Response is slow.

ISSUES OVER COME BY FOG COMPUTING

- ⊙ The security of encrypted data was improved later on as it stays closer to end- users.
- ⊙ Movement of data is reduced across the network.

CONCLUSION

The Internet of Things has certainly become a reality. IoT is rapidly becoming widespread so IoT is a trend that promises a substantial economic and scientific value for industry and academia in the upcoming years. However, the expansion of the IoT and its technological nature poses somechallenges such as data handling and resource management to the current network paradigm to cloud computing due to the tremendous amount of data that are generated every second or even millisecond. Fog computing benefits services in multiple domains, including Smart Grid, ireless sensor networks, Internet of Things (IOT) and software defined networks (SDNs).

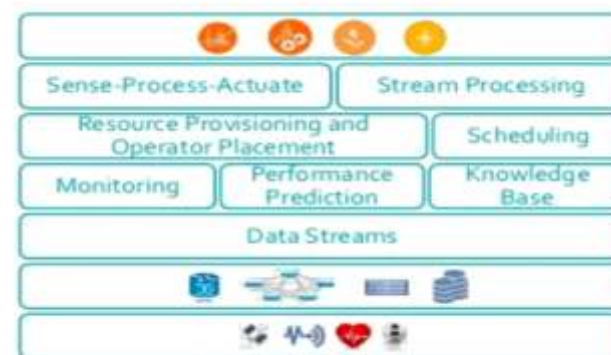
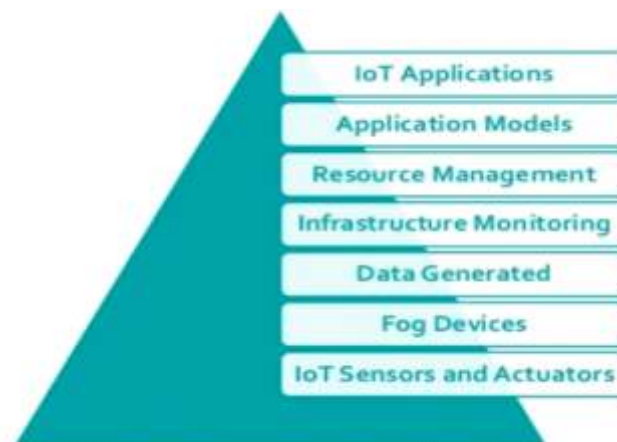


FIG 6 - ARCHITECTURE OF FOG COMPUTING



Srinivas Ramanujan

Sudarsan Nanda

Srinivas Ramanujan was born on 22nd December 1887 in a poor priest family at Arode in the Tanjore district of the then Madras presidency. He started his education in a village primary school at the age of five in the year 1892 and then shifted to a high school after two years in the nearby town. In 1897 Ramanujan stood first class first among all the students of his district and got half-free ship from his school.

Ramanujan was a great genius and this was evident from his childhood. He was always thoughtful, calm, sober and hardworking. One day, in the arithmetic class, teacher was explaining that when a number is divided by itself the quotient is one and the remainder is zero. Ramanujan, after listening to the teacher, suddenly asked him whether this is true if zero is divided by itself. This was the first evidence of his insight and depth in mathematical reasoning. During his early school days Ramanujan had command and authority in Arithmetic, Geometry, Algebra and Trigonometry. When in high school he borrowed Loney's Trigonometry from a college student and solved all the problems from that book without the help of any one; he also provided independent and alternative proofs of some theorems appearing in the book and also discovered some new results. When he used to get up from the bed, he used to write some results and formula in his notebook and used to supply the proofs of some of those later on. He had a great memory as well and used to remember the rational representations of irrational numbers like $\sqrt{2}$, e , π etc. up to any number of places after decimal point. In his later life besides many great mathematical discoveries he provided formula (infinite series representation) for calculating the value of π .

After completing High School in the year 1903 he was admitted to the College in the same town. At that time he came across the book 'Carr's Synopsis of pure mathematics and he was very much impressed with it. During his college days he neglected all the subjects except mathematics and failed in FA examination (which is equivalent to intermediate or higher secondary of these days). He got married in the year 1909 and was in need of a job. He neither had any qualification except, high school nor anyone to recommend him and thus it was difficult for him to get a job. During 1910 he incidentally met V. Ramaswamy layer, who was the president of

Indian Mathematical Society and Deputy Collector of Ramanujan's native town. Mr. layer was kind enough to arrange a clerical job for Ramanujan.

