



# CSI Communications

Knowledge Digest for IT Community

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## *Green Computing*



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## CSI eRATNA Award



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### Shri. Naveen Patnaik

Hon'ble Chief Minister of Odisha

**Shri. Naveen Patnaik**, Hon'ble Chief Minister of Odisha, stands out in today's political scenario as a person who exemplifies simplicity, honesty and selfless service to the people. In the year 2000, he took over as the Chief Minister of Odisha. As a visionary leader, he has brought in perceptible changes in governance and fundamental and far-reaching reforms in every sector.

His twenty years of governance has witnessed exemplary e-Governance interventions making the public services citizen friendly. Under his leadership, the Government of Odisha undertook multiple path breaking initiatives using ICT. Significant e-Governance initiatives with far reaching consequences have been implemented by the Odisha Government in all major departments. With his vision "People First", his Government is committed to provide efficient, reliable and transparent governance to the citizens and to the industry sector in the State.

He has been instrumental in aggressively transforming Odisha into the IT hub of India with an enabling environment which is dynamic, supportive and reliable for development of IT as a key sector in Odisha. In the last twenty years, his government has transformed the State in all areas of governance. Odisha has evolved as one of the leading States where a robust system of e-Governance is delivering enormous services to its citizens. His good works as the most effective administrator have won him 'Adarsha Mukhyamantri' Award in 2018 and many more prestigious awards from different societies and organizations in India and abroad. His efficiency in disaster handling, social security initiatives are now benchmarked and emulated by many others States of our country.

Computer Society of India is very glad and proud to confer upon **Shri. Naveen Patnaik**, Hon'ble Chief Minister, Odisha the "**CSI eRATNA**" Award in recognition of his selfless services to its citizens and the State through e-Governance and ICT initiatives, on the occasion of this 53<sup>rd</sup> Annual Convention at Bhubaneswar on Friday, 17 Jan. 2020.

**Mr. Sanjay Mohapatra**  
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# CSI COMMUNICATIONS

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## From the Desk of Chairman, Publication Committee



Dear Fellow Members,  
Greetings.

As you may be aware, **CSI Journal of Computing** which was not in operation since last few years was revived and the first copy was released by Hon'ble Justice Shri. Sanjay K. Mishra of the Odisha High court during the 53<sup>rd</sup> CSI Annual Convention held at Bhubaneswar. A number of eminent personalities like Prof. K. K. Agarwal, Chair, NBA, Dr. Atchuta Samanta, Founder, KIIT & KISS also participated in this session. I extend my sincere thanks to our most dynamic & vibrant CSI President, Prof. A. K. Nayak who is instrumental in bringing back this prestigious Research Journal as a result of which it got published again. I also appreciate a great effort of our Chief Editor, Dr. R. R. Deshmukh for getting the research articles reviewed by the Learner reviewer and edited the same in most effective and productive manner.

In this issue I wish to make a mention of Edsger W. Dijkstra who is noted for his computer algorithms. Many computer science students might have heard of this famous mathematician & computer scientist. He was a Dutch systems scientist and software engineer and was also one of the first and most influential contributors in the **deadlock area** of computer science. Until the mid-1960s computer programming was considered more an art than a scientific discipline and in the late 1960s, computer

programming was in a state of crisis. In that situation, Dijkstra was involved with a small group of academics and industrial programmers who advocated a new programming style to improve the quality of programs. A university professor for much of his life, he was a professor of mathematics at the Eindhoven University of Technology. Dr. Dijkstra's fundamental contributions cover diverse areas of computing science, including compiler construction, operating systems, distributed systems, programming paradigms, graph algorithms etc. Several concepts and problems that are now standard in computer science were first identified by Dijkstra.

Dijkstra coined the phrase structured programming and his ideas about structured programming helped in laying the foundations for the birth and development of software engineering enabling programmers to organize and manage complex software projects. His revolutionary views of programming led to movements such as structured programming, object-oriented programming. His name is also associated with distributed computing, semaphores, deadlocks, finding shortest paths in graphs, fault-tolerance, self-stabilization etc. That is in brief about Edsger W. Dijkstra.

**Dr. D. D. Sarma**  
Chief Scientist (R), CSIR-NGRI, Hyderabad.



# President's Desk

From : President, Computer Society of India

Date : 01 February, 2020

Email : president@csi-india.org / Cell : (91) 82106 93239

The Computer is used as part of an education system to assist in learning and to control the process of education is known as computer-assisted education. The three major & essential components involved are (a) Computer hardware (b) Computer software and (c) Learning systems. The system provides continuous interaction with the student and the computer with the aim of establishing such interactions is to discover whether some of the critical functions of the teacher may be accomplished by the machine for advancing the individual & group learning. The computer may sometimes be given the role of a teaching machine. Computer is better than mere conventional teaching machines in two main aspects i.e. it can store large data and hold different courses at the same time and it can handle a great number of analysis and decisions easily and more quickly than other arrangements.

The computer assisted education is always methodological because computer analyses the learner characteristics and his reaction, then it supplies the feedback to his comment, new information and new response request.

The theme of this issue of CSI communication Computer Assisted Education is of great importance as it will focus on technology innovation and trend setting initiatives in Academic, Research, Training & Development & other related issues of Education domains for the world in general & the people of India in particular. The future will experience the contribution of this great technology and the benefits of the same for the mass education in India.

## Annual Convention at Bhubaneswar

The 53<sup>rd</sup> annual convention of Computer Society of India is being held at KIIT University, Bhubaneswar, Odisha from 16th to 18th January 2020, I on behalf of the Executive Committee of the Society extend the invitation to all concerned to participate & grace the occasion.

The CSI Annual Convention is composed of different kinds of programmes such as Inauguration, Key Note Address, Panel Discussion, Industry Presentation, Invited Lectures, e-Governance Awards to best Govt. Projects, Young IT Professional Awards, IT Excellence Awards, National Programming Contest Awards, Life Time Achievement Awards, Hony. Fellowship and Fellowship Awards, Service Awards and Academic Awards, Best Ph.D Thesis Awards, Research paper and poster presentation along with the most prestigious e-Ratna Award and many more.

The CSI Annual Convention with the theme "**Digital Democracy-IT for Change**" for which the dedicated & devoted Members of the Bhubaneswar Chapter are making their best efforts to make the convention effective, productive scale of excellence. The Proceeding of the Convention with selected papers shall be published by Springer CCIS. I also express my sincere thanks to the Authorities of KIIT university for providing the venue & other support for this great cause. I request all the concerned for their kind participation & presence for enhancing the strength, efficiency, visibility, productivity & effectivity of CSI.

## CSI Election

The elections for the Executive Committee of Computer Society of India for the period 2020-2021/2022 for various posts is in progress.



My best wishes to all the contesting candidates.

I congratulate the Nomination Committee Chair Sri Arvind Mohan Nayak and members Mr. Deepak Sharma & Dr. Ratnadeep R. Deshmukh for their great effort to conduct the election process in a very transparent way within the time schedule. My sincere request to all the voting members for their larger participation in the democratic process to elect the most suitable & able candidates for the respective positions.

## Momentum in Chapter & Student Branch activities

Most of our Chapters & Student Branches are quite dynamic & vibrant in organizing quality activities from local level, state level, national level to international level seminars/workshops/conferences. Many of them have conducted good & quality activities. I congratulate all the respective Organisers & members for their tireless effort & significant contribution. It is special to mention that the Northern Regional Convention organised by the Lucknow Chapter on 14th December, 2019 as the parts of revival of Regional Convention series which was stopped from last few years. The convention was excellent and I want to express my sincere thanks and congratulate Dr. Arvind Sharma, RVP-I and his team members for their sincere efforts and able leadership.

CSI is going to witness a record number events in the month of January, February & March 2020. The organization of National Convention at Bhubaneswar, Regional Student Conventions, National Student Convention, Regional Conventions, National & International conferences at different locations of the Country. Many more activities are also conducted by different Chapters, Student Branches & SIGs which reports are not coming to the notice of CSI Communication & to the Members also. I congratulate & sincerely thanks to all fellow brothers & sisters and request them for communicating the reports of all activities so that the same can be published in CSI Communication.

I take this opportunity to seek the active & kind support of the members to make CSI more Dynamic, Vibrant, Productive & Sustainable to achieve the height of excellence.

Let us come forward to make Clean CSI & Green CSI with transparent activities & visions to make it Swachh, Pardarshi & Hara Vara.

Thanking you & looking forward to your continued cooperation & support for the all round development of CSI.

With warm regards,

**Prof. Akshaya Nayak**

President, CSI

# Editorial



Prof. (Dr.) S. S. Agrawal

Chief Editor

Dr. Ritika Wason

Editor

Dear Readers

*"Only when I saw the Earth from space, in all its ineffable beauty and fragility, did I realize that humankind's most urgent task is to cherish and preserve it for future generations."*

*- Sigmund Jahn*

The above quote by Sigmund Jahn, a German Cosmonaut describes the current call to the mankind in order to save its own existence. Green Computing naturally is thus the eco-friendly or environmentally responsible usage of computers as well as computing resources in order to reduce their environmental impact.

We dedicate the second issue of this year to understanding and appreciating how green computing is altering the computing practice and applications. Continuing with our invited series Titbits from the History of Computing –VII by the legendary Prof. V. Rajaraman, this issue discloses, "**The First Reduced Instruction Set Computer**" This article explores the birth of the new microprocessor architecture. The first article, "Directing towards Crafts of Greener Computing" by Avinash Sharma and Sakshi Girdhar discusses how computing systems can be intelligently managed through the nuances of Green Computing. The next story entitled, "Green Computing-Concepts, Techniques and Applications" by Mrutunjaya Panda gives a brief overview of the various applications of green computing including the government initiatives. The next story, "An Energy Efficient Relaxation-based Strategy for Green Computing" by A. Albert Raj proposes a relaxation algorithm based strategy for green computing.

The technical trends section discusses the role of bots in green computing in the article, "Bots makes the World Greener" by Xavier Chelladurai. This section also reports how quantum computers are making place as the future computing technology. The article, "Quantum Computing: An Introduction" by I.K. Mukilan and J.K. Periyasamy details the same. The article, "Data Analytics Solution in Banking" by M.S. Minu and Zoya Ahmad elaborates on the benefits of applying Data Analytics to the Banking sector. The last article of technical trends, "Evolution of Interfaces in the History of Java" by Pravin Jain traces the evolution of interfaces in the history of Java.

The research front showcases the Indian efforts towards adoption of Green Computing. The first article, "Green Buildings in India" by Nilesh J. Uke and Mahesh S. Shewale describes how green buildings are contributing towards enhancing the lifetime of a building.

The issue also reports important activities, events, collaborations done by various institutions and chapters of CSI and CSI congratulates them for conducting such activities. Various student branch inaugurations and activities have also been highlighted. We have also included a book review of the book, "Cyber Security: An Introduction"

authored by Prof. S.C.Yadav. Dr. Bhagwan Singh, founder Dean of School of Commerce & Management Studies (SCMS), Central University of Himachal Pradesh (CUHP), Dharmsala, H. P. has done the review.

The issue also reports the 53<sup>rd</sup> annual convention along with other workshops. The grand annual CSI convention, CSI2020 at KIIT, Bhubaneshwar is also showcased. The event was a huge success and witnessed the amalgamation of many renowned experts, researchers as well as scholars in computer science who collaborated to discuss the future of computing in this convention. We also congratulate Shri Naveen Patnaik, Hon'ble Chief Minister of Odisha on being conferred the "CSI eRatna" award on the occasion of 53<sup>rd</sup> Annual convention. Dr. Utpal K. Banerjee, Mr. Satish Kumar Khosla, Mr. Rabindranath N. Lahiri, Prof. B. L. Deekshatulu, Prof. Achyuta Samanta and Mr. H.R. Mohan were conferred the Lifetime Achievement Award. We wish heartiest congratulations to all the awardees.

We are extremely thankful to all our contributors as well as readers. Original, plagiarism-free, unpublished articles are solicited throughout the year from CSI members as well as non-members. Our sincere gratitude to the CSI publication committee members, editorial board members, authors and reviewers for their great contribution and support in realising this issue.

Our special thanks to Prof. A. K. Nayak, President, CSI for his constant encouragement, support and guidance in publication of February, 2020 issue.

We look forward to receive constructive feedback and suggestions from our esteemed members and readers at [csic@csi-india.org](mailto:csic@csi-india.org)

With kind regards,

**Prof. (Dr.) S. S. Agrawal**

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# Titbit from the History of Computing – 7

## The First Reduced Instruction Set Computer

► V. Rajaraman

Emeritus Professor in the Supercomputer Education and Research Centre, Indian Institute of Science, Bangalore. Email: rajaraman.v37@gmail.com

*“What is history? An echo of the past in the future; a reflex from the future on the past” - Victor Hugo*

The Cambridge dictionary meaning of titbit is “A small and particularly interesting item of gossip or information”.

### Prologue

The Advanced Research Projects Agency (ARPA) of the US government gave a project on VLSI design to Professors David Patterson and Carlo Sequin of the Electrical Engineering and Computer Science Department of the University of California at Berkeley (UC Berkeley) in 1980 to explore new microprocessor architecture. The team led by Patterson carried out a statistical analysis of the execution frequency of the instructions in a set of commonly used benchmark programs. The analysis showed that most of the instructions that were in the instruction set of existing microprocessors such as Motorola 68000 and Intel 8086 were not used. Only 30% of the instructions were used 90% of the time. It was also found that due to the complexity of the instructions and addressing modes the decoding circuits used a lot of area of the processor chip. The existing microprocessors also required a large number of accesses to the main memory during computation. This slowed down computation as memory access time was much slower than the CPU processing time. Cache memory alleviated the problem to some extent. Based on these results, Patterson and his group designed a microprocessor with just 31 instructions, all of equal length, and fewer addressing modes as opposed to 56 variable length instructions in Motorola 68000. The reduced number and regularity of the instructions made their decoding circuits simple. The chip area saved was used to introduce a large number of registers in the CPU which were used for many arithmetic operations, storing intermediate results, and for handling procedure calls. As the number of instructions in their computer was small, they called it a Reduced Instruction Set Computer (RISC). The first RISC processor was designed by students at UC Berkeley and an experimental

chip was fabricated in 1982. At the same time students of Professor John Hennessy at Stanford University also had a similar idea and designed a RISC processor named MIPS (Microprocessor without Interlocked Pipeline stages). Hennessy and Patterson later collaborated to write the classic text book titled “Computer Architecture: A Quantitative Approach”. In recognition of their pioneering work they were jointly awarded the ACM Turing award in 2017. The citation for both of them was:

*“For pioneering a systematic, quantitative approach to the design and evaluation of computer architectures with enduring impact on the microprocessor industry.”*



John Hennessy  
(Photos thanks to acm.org)



David Patterson

Observe that the Turing Award did not recognize their work on RISC as the idea of RISC was proposed much earlier by John Cocke an IBM researcher. His work on RISC computer architecture was confidential to IBM and not known to Patterson and Hennessy. John Cocke received the Turing Award in 1987, thirty years before Hennessy and Patterson, for his work on RISC computers and concurrent work on compiler optimization. The Turing award citation of John Cocke was:

*“For significant contributions in the design and theory of compilers, the architecture of large systems and the development of reduced instruction set computers (RISC); for discovering and systematizing many fundamental transformations now used in optimizing compilers including reduction of operator strength, elimination of common subexpressions, register allocation, constant propagation, and dead code elimination.”*



John Cocke (Photo thanks to youtube.com)

### Genesis of IBM 801 – the First Reduced Instruction Set Computer

In 1974 IBM Thomas J. Watson Research Centre at Yorktown Heights in New York began a project to design a digital telephone exchange. The specification of the exchange was that it should handle an average of three hundred calls per second in real time. Each call to be handled by the exchange required 20,000 instructions to be processed. The computer to be built was required to process 6 million instructions per second (MIPS). However, as the design team led by John Cocke did not know much about the actual instructions that would be required for call handling, they decided to build a computer to cater for the worst-case scenario and aimed at a 12 MIPS computer – a very high-speed computer in 1974! The nature of the instructions to be processed was quite different from a general-purpose computer. For instance, there was no need for floating point arithmetic. Another important decision that was taken by the team was to write all programs in a high-level language PL.8, a subset of PL/1, that was a popular language developed by IBM in 1964. The design of the machine had progressed rapidly but the telephone exchange contract was not awarded to IBM and the project was to be abandoned in 1975. John Cocke, however, used the ideas and experience gained by the team during the design effort and built a fast minicomputer and named it IBM 801, somewhat unimaginatively, as 801 was the building number in which the work was being done.

### Design Decisions

One of the studies that had been carried

out by IBM using instruction execution traces of a variety of programs on its earlier mainframe computers such as the IBM 370 series was that LOAD, STORE, BRANCH, FIXED-POINT ADD, and COMPARE were the most frequently executed instructions consuming over 50% of the computing time. In fact, it was found that about 40 instructions took 90% of the execution time of programs. It was thus decided to have a small number of instructions in IBM 801. An instruction was added only if it paid for itself by how frequently it was used. Another study carried out during the design of IBM 801 showed that in order to attain 12 MIPS speed it was necessary to have separate instruction and data caches which increased the bandwidth between the memory and CPU. Only two instructions accessed memory, one to load data from the memory to a register and the other to store data from a register to the memory. (Nowadays this type of CPU architecture is called Load-Store architecture). All arithmetic was carried out using operands stored in a large number of CPU registers. Instructions of IBM 801 were simple, short, and of uniform length unlike many of the existing machines in which the instructions were complex and long, with many addressing modes. (Cocke called the design a Regular Instruction Set Computer). The reason earlier computers used long and complex instructions was due to fact that accessing instructions from memory was slow and designers wanted to reduce the number of instructions in a program and consequently the number of memory accesses. Complex instructions also simplified the design of compilers. In IBM 801 most instructions were accessed from the fast instruction cache and the penalty of

having more instructions in a program was low.