Mr. Ramaswamy layer was himself a great mathematician; he became curious and interested to go through the notebook of Ramanujan. He was greatly impressed with the mathematical works of Ramanujan and thought that a great talent will be spoiled if he continues as a clerk. Hence Mr. layer recommended him to the principal of the nearby college Mr. P.V. Sesu layer and the collector of Nalore Mr. Ram Chandra Rao. Mr. Rao supported Ramanujan for sometime to enable him to continue his mathematical research; his effort to arrange some long-term fellowship could not be successful. Finally Ramanujan again joined as a clerk in Madras Port Trust on 9th February 1912 and he did not neglect his mathematical work. The first research paper of Ramanujan entitled 'Some Properties of Bernoulli Numbers' containing outstanding results was published in the 'Journal of Indian Mathematical Society' in the year 1911 and two other notes in the related subject were published in the same journal in the following year 1912. Because of these three publications, Ramanujan drew the attentions of all the mathematicians of our country and many mathematicians all over the world. Many of his friends advised him to contact and have correspondence with the great mathematician G.H. Hardy.

Finally Ramanujan decided to correspond to G.H. Hardy. He wrote the first letter to Hardy on 16th January 1913 which his friends helped him to put in English. It contained 120 theorems, 15 of which are presented in Appendix I of this article. Hardy was very much impressed with this, he arranged fellowship for Ramanujan in the month of March same year to enable him to do research in Trinity College, Cambridge. But Ramanujan being from a conservative family did not agree to proceed to England. Soon after this the Head of Meteorological Department of India and the Chairman of Madras Port Trust arranged a fellowship for him to do research. Ramanujan resigned the job and engaged himself in mathematical research in Madras where he continued for two years. One esteemed fellow of Trinity College Mr. E.H. Neville came to Madras University during 1914 to deliver some lectures. Hardy requested Neville to persuade and convince Ramanujan who finally agreed to the proposal and he left for England in the year 1914. Madras University granted a fellowship for him for five years at the rate of 250 pounds per month and agreed to pay for his travel. He also received another 60 pounds per month from 'Trinity College'; thus he had no financial problem and engaged himself in research with Hardy and Littlewood. Hardy was a great mathematician and made many outstanding contributions. When Hardy was asked what his greatest discovery was, he used to say that Ramanujan was his greatest discovery. Ramanujan has made many great discoveries in England. Hardy wrote a letter to Madras University on 11th November 1915 mentioning that Ramanujan is the greatest mathematician he had ever seen.

During the spring of 1917 it was suspected that Ramanujan was suffering from some deadly disease. He was treated in a nursing home in Cambridge and later in hospital in London. During early 1918 his health improved to some extent and he again



concentrated. in mathematical research. During this year he was elected for the prestigious fellowship for the Royal Society of England. He was the first Indian to receive this highest scientific prestigious award and he received it only at the age of 30. He was also elected fellow of the Trinity College the same year. Towards the end of the year 1918 it was diagnosed that he was suffering from T.B. Even in his hospital bed he never stopped doing mathematics till his last days. While he was in hospital bed, one day Hardy visited him and told him that he came by a taxi bearing no. 1729. Hardy said this is a product of three numbers 7, 13 and 19 and these are inauspicious numbers. Ramanujan immediately remarked that 1729 is the smallest number, which can be written as the sum of two cubes in two different ways :

$$1729 = 12^3 + 1^3 = 10^3 + 9^3$$

Hardy was surprised to listen this and he asked if Ramanujan knew such an example for fourth powers, Ramanujan said he could not answer immediately but he was sure such a number is very large. infact it was found later such a number has nince digits and this is $635318657 = 158^4 + 59^4 = 134^4 + 133^4$