Another idea was pipelining instruction execution that was facilitated as all instructions were of uniform length and took almost equal time to execute. With pipelining while one instruction was fetched, another was decoded and fetched data from a register, the third executed the instruction, the fourth stored the result in a register, and the fifth wrote back the result from the register to data cache. Each of these steps took only one clock cycle. Pipelining acted as an assembly line thereby improving the instruction throughput to one instruction per clock cycle. The pipeline throughput would be upset if an instruction to be executed was not the next instruction in a sequence which happens if the instruction is a branch instruction. It would also be upset if the data needed for execution of an instruction is not yet available. Techniques were developed to alleviate these problems both by using extra hardware and by using compiler transformations. In fact, RISC idea worked due to advances in compiler design that enabled the designers to write optimizing compilers that efficiently used the available hardware. The IBM 801 was built in 1978, four years before UC Berkeley RISC, and at that time was IBM's fastest experimental computer.

### Epilogue

IBM 801 was spun off as IBM ROMP (RISC Office products Microprocessor) that was used as the processor in IBM PC RT (RISC Technology) in 1986. IBM PC RT was not successful but spurred further development of RISC microprocessors leading to IBM RISC System/6000. Soon after IBM partnered with Motorola and

Apple, the AIM alliance, to build a single-chip RISC microprocessor in 1993 that was used in Apple Power Macintosh 6100. IBM RISC based processors are used in almost all IBM computers including IBM Blue Gene supercomputer.

The RISC architecture developed at UC Berkeley and Stanford and its variants were used in a variety of workstations such as those by Sun Microsystems, Digital Equipment Corporation, and Silicon Graphics. Today a large majority of microprocessors are based on RISC architecture. Billions of ARM (Advanced RISC Machines) processors are used in mobile phones. RISC idea has become so pervasive that even Intel 80x86 series of Complex Instruction Set Computers convert their instructions to RISC-like micro operations at run time and execute these micro operations using pipelining to increase instruction throughput.

### Acknowledgment

I thank my colleague Prof. R. Govindarajan for constructive comments that improved this paper.

### Suggested Reading

- [1] John Cocke and V. Markstein, The evolution of RISC technology at IBM, IBM Journal of Research and Development, Vol.34, pp. 4-11, 1990
- [2] George Radin, The 801 Minicomputer, IBM Journal of Research and Development, Vol.27, pp 237-246, 1983.
- [3] John Hennessey and David Patterson, Computer Architecture - A Quantitative Approach, 6<sup>th</sup> Edition, Morgan Kaufmann- Elsevier, 2017.

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A pioneer in Computer Science, education and research in India, Prof. Rajaraman was awarded the Shanti Swarup Bhatnagar Prize in 1976. He is also the recipient of Homi Bhabha Prize by U.G.C., Om Prakash Bhansil award, ISTE award for excellence in teaching computer engineering, Rustam Choksi award, Zaheer Medal by the Indian National Science Academy, Padma Bhushan by the President of India in 1998, and lifetime contribution award by the Indian National Academy of Engineering and Computer Society of India. He was awarded DSc (h.c.) by IIT, Kanpur and by Bengal Engineering and Science University, Sibpur. An author of several well established and highly successful computer books, Prof. Rajaraman has published a large number of research papers in reputed national and international journals. (A detailed biodata may be found in [en.wikipedia.org/wiki/Vaidyeswaran\\_Rajaraman](https://en.wikipedia.org/wiki/Vaidyeswaran_Rajaraman)).



# Green Computing - Concepts, Techniques and Applications

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## 1. Introduction

Green Computing is no more a simple buzz phrase, but much more beyond that. Recently, green computing attracted manufacturers and service providers in greening of ICT (information and communication technology) for study and develop energy efficient computers with possible relying or disposal of computing waste procedure. Further, this helps end users to create a green society and sustainable, energy efficient environment to live with<sup>[1]</sup>.

As per Wikipedia, Green computing enables user to understand how efficiently computing resources can be used so that a optimal computer system can be designed in comparison to the cost of energy utilized and operational cost together.

Scientist today envisages Green computing as a necessity for future due to enhanced carbon dioxide emission from computing system leading to global warming because of increase in energy consumption levels.

The goals of green computing are quite similar to Green chemistry in many ways and found its applications ranging from small hand held device to large data centers.

Now-a-days, there are several initiatives by the Government to promote green computing concepts by highlighting some of the following points, so as to make computing usage greener:

- When not in use for long time, the computer shall be placed in sleep or hibernate mode to save energy
- The computer shall be switched off, when you go to sleep at night
- Use power management features for controlling energy consumption
- Encourage to purchase laptop than desktop, etc.

Recent study reveals that cloud computing is the greenest computing, offers

the best form of virtualization to reduce energy consumption. At the same time, one need to analyze the amount of energy being consumed by the electronics parts in a computer system and its remedial measures to reduce the energy consumption either through virtualization, optimization or closing down some unnecessary services. The same idea also applicable to data centers. A thermal image of the data center could enable us to understand which units in data centers are generating more heat and which are coolest. It is worth mentioning here that, US data enters consumes around 60 billion kWh in 2006, but gets manifold in recent years, which needs to be addressed.

## 2. Government and Industry initiatives

In order to encourage implementation of Green Computing, several steps are taken by many Government organizations recently such as: Energy star program, which intends to frame stricter guidelines to develop efficient computer equipment and associated product with a viable ranking system. It is worth noting here that already country like: USA, green computing concepts has materialized to some extent by doing recycling process for aged computers and consumer electronics components and/or equipment, making huge investment in developing sustainable smart grids, renewable energy optimization and energy efficient data enters to name a few.

The industries are also joining hands in the process of Green Computing initiatives. Sun Micro-system, VMware, Microsoft, IBM and other computer giants trying to work together in developing technological advancements to build Green Grid, so as to address the business computing ecosystems and energy efficient data centers. Some industries took initiatives to

develop some process in order to reduce the electric power consumption of Computer system in both active and inactive states.

## 3. Approaches

Looking into the complexity of modern ICT systems requirement that involves user, hardware and networking at large, Green computing process are required to find some legitimate solutions to address all the issues pertaining to end user happiness, profit from the investment, some fiscal motivations for the participated industry and with little bit managerial restructuring with some kind of regulations for better implementation.

In this context, Gartner highlights the successful implementation of Green computing in Computer manufacturing process. It suggested for the product longevity as well as software and deployment optimization as a biggest contribution to green computing.

Secondly, as per U.S. department of Energy, a computer data center is a heavy consumer of energy which is almost more than 200 times than that of an office building. Green computing is a solution here again by developing some energy efficient data enters.

In the third point, it is also very interesting to note that algorithmic efficiency is also a motivator to go for Green computing. What is observed here is that if we could write a computer program with efficient resource allocation for a given job, the energy consumption by the computing system will be reduced drastically. It is observed from the literature that a typical Google search generates nearly 0.2 grams to 7 grams of CO<sub>2</sub> emission. Hence, Green computing with algorithm efficiency seems not only to reduce cost but also try to mitigate the negative impacts on the environment.

In view of all the above discussion, one

can think of developing various approaches for achieving the objective Green computing initiatives in terms of : efficient resource management, reduction in cost, product longevity, eco-friendly environment, intelligent policies to control power consumption etc<sup>[4]</sup>.

#### 4. Applications

In this section, some prominent applications of Green computing are highlighted.