The number 1729 is known as Ramanujan number. It has many properties, some of which are as follows :

$$1729 = 1 \times 7 \times 13 \times 19$$

$$1729 = 127^2 - 120^2 = 73^2 - 60^2 = 55^2 - 36^2 = 865^2 - 864^2$$

$$1729 = (44 + 4)(44 - 4 - 4) + \frac{4}{4} = \frac{7777}{7} + 77 \times 7 + \frac{7+7}{7}$$

$$= \frac{9999}{9} + 9 \times 9 \times 9 + \frac{999}{9}$$

1729 is divisibleby

$$1 + 7 + 2 + 9 = 19$$

$$1729 = 10^3 + 25^2 + 10^2 + 2^2$$

Ramanujan was very simple, broad minded and great believer of God. He had firm conviction that whatever ideas are coming to his mind; it is due to God. End of 1918, it was diagnosed that he had TB. The extreme climate of England was also not suitable for him. He finally decided to come back to India. He was sure that he is not going to live long and decided to die in his motherland. He left England on 27th February 1918. His mother and one brother came to Bombay to receive him. He tool rest for two days in Bombay and started for Madras, reached Madras on 2nd April 1918and joined his wife Janaki. He was very weak and very much sick by that time. He stayed with his wife and was under treatment, TB specialist of Madras Dr. P.S. Chandrasekhar layer was treating him. Finally he could not be cured, passed away at Madras on 26th April 1920. Towards the end of 1919 Madras University offered him Professor of Mathematics but he could not survive to accept this offer.

The complete list of research publications of Ramanujan is presented in Appendix – II Ramanujan formula for the value of π is

$$\frac{1}{\pi} = \frac{\sqrt{8}}{9801} \sum_{n=0}^{\infty} \frac{(4n)! (1.103 + 26390n)}{n! (396)^{4n}}$$

$$\text{For } n=0 \text{ we have } \pi = \frac{9801}{1.103\sqrt{8}} \approx 3.1415926218033$$

In 1986 one computer scientist of USA calculated the value of π correct upto 17000000 places of decimal by using the above formula of Ramanujan.

Ramanujan’s contributions were in the areas of Number Theory, Series, Integrals in particular elliptic integrals. Modular equations, infinite products, progressions in particular harmonic progressions, Riemann Zeta function, Combinatorics and in many other topics. Many famous mathematicians including Hardy himself have written books on Ramanunan’s works and contributions, a list of which appears in Appendix II. Ramanujan’s notebooks were published by TIFR. it contains many problems, which he did not solve. Many mathematicians around the world are working on it, many have been solved and many others are still unsolved.

Ramanujan’s works on continued fractions, congruencies, partition of integers are also very much significant. The expression of a positive integer as a sum of certain positive integers is called a partition of that integer: For example.

$$4 = 3 + 1 = 2 + 2 = 2 + 1 + 1 = 1 + 1 + 1 + 1$$

Therefore 4 has five partitions. In general let us write $p(n)$ to denote the number of partitions of the positive integer n. Then according to this notation $p(4) = 5$. Actually p is a function from the set of all positive integers into itself; it is called – the partition function. Hardy has remarked not much is known about the mathematical properties of $p(n)$. It is Ramanujan who discovered some properties of such functions; probably no other mathematician has been successful in this problem. Ramanujan used the theory of elliptic function and obtained some properties of partition function.

If n is a large positives integer $p(n)$ will also be large and this was first proved by Hardy and Ramanujan in the year 1917. Long before this was proved Ramanujan conjectured that $p(14013)$ is divisible by 114 and this conjecture was proved to be true when Hardy and Ramanujan obtained general result in 1917.

In order to show respect to the departed soul, members of the mathematical Society raised some money and instituted a prize called ‘Ramanujan Prize’ in the year 1930 to be awarded for outstanding contribution in mathematic. The first year’s prize was shared by S. Chandrasekhar from Cambridge University and Koshambi from Harvard



University. Dr. Alagappa Chettiar was a great patron of higher education. He established an Institution called ‘Ramanujan Institute for higher studies and research in mathematics. This Institute was handed over to Madras University after the death of Mr. Chettiar.

Appendix – I

Srinivas Ramanujan wrote a letter to Professor G.H. Hardy on January 16, 1913. This was his first letter to Professor Hardy which his friends helped him to put in English. The letter contained 120 theorems of which 15 are presented below.

$$1. 1 - 5\left(\frac{1}{2}\right)^3 + 9\left(\frac{1.3}{2.5}\right)^3 - 13\left(\frac{1.3.5}{2.4.6}\right) + \dots = \frac{2}{\pi}$$

$$2. 1 + 9\left(\frac{1}{4}\right)^4 + 17\left(\frac{1.5}{4.8}\right)^4 + 25\left(\frac{1.5.9}{4.8.12}\right)^4 + \dots = \frac{2^{3/2}}{\pi^{1/2} \left\{ \tau\left(\frac{3}{4}\right) \right\}}$$

$$3. 1 - 5\left(\frac{1}{2}\right)^5 + 9\left(\frac{1.3}{2.4}\right)^5 + 13\left(\frac{1.3.5}{2.4.6}\right)^5 + \dots = \frac{2}{\left\{ \tau\left(\frac{3}{4}\right) \right\}^4}$$

$$4. \int_0^{\infty} \frac{dr}{(1+x^2)(1+r^2x^2)(1+r^4x^2)\dots} = \frac{\pi}{2(1+r+r^3)+r^6+r^{10}+\dots}$$

$$5. \int_0^a e^{-x^2} dx = \frac{1}{2}\pi^2 - \frac{e - a^2 1235}{2a + a + 2a + a + 2a + \dots}$$

$$6. 4 \int_0^{\infty} \frac{xe^{-x}\sqrt{5}}{\cosh r} dx = \frac{11^2 1^2 2^3 2^3 2^3 3^3}{1+1+1+1+1+1+1+\dots}$$

$$7. \frac{1e^{-2x}e^{-4x}}{1+1+1+\dots} = \left\{ \sqrt{\frac{5+\sqrt{5}}{2}} - \frac{\sqrt{5}+1}{2} \right\} e^{-2/5\pi}$$

$$8. 1 - \frac{3!}{(1!2!)^3}x^2 + \frac{6!}{(2!4!)^3}x^4 - \dots = \left(1 + \frac{x}{(1!)^3} + \frac{x^2}{(2!)^3} + \dots \right) \left(1 + \frac{x}{(1!)^3} + \frac{x^2}{(2!)^3} + \dots \right)$$

$$9. \int_0^{\infty} \frac{1 + \left(\frac{x}{b+1}\right)^2}{1 + \left(\frac{x}{a}\right)^2} \frac{1 + \left(\frac{x}{b+2}\right)^2}{1 + \left(\frac{x}{a+1}\right)^2} \dots dx = \frac{1/2\pi^{1/2}\tau(a+1/2)\tau(b+1)\tau b - a + 1/2}{\tau(a)\tau(b+1/2)(\tau b - a + 1)}$$

$$10. \text{If } \alpha\beta = \pi^2, \text{ then } \alpha^{1/4} \left(1 + 4\alpha \int_0^{\infty} \frac{xe^{ax^2}}{e^{2\pi x} - 1} dx \right) = \beta^{-1/4} \left(1 + 4\beta \int_0^{\infty} \frac{xe^{-\beta x^2}}{e^{2\pi x} - 1} dx \right)$$

$$11. \text{If } u = \frac{xx^2x^{10}x^{16}}{1+1+1+1+\dots} \text{ and } v = \frac{x^{1/5}xx^2x^3}{1+1+1+1+\dots} \text{ then } v^5 = u \frac{1-2u+4u^2-3u^3+u^4}{1+3u+4u^2+2u^3+u^4}$$

$$12. \frac{le^{-2x\sqrt{5}e^{-4x}\sqrt{5}}}{1+1+1+\dots} = e^{2\pi/\sqrt{5}} \left[\frac{\sqrt{5}}{1+5\sqrt{5} \left\{ 5^{3/4} \left(\frac{\sqrt{5}-1}{2} \right)^{2/5} - 1 \right\}} \right] = \frac{\sqrt{5}+1}{2}$$

$$13. \text{If } F(x) = 1 + 1/2^2 k + \left(\frac{1.3}{2.4}\right)k^2 + \dots \text{ and } F(1-k) = \sqrt{210}F(x), \text{ then } k = (\sqrt{2}-1)^4 (2-\sqrt{3})^2 (\sqrt{7}-\sqrt{b})^4 (8-3\sqrt{7})^2 (\sqrt{10}-3)^4 x(4-\sqrt{15})^4 (\sqrt{15}-\sqrt{14})^2 (6-\sqrt{35})^2$$