##### 4.1 Biomedical systems

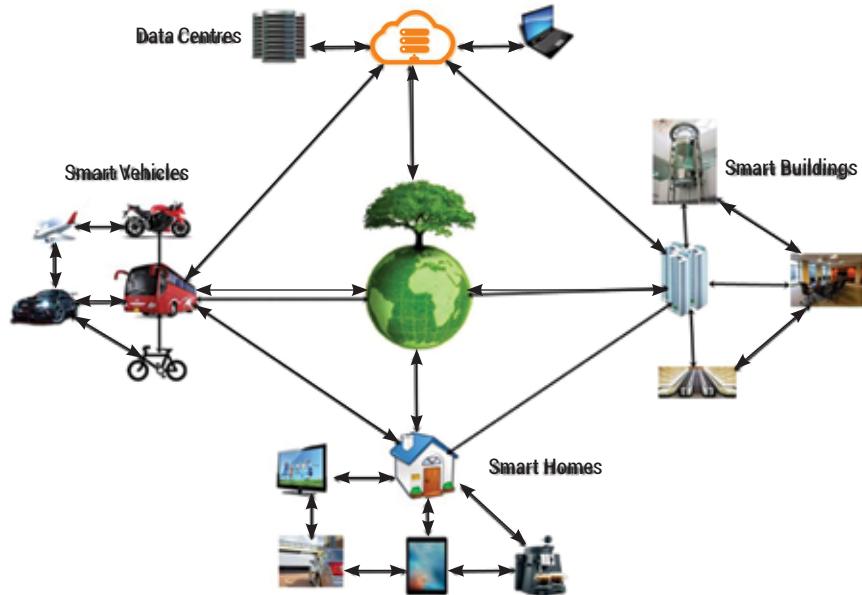
A biomedical system primarily consists of three components that include: Implanted device, embedded sensor and computer server. Green computing application to biomedical system with the above components is required to analyze the one or more of the following factors such as: power consumption by the implanted device, heat dissipation by the electronic device used, cost, reliability of the software and hardware used, minimize the area and operational efficiency for servers.

##### 4.2 Data center Cooling

For example: If a computer server in data center generates heat, the immediate but a horrible solution is to use some cooling mechanism such as using an air conditioner. But, a good solution is to use heat rejections by deploying cooling units next to the servers so that cold air enters in the front and exhaust at the back. Example of this is used by Facebook server for avoiding excessive heating.

##### 4.3 Green Cognitive radio

Since the demand for wireless data exchange is increasing day by day, there is a huge associated pressure on deployed wireless capacity. In order to achieve this, a lot more complex methodologies are attempted to enhance the spectral efficiency in cognitive radio network scenario that increase the power consumption, more heat dissipation from the processors in network elements and hence need much more cooling. Green computing is now finding its place to address the issue by efficient usage of energy with better prediction and capitalization from renewable energy sources. Further, Green cognitive radio urges for using AI, reinforcement learning techniques etc. to have better utilization of free spectrum, efficient modulation techniques concerning with power and bandwidth and lastly to have extended



**Fig. 1: An example scenario of Green IoT (source: Internet)**

battery life<sup>[6]</sup>.

##### 4.4 Green Communication for Wireless Body Area Networks (smart and green hospital care)

Wireless body area network (WBAN) is found application in healthcare where the tiny sensor motes are deployed inside the human body for remote healthcare of the patient. Since, the sensors are largely limited by battery power, storage capacity and computation and the WBAN consumes lots of energy, some energy efficient green communication framework is suggested for its effectiveness<sup>[7]</sup>.

##### 4.5 Green Internet of Things

Green Internet of Things (Green IoT)<sup>[3]</sup> as the name indicates enumerates the use of Green ICT such as: green data center, green RFID, green wireless sensor network, green WBAN in a smart digital world. An example of this is shown in Fig. 1.

The primary and very interesting arena of green IoT<sup>[2]</sup> involves in green manufacturing where there is no negative impacts on environment; green utilization by minimizing the power consumption by the digital components such as: Computer, smart watch, smart phone etc.; green design with green IoT components, data centers and cooling mechanisms, and finally, green disposal with some way to recycle the age old electronics equipment.

The idea of green IoT in case of smart

homes urges to use some energy harvesting mechanism such as: energy directly from the sun light and to take intelligent decision strategy to keep the sensors in sleep mode when not in use.

#### 5. Conclusions

This paper discusses a brief overview of the concept of green computing, its need, various approaches and some interesting recent applications. From the discussion, it is understood that green computing is a novel and an innovative trend in the computing and smart world to make our life better with almost zero impact on environment. Further, It is envisioned to have its potential to address the future in developing smart terminals, green communication, green cloud computing<sup>[5]</sup> and green WSN to name a few. However, the question lies whether we are ready to pay more for energy efficient mobile phone calls, collective societal response to regulation and restrictions imposed, ethical responsibility in algorithm governance, practicing with diverse technologies like: AI, machine learning, big data, automation etc.

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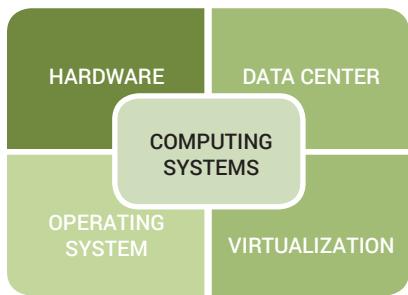
# Directing towards crafts of Greener Computing

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When designing a computing system, the elemental vehemence of the industry and the designers both is on meliorating the performance of the system. Though the increased demand and pressure of new and improved applications from the three major arenas that is technological, business and user has contributed to the achievement of the objective of high performance but at the cost of ever so much consumption of energy that has led to carbon footprints and high on pocket electricity bills especially for big computational facilities like data centers, Clouds etc.

In view of this the designers have scooched their intent towards improving energy and power efficiency along with the performance. There can be a lot of problems and issues when high power or energy is consumed so the computing systems should have power efficient design at all the four levels that are virtualization, hardware, data center and operating system (Fig. 1).

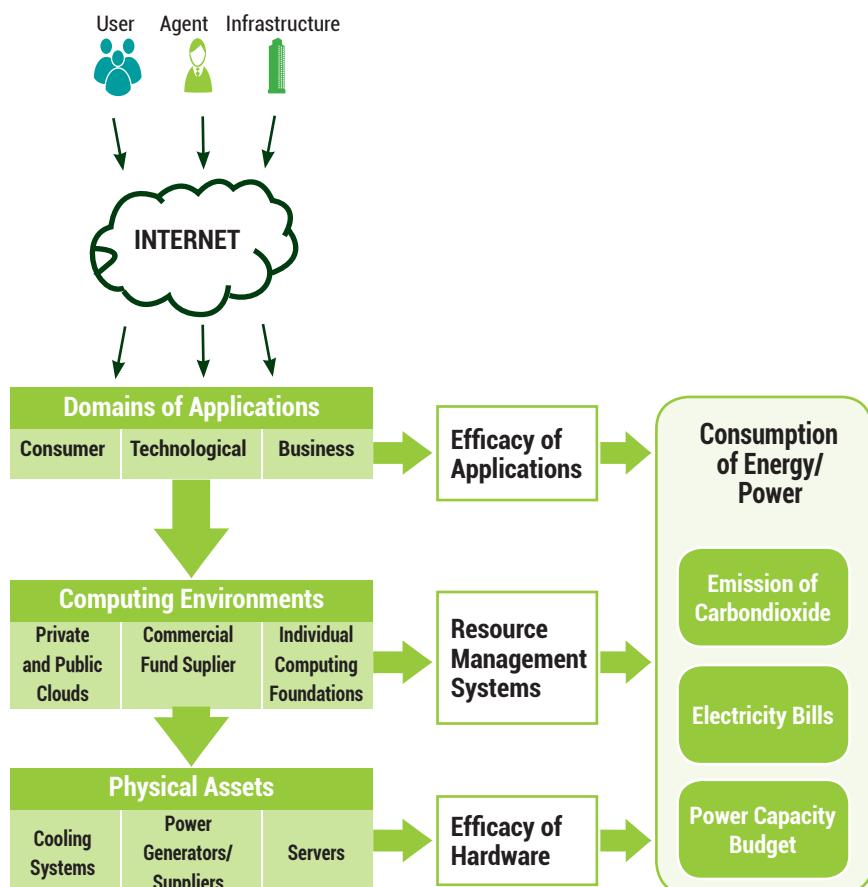


**Fig. 1 : Levels of Computing Systems**

Along with the capabilities of the hardware that has been deployed on the infrastructure, applications that run in the system and the resource management system are equally responsible for determining the consumption of energy (Fig.2). A resource supplier incurs the total cost of ownership (TCO) that is used to ascertain the wallop of power efficiency on consumers or end-users. As more and more power is consumed the need to dissipate a lot heat also rises thus requiring an effective cooling system. Therefore huge electricity bills are not the only drawback of devouring eminent power. Also various power delivering

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**Fig. 2 : Energy Consumption at Different Levels of Computing Systems**

facilities like power distribution units (PDU), uninterruptible power supplies (UPS) etc are also needed to provide continuous power round the clock. The issue is not over yet. Let us assume that we somehow manage to overcome the problem of the total cost of acquisition (TCA) and intense cost of operation, one of the biggest problems related to the environment that is caused by the utilization of high power is the emanation of carbon dioxide ( $CO_2$ ). It has been observed that around 3% of the total  $CO_2$  footprint is generated only from IT sector.

With the increase in global warming and unexpected change in the climate, major concern is to develop and adopt algorithms and techniques that are energy efficient.

Extensive research is being conducted on daily basis to understand the currently available body of knowledge and new ways and methods are being developed to optimize the computing environments in lieu of power management along with upholding the aspect of performance.

## Managing computing systems intelligently

The foremost necessity while creating a computing infrastructure is the need to make it energy efficacious as tremendous level of electrical power is devoured. This has led to not only monetary concerns but the nature is also getting equally affected. Therefore making computing systems energy efficient has become the top most

priority of all the designers. Studies have revealed that if computing infrastructure is brought off intelligently, the obligation of attaining performance can be met along with abridging the consumption of energy to a great extent.

**Dynamically adjusting the voltage and frequency of CPU** – different power saving algorithms and methods were applied along with dynamic voltage and frequency (DVFS) technique that have made run-time control of the software possible over the consumption of power by the CPU. With DVFS technique, when the usage of CPU is not one hundred percent the dynamic consumption of power is reduced cubically in ideal case as the performance of the CPU is deliberately narrowed. In simple words, in order for this technique to function effectively, the ongoing needs of the performance has to be checked at regular intervals so that supply of voltage and clock frequency can be modified consistently and CPU utilization can be monitored efficiently.

**The magic of virtualization** – utilization of resources can be enhanced by minimizing the amount of hardware that is being used in a computing environment eventually leading to the less consumption of power. This is done by using the art of virtual computing to the computer resources by creating a

lot of virtual machines (VMs) on a physical server. Some of the overall positive effects of inculcating virtualization are

- With the use of both offline or live migration, VMs can be easily transferred from one physical host to the other
- Idle nodes can turn on their power saving modes as virtualization enables redeployment of VMs at run time.
- For applications that partake the same computer node, performance and fault isolation has been greatly mended.
- Arrangement of multi-node can be avoided as VMs can be easily designated to a one physical node.

**At the data center level** – the basic idea behind managing resources efficiently at Clouds and data center level is the amalgamation of work burden into at the very least of physical resources and turning off the idle resources and as a result resources are utilized to the fullest and consumption of energy is brought down along with throttling Returns On Investments (ROI) and bringing down the TCO. But the most important thing to make sure is to do this merger of workload and physical resources smartly after cautious interpretation as the norms and guidelines of SLA are also to be met and this reallocation of VMs also contributes to operation and energy overheads. Therefore

extensive research has been made to deduce the power saving method that is as effective as possible.

## Generalizing the Requirements for Modern Computing Environments

In general we can say that in order for a computing system to be greener i.e. more energy proficient following standards are to be acquiesced to devise an effective solution:

- Applications have different SLA for different users; the computing system should be able enough to adhere to the obligations of SLA.
- In huge infrastructures, workload is mixed or created by different applications; the technique devised should support this.
- Meeting the QoS for every application must be guaranteed.
- Catering of resources should be streamlined
- Discrepancy of software and hardware has to be encouraged while virtualizing the infrastructure.
- Multiple system resources like network interface, memory, CPU, disk storage etc. must be taken into consideration while making the best use of the resources.

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# Bots make the World Greener

## The role of robots in Green Computing

► Xavier Chelladurai

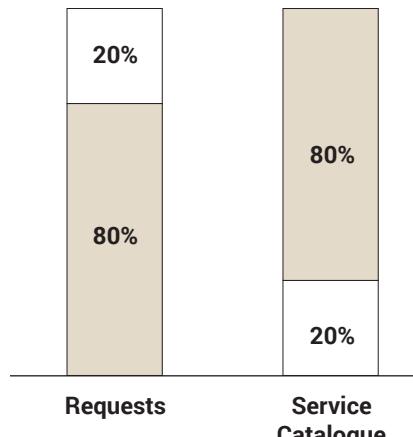
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In the recent years there is an increasing interest among the businesses to transform their operational models adapting Artificial Intelligence based technologies. This is partly because of the rapid growth and availability of the technologies but mainly due to the competition and the customer expectations. While Artificial Intelligence based technologies increase the customer satisfaction, it also makes the life better and contributes for better performance and sustainability. In this article we identify the areas of contribution by Artificial Intelligence based bots in the direction of Green Computing.

### Bots in Business

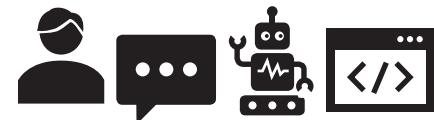
Chatbots are intelligent software robots capable of understanding chat / voice messages given by users and provide the required support. The following are some sample usecases.

1. Virtual Assistants: Every banking website has a chatbot. For example, when we go to ICICI Bank website, the iPal Virtual assistant appears and starts the conversation using chat. When we open Bajaj Allianz website there are two virtual assistants popping up, one, a Service Assistant (called Boing) and the other a Purchase Assistant.
2. Voice Assistants are changing the lifestyle of people in a great way. A voice assistant is a digital assistant that uses voice recognition, speech synthesis and NLP. Apple Siri, Google Assistant and Amazon Alexa are some popular Voice Assistants. A survey has reported that 46% of the US adults use digital voice assistants.
3. Chatbots in Service Delivery  
In the service delivery, in most of the cases, we find that 80% of the customers are looking only for 20% of the services in the catalogue.



**Fig. 1 : 80% of the requests for 20% of services in the catalogue.**

We automate the services listed in the catalogue and have the scripts ready. When the customer raises a request the intelligent chat bot reads the request, understands using NLP and maps the request to the respective script which is already available. The script is triggered, and the service delivered. This is explained in Fig. 2.

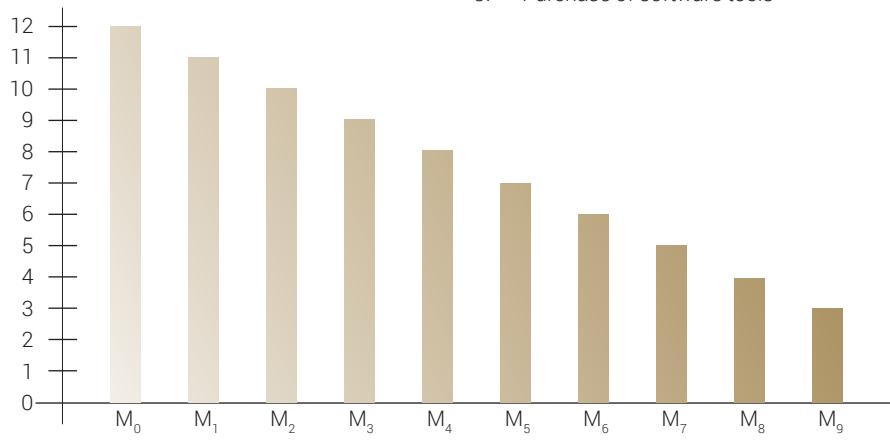


**Fig. 2 : When the user sends the request through chat, the bot understands the request, triggers the script and provides the service**

### Case study: Service Chatbot

In my experience in a software company, we were providing IT Infrastructure support for a British company. There were 6000 employees in the customer organization, and we were getting 1200 service requests per month from the contractual service catalogue. As the scope was in IT support, the requests were something like the following:

1. Software Installation
2. Patch update
3. Laptop issues
4. Connectivity issues
5. Application Access issues
6. Password issues
7. License issues
8. Information on database versions
9. Purchase of software tools



**Fig. 3 : Graph showing the support requests handled by human employees for 9 months after introducing bot**

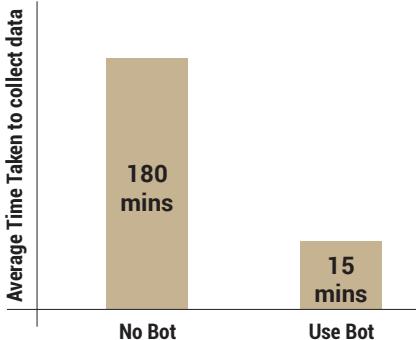
## 10. Storage request

We implemented a chat enable service bot. In a period of 9 months the more than 68% of the requests were handled by the bot. The number of tickets resolved by the human employees came down month on month as shown in the graph.

## Bots and Green Computing

A research study conducted by a group of research students reveal the following:

- When we search for some information in a Banking site (example: rate of interest for loan, process for a particular activity etc.) it is found that the bots save us 65% of our time.
- When we use virtual assistants in mobile phone or any instruments it saves 80% of our usage time of the device.



**Fig. 4 : Average time for Information Collection from Banking Site**

All the above savings are converted directly into machine time savings and hence energy savings.