14. The coefficient of x^n in $(1 - 2x + 2x^4 + 2x^9 + \dots)^{-1}$ is the integer nearest to

$$\frac{1}{4n} \left(\cosh \pi\sqrt{n} - \frac{\sinh \pi\sqrt{n}}{\pi\sqrt{n}} \right)$$



15. The number of numbers between A and x which are either square or sums two squares is $K \int_a^x \frac{dt}{\sqrt{\log t}} + \theta(x)$. Where $k = 0.764\dots$ and $\theta(x)$ is very small compared with the previous integral.

Publications of Ramanujan

Appendix – II

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 2. On question 330 of Prof. Sanjana : JIMS 4(1912)59–61.
 3. Note on a set simultaneous equations : JIMS 4(1912)94–96.
 4. Irregular numbers JIMS 5(1913)105–106.
 5. Squaring the circle JIMS 5(1913)132.
 6. Modular equations and approximations to π , Qrt. J. of Maths 45(1914)350–372
 7. On the integral $\int_0^x \frac{\tan^{-1} t}{t} dt$; JIMS 7(1915)93–96
 8. On the number of divisors of a number : JIMS 7(1915)131–133
 9. On the sum of the square roots of the first natural numbers : JIMS 7(1915)173–175
 10. On the product _____ JIMS 7(1915)209–211
 11. Some definite integrals : Messenger of Maths (*M.M.*) 44(1915)10–18.
 12. Some definite integrals, connected with Gauss's sum: *MM* (1915)75–85
 13. Summation of a certain series : *MM* (1915)157–160
 14. New expressions for Riemann's functions $\xi(s)$ & $\sum, (t)$ Qrt. J of Maths 46(1915)253–260
 15. Highly Composite numbers : PIMS 2,14(1915)347–409
 16. On certain infinite series : *MM* 45(1916)11–15
 17. Some formulae in the analytic theory of numbers : 45(1916)81–84
 18. On certain arithmetical functions : Trans. Cambridge Phil. Soc. 22(9)(1916)159–184
 19. A series for Euler's constants : *MM* 46(1917)73–80
 20. On the expression f a number in the form $ax^2 + by^2 + cz^2 + du^2$ Proc. *CPS* 19(1917)11–21
 21. On certain trigonometrical sums and their applications in the theory of numbers Trans. *GPS* 22(13)(1918)259–276
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 24. A proof of Bertrand's postulate : JIMS 11(1919)181–182
 25. Some properties of $p(n)$, the number of partitions of n : Proc *CPS* 19(1919)207–210
 26. Proof of certain identities in combinatory analysis. Proc. *CPS* 19(1919)214–216
 27. A class of definite integrals : Qrt. J. Maths 47(1920)294–310
 28. Congruence Properties of Partitions: *PLMS* 2,18(1980). Records for 13 March, 1919.
 29. Algebraic relations between certain infinite products: *PLMS* 2(18)(1920)records for 13 March 1919.
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- PAPERS IN COLLABORATION WITH G.H. HARDY**
31. Une formula asymptotique pour le number despartitions de n: comptes Rendus, 2 Jan 1917.



32. Proof that almost all numbers n are composed of about $\log \log n$ prime factors
PLMS 2,16(1917). Records for 14 Dec. 1916.

33. Asymptotic formulae in combinatory analysis: *PLMS* 2,16(1917), Records for 1
March, 1917.

34. Asymptotic formulae for the distribution of integars of various types
PLMS 112–132

35. The normal number of prime factors of a number n : *Qrt. J. of Maths.*
48(1917)112–132

36. Asymptotic formulae in combinatory analysis : *PLMS* 2(17)(1918)75–115.

37. On the coefficients in the expansions of certain modular functions Proc. of the
Royal Soc. *A.* 95(1918)144–155

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2. S. Ramanujan –Collected papers, edited by G.H. Hardy, Chelsea, 1962.