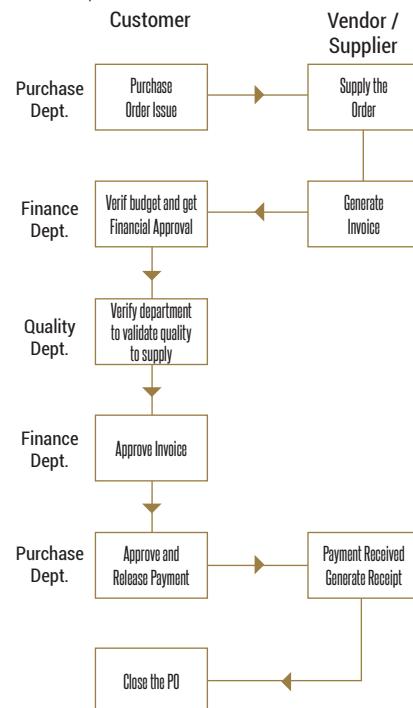
## Robotics Process Automation (RPA)

Robotics Process Automation (RPA) is the technology used for automating manual, repetitive, well defined business operations. We develop bots using RPA tools such as UI Path, Automation Anywhere, Blue prism etc., to automate the business processes. In order to understand a business process, let us consider the example of Order to Cash Process (O2C Process).

A typical O2C Process flow is shown in Fig. 5.

The purchase department gets the request for purchase from the business. The purchase department issues the purchase order for the purchase of the specific goods or service. The purchase order has the budget reference, rate and quality specifications.

When the purchase order is received by the vendor, the delivery is made with a copy of the invoice. The quality of the goods / service is checked by the quality department and the amount is debited from the budgeted amount by the Finance department. Now the invoice is approved for payment and the amount is released. The vendor receives the payment and issues a receipt. After the formal receipt is received the purchase department closes the invoice so that no more duplicate deliveries are made.



**Fig. 5 : O2C Process**

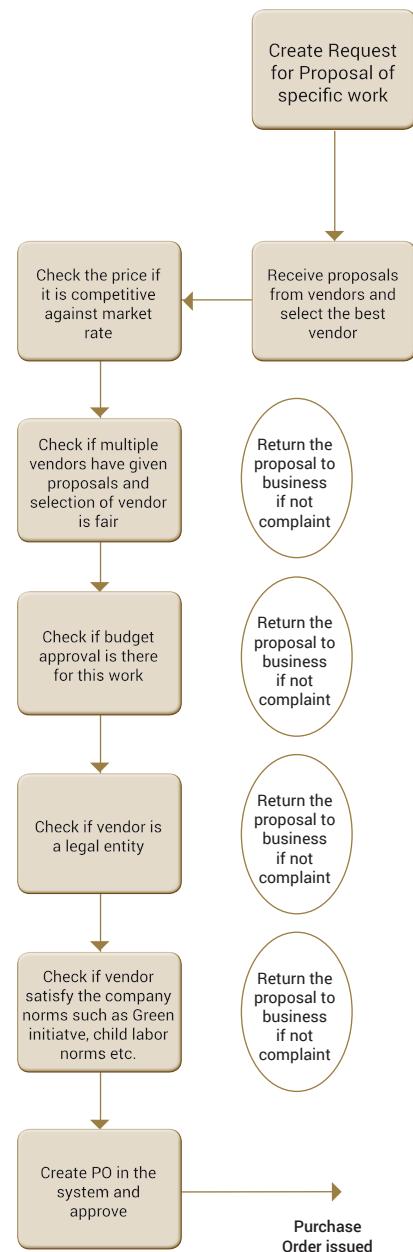
## Manual Process Agent

In every organization we have business agents who manage these transactions. For example, an agent in the purchase department issues PO following the process shown in Fig. 6.

The above flowchart has the following feature

- Well defined and unambiguous
- Repetitive. In an organization, thousands of POs are issued in a month.
- Verifies multiple system for various step such as legal compliance, budgetary approval etc.
- The exception for the flow may be very small.

This process is automated by RPA tools and the bots deliver the services and issues purchase orders. This automation saves more than 70% of effort in the purchase department



**Fig. 6 : Issue of Purchase Order.**

## Conclusion

Artificial Intelligence based automation has resulted in augmenting the work force with the digital work forces, Robots. Humans and machines will co-exist in future. In this

article we have seen how the introduction of bots saves human efforts and hence saves energy consumption. Instead of running a business with 100 people organization can earn the same revenue with 30 people and 70 bots. As the bots are software robots,

there is enormous savings to support the green world

- 70% of reduction in travel between home and workplace.
- 70% of reduction in water and other utility usages in workplace.

- 70% of reduction in Administrative effort.

- 70% of reduction in energy usage.

With the new world of humans co-existing with bots, we are looking for a greener world. ■

## About the Author



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# Quantum Computing: An introduction

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Associate Professor

This article introduces the basics of quantum computing, future computing technology. Along with the development of science and technology the computational efficiency is also to be increased to accelerate the other developments and comforts of people. The conventional classical computation has a limitation in terms of size and speed. Fortunately, the quantum world unveiled tremendous scope for the reduced size and fast process of computing devices. This brief note introduces the future computation technology quantum computing. Quantum computer is a next-generation computing platform where nanoscale devices governing quantum mechanical laws will be used.

## Introduction

In this digital era, the speed of a computer and other digital gadgets is to be increased surplus to meet out the technological developments and needs. Moreover, people also want smaller and handy devices with more power. As the size reduction is warranted with high speed and high-density operation, it requires hardware updates. However, size reduction is limited; it cannot be reduced beyond a level of 14 nm according to Moore's law. Therefore, instead of classical computers such as analog and digital, a new generation of computer is needed to fulfil the speed and density requirements. Fortunately, quantum computers will solve the issues in future by providing fast and high-density communication. Using quantum computing complicated tasks can be solved in fewer steps than any classical computers [1].

## Quantum bits (qubits)

In classical computers, the logic gates are playing the main role as several combinations of diodes and transistors depending upon their function. These logic gates can handle only two bits '0' or '1' at a time, it can be either ON or OFF. A logic gate can be given many inputs at a time, but it can produce only one output at a time, this limits the speed. Similarly, a transistor also acts as a switch for information transport producing either 'high' or 'low' as output voltages (ie. ON or OFF). If we reduce the size of hardware less than 14 nm using the same binary

system electron transfer may be disturbed by the effect namely 'quantum tunnelling'[2]. That is, the electron can cross the barrier without control. The present computer system is based on a binary unit that is the information is handled as a binary unit of 1 or 0. For example, in a 32-bit computer 32 binary numbers are used at a time. Complex operations and data are represented as combinations of these two bits (0 or 1). In logic gates, the resultant binary output of many inputs is obtained by Boolean functions. If we want to do more complex problems in a classical computer it needs to involve a large number of logic gates, it will impede the speed of the process. Instead, if we use quantum bits the processing speed can be increased as a single qubit can be of many states simultaneously compared to the normal bit.

These quantum bits (qubits) are used in quantum computers where the quantum states of an electron are considered. A single qubit is a quantum state of the electron, in a single quantum state two electrons of opposite spins can be accommodated. An electron in a magnetic field can align either as a *spin-down* or *spin-up* state denoting its two states (0 or 1). Change of electron's spin from one state to another is achieved by using a pulse of energy such as from a laser light or magnetic field. According to quantum law, an electron (qubit) can simultaneously be in both states 1 and 0 (Spin up or down).

According to superposition rule of quantum physics, a quantum computer can take  $2^{An}$  ( $2n$ ) computations for  $n$  qubits. If a quantum computer consists of 500 qubits, then it can perform  $2^{500}$  calculations in a single step, it is an awesome level more than parallel computing of today's classical computer. A phenomenon called quantum entanglement is used to interact and communicate between the particles of qubits. As we know, a qubit can be as 0 or 1 at the same time, the proportion of a bit to be either in 1 or 0 states is decided by the phenomenon called superposition. If we consider 4 bits it can have  $2^4(16)$  possible combinations, out of which the only one combination can be used at a time in traditional computing. Whereas, in qubits, all the possible 16 combinations can be used at a time. Hence, the possibilities of representing different states are grown exponentially for every qubit added.

In traditional computing, the logic gates produce one output signal from many inputs using simple logic of Boolean algebra. While, in quantum computing, the inputs are manipulated by quantum gates using superposition principle and probabilities calculation, and finally gives an output. As we have to consider many states simultaneously in quantum computing, it requires a more complex algorithm design. Quantum computers are necessary for home or day-to-day computers, whereas, it is very much needed for the future where high-

speed and high-data analyzing is required. Let us see a conceptual explanation of how quantum computers work.

In a discussion of group meeting consisting of 5 members, we have to find out a seating arrangement how everyone can be seated. For this, they can be arranged in 5! ways, that is  $120 (5! = 1 \times 2 \times 3 \times 4 \times 5 = 120)$  ways. For a classical computer manipulation, the 120 possibilities are compared individually and then the best option is figured out.

Whereas in the quantum computer, converting the data as qubits, they are analyzed by superposition and the best result is produced. For this process of finding the best configuration, the data is converted as qubits and fed into the quantum computer by encoding each state with a phase. During quantum computing, the amplitudes of similar phase states are added and for dissimilar phases amplitudes are cancelled. Finally, by interference some answers are amplified cancelling others, resulting in the final output.