Some books / Papers on Ramanujan and His Note Books

SOME BOOKS / PAPERS ON RAMANUJAN AND HIS NOTE BOOKS

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10. B.C. Berndt. Notes on different chapters of Ramanujan’s second note books.

Important Dates With Ramanujan

1. 1887 (Dec. 22) – Birth of the grate star in Erode, Madras.
 2. 1892- Schooling started in a small village school, India
 3. 1903 (Dec.) –Took Matriculation examination of University of Madras and obtained first class.
 4. 1903-1907 – Tried to pass college education (F.A. Examination) twice but failed in other subjects.
 5. 1909 – Married to srimati Janaki Devi.
 6. 1911 (Dec.) His first paper on “Some properties of Bernoulli’s numbers” was published in the *Journal of Indian Mathematical Society*.
 7. 1912 (Feb. 9) – Accepted clerical position in Madras Prot Trust Office.
 8. 1913. (Jan.6) – Wrote his first letter to the famed English Mathematician, G.H. Hardy.
 9. 1913 (Feb. 27) – Communicated 2nd letter to Prof. G.H. Hardy
 10. 1913 (May 1) – Received a scholarship of Rs. 75/- Per month, from Madras University to submit quarterly reports detailing his research to the board of mathematics.
 11. 1913 (Aug. 5) – Submitted ‘The First quarterly report.’
 12. 1913 (Nov. 7) – Submitted ‘The Second quarterly report.’
 13. 1914 (Mar. 9) – Submitted ‘The Third quarterly report,
 14. 1914 (Mar. 17) – Sailed to England to Cambridge.
 15. 1919 (Feb. 27) – Travelled back to India due to terminal illness.
- 1920 (Apr. 26) – Passed away after spending his last month in considerable pain.



Social Stock Exchange (SSE)- Innovative Method for Social Financing & Impact Investment

Prof. Nirmal K Mandal

Context : The responsibility of sustainable development and welfare of the masses cannot be exclusively borne by the government. The involvement of private organizations becomes increasingly important as we move away from a welfare state system to more free market-oriented economy.

According to the United Nations Development Programme (UNDP), India would need \$1 trillion per year to achieve the UN Sustainable Development Goals by 2030, with a \$560 billion per annum funding gap. According to another recent Brookings Institute research titled "The Promise of Impact Investing in India", India confronts a \$564 billion budget deficit in order to accomplish the "sustainable development goals (SDGs)" by 2030.

Given this context, it is critical that private sector capital is pushed into the social sector and that capital is put to use effectively to achieve long-term societal impact.

India has a long history of generosity. Many people prefer to give anonymously to various social causes or projects. A rising number of people are also eager to invest for the benefit of society but are confused to whom or where to give and how to track results. It is also difficult for India's over three million Non-Governmental Organisations (NGOs) to attract such potential sponsors or social impact investors. Further, numerous funding sources such as Corporate Social Responsibility (CSR) Philanthropic donations, "Socially Responsible Investing (SRI)", Impact Investing & Government grant operate in silos, each

with varied degrees of social impact.

So, what is the solution with the aforesaid context? The Social Stock Exchange (SSE), approved by the government of India, is one possible solution. A SSE is a platform for social enterprises listed in the exchange so that they can raise fund from investors for creating social impact. It is comparable to a traditional stock exchange except only for a social cause. This is a revolutionary concept to tap the investors for capital for social financing. It is a new concept in India. This concept arose as an alternate avenue for mobilising finance for NGOs fighting for the benefit of society and communities during the Covid-19 epidemic. The Finance Minister of Government of India proposed this concept in the budget speech for the financial year 2019-20.

Golden Opportunity for Social Enterprises:

Social enterprises are organisations that innovate to solve society challenges, and their returns include both social and financial benefits. They sell goods and services to clients willing to pay a premium for a socially beneficial product, as well as to poor customers at a reasonable profit while still delivering that service at a lower cost than other suppliers. Some social enterprises operate without profit and provide assistance to the less privileged population segments of society. However, many of these Social Enterprises struggle to find finance.