Before starting to know how a quantum computer is working, we should have some prior idea about quantum mechanics and how it helps for advanced computations. The basic computational unit of a quantum computer is Qubit. It is measured as zero state or one state like normal bits, but on the contrary, it is different from normal bits by using quantum mechanical phenomena of entanglement and superposition. The qubit is expressed as in both zero and one states simultaneously. A qubit is represented by "ket 0" ( $|0\rangle$ ) and "ket 1" ( $|1\rangle$ ) notations similar to classical 0 and 1. According to the quantum mechanical superposition principle, the state of single-qubit at any instant is represented as  $a|0\rangle + b|1\rangle$ , where the constants  $a$  and  $b$  are amplitudes of qubits 0 and 1 respectively and also  $a^2 + b^2 = 1$  [3]. If we consider two states 0 and 1, then the possible states according to the classical system are 00, 01, 10, and 11. Whereas in qubits, the number of possibilities are given as  $a|00\rangle + b|01\rangle + c|10\rangle + d|11\rangle$  depending on superposition principle [4].

Therefore, to denote two qubits 4 ( $a, b, c, d$ ) characters associated with either probabilities or amplitudes are required, whereas for three qubits 8 characters are required. Similarly,  $2^n$  characters are needed for  $n$  qubits for the analysis of the data using a quantum computer.

That is, a small increase in qubits number can increase enormous qubits to represent the states, unlike classical computers. Though there are large numbers of possibilities, it is not easy to identify the instantaneous state of an electron. So, the quantum computer requires an efficient quantum algorithm to use the quantum computer in full potential. Two qubits can have opposite values, if we want to know the exact value of individual qubit, we have to measure it.

To measure and change the state of qubits quantum entanglement is used. The quantum entanglement can be explained as follows. If we have two electrons with qubit of zero (0) states, from these two electrons one electron can be changed into the state of one (1). This is possible by applying electromagnetic energy of certain frequency proportional to the energy difference between 0 and 1 states of the electron, then by superposition. Therefore, by applying electromagnetic energy of suitable frequency, the second electron can be put into superposition and thereby its state can be changed with respect to the first electron state. That is, now the two qubits of different states are entangled. If the first one electron is in the spin-up state, then the second electron will be spin-down by entanglement and vice-versa.

### Quantum logic gates

Quantum logic gates are the building blocks of quantum computers [5]. They are similar to classical logic gates and on the contrary, it is reversible. The AND gate of classic computer makes 0 output (null) for both 1 and 0 or 0 and 1 inputs. Whereas, the NOT gate just reverses as NOT 0 = 1, NOT 1 = 0 which is suitable for quantum computing. That is quantum logic gates are also similar to classical NOT gate if the input is 0 output is 1 and vice-versa. This gate is called as Pauli-X gate in the quantum world and its function is represented as  $|0\rangle \rightarrow |1\rangle$  and  $|1\rangle \rightarrow |0\rangle$ . Similarly, the Hadamard gate is used to produce superposition of qubits. The **swap gate** is used to swap between two qubits, i.e.  $|0\rangle \rightarrow |01\rangle$  and so on. There is also controlled gates, which act on the qubits and regulate the operation between the qubits. The controlled Not gate (CNOT) acts on the second qubit only if the first qubit is 1 ( $|1\rangle$ ), or else leaves it unaffected as shown in table 1.

**Table 1 : CNOT Gate function**

Before		After	
Control	Target	Control	Target
$ 0\rangle$	$ 0\rangle$	$ 0\rangle$	$ 0\rangle$
$ 0\rangle$	$ 1\rangle$	$ 0\rangle$	$ 1\rangle$
$ 1\rangle$	$ 0\rangle$	$ 1\rangle$	$ 1\rangle$
$ 1\rangle$	$ 1\rangle$	$ 1\rangle$	$ 0\rangle$

Hence, the CNOT gate is used to entangle the Control and Target states. The Hadamard gate acts first control and permits a CNOT gate to act on target. For this, the target and control both should be together entangled and superimposed. That is, the CNOT gate generally produces entanglement between the states in quantum computing. It can also be used to perform all logic functions together with arbitrary qubit rotation. Therefore for the working of quantum computers, different quantum logic gates are used to change properties of arbitrary qubits by making them interact between them. Efficient use of suitable algorithm can make this interaction possible. A quantum algorithm is a step-by-step procedure to produce superposition and entanglement of the qubits. Already, there are different algorithms like Simon, Shor and Grover's algorithms [6]. The spintronic computer (spintronics) and photonic computer (photronics) are also other forms of quantum computers.

### Conclusion

Though quantum computers are possible to perform simple operations like classical computers, it is not as cheap as classical computers. So, quantum computers can be used for complex operations using a large amount of data. That is, classical computer can be used to assist in the process of quantum computing. This quantum computing has a wide range of applications in various fields such as in biology, computer hardware and even it can elucidate thoughts of a human as explained by the Global Consciousness Project. The entanglement properties of quantum computing have many suggestions for quantum cryptography which is useful for future cyber-security [7]. Quantum computer and quantum computing microchips are developed by giants IBM, Intel and Google. IBM Q is the first initiation for the development of commercially quantum computers. Using the IBM Q, we can run quantum algorithms

through online composer or free python library available.

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## **KIND ATTENTION !**

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**Prof. (Dr.) S S Agrawal**  
Chief Editor

# Data Analytics Solution in Banking

► M. S. Minu and Zoya Ahmad

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Whether it is a web page we open or a transaction we make, we produce huge amounts of data. All these actions amount to around 2.5 quintillion bytes of data daily. Such huge amounts of data can be helpful in almost any industry, including the banking market. The bulk of data generated and handled in the banking and financial sector is humongous. Therefore banking being one of the most sought after business domains that makes the highest investment in big data and BA technologies is not a surprise.

Financial services are vigorously using the concept of big data analytics to improve scalability, derive business insights and store data, as the number of electronic records increase. Except for those occasions wherein we withdraw cash from an ATM or submit physical forms at any bank branch,

client interactions with banks have become mostly online. The extrapolative power of risk models that financial institutions and banks use can also be improved by applying big data analytics. It gives an understanding into many multifaceted areas of an individual's life including their preferences, needs and lifestyle of the customer. The individual needs of the customers can be met as the banks can easily personalize their services.

The big data analytics market, according to the study by Institutional Deposits Corporation (IDC), in 2019 was valued at USD 29.87 billion and by 2025; it is expected to reach USD 62.10 billion, at a CAGR of 12.97% over the forecast period 2020 – 2025.

## Benefits of Using Big Data Analytics In

### Banking Sector

The upper hand of using big data analytics in the banking sector are—

- **Client Experience is personalized:**  
Personalized banking solution to a customer is perhaps the most important aspect of any business. Big data analytics can be used to improve it tremendously. It can be used for the analysis of data for previous transactions. The accounts those are more likely to close in the forthcoming months and take preventive actions can be detected.
- **Targeting and Subdivision of User:**  
By analysing data, you can detect problems in your product targeting and understand your customers' needs.

This will help you fix the existing issues in the best way possible. Big data lets you plan targeted marketing campaigns that will generate additional revenue.

- **Automation and Optimization of Business Practice:** By eliminating the human factor, some grave processes in bank operations can easily be automated to reduce the risk of failure. This practice can be automated through technology such as machine learning and AI. This can decrease the time, effort, money, and amount of errors associated with the human factor.
- **Management of Risk and Improved Cyber-Security:** Cyber-security is the most burning issue in the banking sphere, and big data analytics can substantially improve it. Big data analytics is applied to recognize potential risks, including fraud or even terrorist activities.
- **Better Employee Performance and Management:** Big data can also help get insights into the day-to-day performance of every worker in real-time. The performance of different branches can also be analysed and their productivity measured.
- **To Prevent Blunders and Frauds, Application of Efficient Risk Management:** Potential risks associated with money lending processes in banks are identifiable by

Business intelligence (BI) tools. The market trends can be analysed and the banks can decide on lowering or increasing interest rates for different individuals across various regions with the help of big data analytics.

- **Regulatory Compliances are easily filled:** Analysis and tracking of all the regulatory requirements by going through each application from the customers for accurate validation can be done by Business Intelligence (BI) tools.

### Challenges of Using Big Data Analytics

Just like everything comes with a boon and a bane, big data analytics also has its issues. They are certainly not same in number as the benefits, but they are still quite prominent and should be addressed—

- **The Problem with Legacy Systems:** The legacy systems can't keep up with the ever-growing workload of big data. The out-dated infrastructure simply cannot do what is required of them. This means that very soon, banks will either have to grow their processing capacities to rebuild their systems entirely.
- **High Threats:** Cyber-security remains the main issue for financial institutions across the world. Collecting data always comes with a risk. This risk increases with an increase in the amount of data. Out-dated technology which is used to process, analyse and store data will

soon pose to be a grave problem in the coming future. Therefore, if the data is bigger, the risk will be higher.