Now there is cause for celebration among social enterprises. **"The Securities and Exchange Board of India (SEBI) has cleared the way for them to enter the capital market by approving the proposal of**



Schematic diagram of Fund Raising Instruments & Process (Source: National Stock Exchange)

the "National Stock Exchange (NSE)" to create Social Stock Exchanges (SSEs) as a new category. The SSE in India is now operational as a result of this permission. Organisations seeking accomplishing a social welfare goal will now be able to raise both equity and debt using this new exchange.

NSE has recognised two types of social enterprises. These are "Not-for-Profit Organisation (NPO)" and "For Profit Social Enterprise (FPE)". These social enterprises must be engaged in the activities leading to positive social impact. A for-profit company or a body corporate that engages in the 16 specified activities while targeting neglected or under privileged population groups or areas and demonstrates that 67% of its activities are permitted for the target audience is considered an FPE. The term "NPO Social Enterprise" refers to charitable trusts, charitable societies, and organizations registered under Section 8 of the Indian Companies Act 2013.

Fund Raising Instruments & Process:

The NPO and FPE can use different methods to raise funds through the SSE. A NPO must register with a SSE before raising funds through a SSE. It can issue financial instruments like "Zero Coupon Zero Principal" Instruments, Development Impact Bond & Mutual fund scheme for a specific social project with a fixed time frame.

Zero Coupon Zero Principal Instruments provide no returns to the investor and are similar to contributions. As a result, the borrowing entity (NPO) is not required to pay interest (i.e., zero coupon) or principal (i.e., zero principal). It would be a 'Social Investment' with no 'money return,' making it a gift/donation/grant.

Surprisingly, foreign investors, especially NRIs, are not permitted to invest in NPO. The Development Impact Bond does not provide any fixed rate of return to the investors. The investors can be repaid (the principal and the premium) by the outcome funder (Donor Agency/government agency) only if the project is successful. However, if the project fails, the investors do not receive anything. The donation through mutual fund scheme operates in a somewhat different manner. Money invested in NPO mutual funds will be invested in stock markets. At the end of each year, the investor may opt to donate a percentage of the corpus value to the NPO for a philanthropic purpose.

FPEs can get directly listed without registration and may raise capital by issuing equity shares, debt instruments, or any other method that SEBI may designate in the future. However, it is not permitted to issue Zero Coupon Zero Principal Instruments in order to raise funds. Through these financial instruments, Investors are expected to receive the blended return (financial and social).

Emerging Impact Investment Market:

The question may arise as to why investors would be interested in a SSE. Conventional investors want to maximise their rate of financial return. However, there is one group of investors who want to invest for positive social impacts but do not seek any financial returns. Another type of investor is interested in the blended return (both financial and social). SSE may serve both of these populations, hence generating a new area of investment prospects. 'Impact investment' is the name given to this emerging market. Impact investments are



being made by investors all over the world in order to harness the power of finance for good. Impact investing seeks better social and environmental outcomes at the expense of lower financial returns. Further Investors may benefit from a variety of advantages, including a 100 percent tax deduction under Section 80G rather than the current 50 percent; exemption from long-term capital gains, and so on. Similarly, the anticipated tax cuts, the expedited tax holiday, and other benefits are intended to benefit social enterprises.

International Experiences:

Over the previous two decades, several SSEs have emerged around globe. Brazil was the first nation to establish a SSE, which was established in 2003. Since then, many nations have followed suit, including the United Kingdom, Canada, Singapore, Kenya, and South Africa.

Singapore has one of the most successful SSEs among these countries. SSE in Singapore is called as "Impact Investment Exchange Asia". It was founded in 2013. This SSE contributes around \$40 million in impact investment funding each year in the domain of water, agriculture, women empowerment, climate change & energy has a network of over 30,000 partners.

The Social Stock Exchange in United Kingdom established in 2013 now consists of eleven firms with a combined market valuation of roughly 470 million pounds. These member companies' missions include, among other things, low-cost housing, renewable energy, and physical & mental health care services. The majority of SSEs are hosted in their countries' existing exchanges, with assistance from some external parties in rare circumstances.

Challenges & Way Forward

SSEs have been co-located within the "Bombay Stock Exchange (BSE)" and the "National Stock Exchange (NSE)" under the regulatory regime of SEBI. SSEs can benefit from current stock exchange services such as network connectivity, a pool of investors, and technological infrastructure and services. However, SSEs must retain their autonomy in administration and governance.

There are multiple risks associated with SSE. FEE diverting the fund for non-social cause funds is one of the risks. The regulator's key challenge is to guarantee that investors and social enterprises remain strongly committed to the objectives of their social intent, they do not deviate from their social goals, and investors

have no say in how they are administered. Accordingly, it necessitates a strict system of surveillance in the social Impact investment ecosystem. Another risk is that investors will prioritise larger established non-profits over grass-roots or new NPO.

Social enterprises listed on the SSE will be subjected to regular audits to measure their social impact, and the "annual impact report" will be disclosed to all stakeholders, just as listed companies on traditional stock exchanges. Measuring impact and reporting on environmental, social, and governance (ESG) parameters are also key implementation hurdles. This is because, unlike traditional capital markets, where an organization's success is evaluated solely by its financial performance, social enterprises place an emphasis on triple bottom line approach (People, Planet & Profit). It focuses not only on profit but also on social and environment performance. Due to the subjectivity of the metrics for assessing social impact, one of the issues is defining the right metrics for measuring social impact and means of verification; for example, the metrics for measuring the social impact of women's empowerment will be radically different for women in Kerala compared to women in Bihar. This raises the possibility that investor decisions will be based on insufficient information, resulting in the investment's potential not being completely realised. It is therefore critical to standardise the reporting structure with measurable metrics with means of verification for monitoring and impact evaluation for these social enterprises.

Other countries' social stock exchanges are only a few decades old and are still in the early stages of development. There is no notable worldwide success story associated with these Exchanges. Before launching the Indian SSE, Indian policymakers and regulators learnt from existing worldwide SSEs and adopted functional mechanism. In view of which Indian SSE will have an advantage over its worldwide peers.

It would be a boost for SSE if the fund from CSR, SRI, "Impact investing", Individual/Institutional donations/grant and other sources was pooled and channelised effectively and monitored with standardised reporting framework and right metrics for measurement for social impact. This has the ability to revolutionise the game if effectively executed. Let's wait and watch how these SSE affect the social financing market.



"Subconsciousness"

The power of the subconscious mind.

Artist: Smruti Ranjan Nayak



Title: Subconsciousness, Size: 36"X42", Medium: Acrylic on Canvas

Commonly Psychologists and Psychiatrists use the term "unconscious" in traditional practices, whereas metaphysical and New Age literature, often use the term subconscious which is believed to harness the power to influence a person's life and create magical outcomes. The conscious mind represents only 10 per cent of the total capacity of the human brain. The conscious mind sleeps when the person sleeps. The Sub-conscious mind represents 90 per cent of the total capacity of the human brain. It motivates you constantly to do and to create a benchmark. Supposing the whole world believes in you, but if your subconscious does not believe in your goals, even God cannot help you. Even if no one in the world believes you, but if your own subconscious believes in you, God will not stop you.

My painting depicts that when the body sleeps the subconscious mind is always awake to aspirations & higher goals. Shakespeare quoted, "The human body is a muddy vesture of decay". That means the human body is mortal and so it is subject to decay and will finally be aligned in soil. But the mind is eternal. The subconsciousness has ethereal powers. It is in a constant turmoil to make a significant change in this world. Every act that we think subconsciously could also be implemented consciously, and that could make a world of difference.

The subconscious is the source of creativity, intuition, inspiration, achieving higher goals and spiritual enlightenment. When we sleep, we access and spend time within the subconscious. The messages we receive from our dreams and thoughts that afloat

when we are conversing with the subconscious inform us about what is unique, authentic, and sacred to each of us. When we heed these messages, we are following the path of our soul's evolution. Therefore, Subconsciousness is not an art, not an idea- it is the very basis of creation. Thoughts and emotions come from the same source-the human subconsciousness. So, the mind can create wonders.

What is the need of the hour now is converting the subconscious thoughts to leadership qualities. Without that everything in the world will go waste.





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