- **The Big, Immense Data:** Big data is getting too big. With the amounts of data constantly growing, the percentage of useless data continues to be extremely high making the relevant data very hard to find and separate from the meaningless one.

Despite the above-mentioned challenges, the benefits of big data in banking area easily validate any threats. Data is a universal fuel that can boosts your business to the top. The knowledge and insight that it provides you with, the money it saves and the resources it frees up.

Using big data analytics can be very helpful in any sphere, in banking especially. It is important to understand the trends in big data analytics to be able to make predictions for the future and be ahead of your competitors by satisfying your clients to the fullest.

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# Evolution of Interfaces in History of Java

Want to learn more about how interfaces have changed over the course of Java's history? Check out this article on the interface changes over the years.

▶ Pravin Jain

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The Java programming language has evolved over a period of more than two decades now. There is no other programming language that has evolved so much over such a long period of time, while also maintaining support for its legacy code-base. Java has always provided backward compatibility to the maximum possible extent while keeping pace with the new features available in most of the current programming languages.

The Java programming language is mainly about developing four kinds of types – classes, interfaces, enums, and annotations. The enums and annotations appeared from Java 5 onwards. In this article, I would like to talk about the evolution of the interface type in the Java programming language.

The interface in Java was initially designed as an abstract type, which could be used for multiple inheritance of types. In Java 1.0, an interface definition could contain only two kinds of members static constants and abstract methods:

```
public interface SomeInterface {
    int SOME_CONSTANT = 35; // variable
    declaration
    int abstractMethod(int x, int y); // method declaration
}
```

All variable declarations in an interface would always be public static and final and would require an assignment. Along with that, all methods in an interface would be public and abstract.

Having only abstract methods and no implementation for methods in an interface, this allowed it to be used for the multiple inheritance of types, while still avoiding the diamond problem of multiple-inheritance.

A class could inherit abstract methods of the interface or provide an implementation. When the same method signature appears in the super-class and also in an interface it is implementing, then the method is inherited from the super-class and not from the interface.

Java 1.1 introduced the idea of inner classes where a class could be a member of

a class. From Java 2 onwards, we had the static nested classes and interfaces, and these could also be used inside an interface. Thus, since Java 2, we had four kinds of members in an interface static constants, abstract methods, nested classes, and nested interfaces:

```
public interface SomeInterface {
    int SOME_CONSTANT = 35; // variable
    declaration
    int abstractMethod(int x, int y); // method declaration
    // nested class definition
    class NestedClass {
        // members of a class
    }
    // nested interface definition
    interface NestedInterface {
        // member of an interface
    }
}
```

All nested classes and interfaces, defined in an interface would always be public and static.

Later, Java 5 was released with lots of new features. It introduced the generics and the new enum and annotation types.

The generics introduced in Java 5 are about type parameters. We have the generic classes, generic interfaces, and generic methods, i.e. classes, interfaces, and methods, that could be defined with type parameters. So, from Java 5 onwards, we could have six types of members in an interface, using static constants, abstract methods, nested classes, nested interfaces, nested enums, and nested annotations.

```
// generic interface with one type
parameter T
public interface SomeInterface<T> {
    int SOME_CONSTANT = 35; // variable
    declaration
    int abstractMethod(int x, int y); // method declaration
    T abstractMethodUsingGenericType
    (T[] array, int i); // method using type
    parameter
    // nested class definition
```

```
class NestedClass {
    // members of a class
}
// nested interface definition
interface NestedInterface {
    // member of an interface
}
// nested enum definition
enum NestedEnum {
    OBJECT1,
    OBJECT2,
    ;
    // methods, variables and
    constructors
}
// nested annotation definition
@interface NestedAnnotation {
    String attrib1();
}
}
```

The type parameter, T, in the interface definition could only be used for abstract method's return type and parameters for the abstract method. It cannot be used with the static members. The nested enum and annotation are always public and static.

An important feature of Java has always been its backward compatibility. Even though the language has evolved over the years, great care was taken to support legacy code bases. All newer Java versions have always been able to compile and run older source code – without making any changes to the code. This support often comes at a cost. Interfaces are an example of this. The key feature of an interface is that it can only have abstract methods. To allow for backward compatibility, this behaviour cannot be easily changed, making it nearly impossible to enhance the existing interfaces in the API with newer methods. Consider the List<E> interface that has existed since Java 2. It would have been desirable to introduce a sort method for List<E>, but it could not have been added as an abstract method since this would break the code for all existing classes that implement the List interface.

To solve this problem, Java 8 added

default methods as members in the interface. This allowed the interface to be enhanced with new methods, providing a default implementation for the new method. Java 8 also allowed interfaces to include static methods. Therefore, from Java 8 onwards, the members of an interface can be static constants, abstract methods, default methods, static methods, nested classes, nested interfaces, nested enums, and nested annotations:

```
// generic interface with one type
parameter T
public interface SomeInterface<T> {
    int SOME_CONSTANT = 35; // variable
    declaration
    int abstractMethod(int x, int y); // method declaration
    T abstractMethodUsingGenericType
    (T[] array, int i); // method using type
    parameter
    default int defaultMethod(int x, int y) {
        // implementation of method
    }
    static void main(String[] args) {
        // any static method, including main
        can be included in interface
    }
    // nested class definition
    class NestedClass {
        // members of a class
    }
    // nested interface definition
    interface NestedInterface {
        // member of an interface
    }
    // nested enum definition
    enum NestedEnum {
        OBJECT1,
        OBJECT2,
        ;
        // methods, variables and
        constructors
    }
    // nested annotation definition
    @interface NestedAnnotation {
```

```
        String attrib1();
    }
}

The default and static methods in an interface are always public. Now, since we have default methods, which are implementations, it meant that, in Java, we now also have multiple inheritance of behaviour and not just types.
```

Now, we have the diamond problem of multiple inheritance in Java. Since we can implement behaviour via default methods, we can now have a repetitive, common code, which can be duplicated in multiple default methods within the same interface. To avoid this, we would normally break the implementation of a method into smaller methods. And, since these methods may not really be required to be available outside the interface, they should ideally be private. This can now be done with Java 9, which introduced private methods in an interface.

The supported members in an interface from Java 9 onwards are static constants, abstract methods, default methods, static methods, private methods, nested classes, nested interfaces, nested enums, and nested annotations:

```
// generic interface with one type
parameter T
public interface SomeInterface<T> {
    int SOME_CONSTANT = 35; // variable
    declaration
    int abstractMethod(int x, int y); // method declaration
    T abstractMethodUsingGenericType
    (T[] array, int i); // method using type
    parameter
    default int defaultMethod(int x, int y) {
        // implementation of method
        // can call the privateMethod and
        privateStaticMethod here
    }
    static void main(String[] args) {
        // any static method, including main
        can be included in interface
    }
}
```

```
// can call privateStatic method here
}
private int privateMethod(int x, int
y) {
// private method implementation
}
private static void
privateStaticMethod(int x, int y) {
// private method implementation
}
}

// nested class definition
class NestedClass {
// members of a class
}
}

// nested interface definition
interface NestedInterface {
// member of an interface
}
}

// nested enum definition
enum NestedEnum {
    OBJECT1,
    OBJECT2,
    ;
// methods, variables and
constructors
}
}

// nested annotation definition
@interface NestedAnnotation {
String attrib1();
}
}
```

## Conclusion

It is interesting to note how the nature of an interface has evolved over the years while maintaining backward compatibility. Before Java 8, a core tenet of an interface was that it can only have public and abstract methods. However, from Java 8, an interface can also have non-abstract methods, and Java 9 onwards it can also have private methods.

Hope you enjoyed this article on the evolution of interfaces in Java! Please let me know what you think in the next issue.

## About the Author



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# Green Buildings in India

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**Green Building (GB)** has received increased attention over the last 15 years from both policymakers and environmental economists; which has impacted the entire life of a building. This article presents the need of green building in India and the efforts by policy makers to set the parameters involves in procedures from planning to design, build, operate, maintain, renovate and finally exterminate. IGBC (Indian Green Building Council) is the India's foremost renovate for green building accreditation and associated services. This council provides broad ranges of services consisting of innovative green building evaluation events, accreditation services as well as offer many training and instruction programs for green building.

Green Building idea has an era-accomplishing importance, can decrease the misuse of resources, enhance resource consumption, and lessen human actions on the devastation of nature. The usage of ecologically responsive energy-conserving techniques in green buildings should go throughout the entire procedure of building design, construction and use, facilitating green energy conserving technologies to boost their efficiency

**Introduction:**

Green Computing and its related networking basically implies to climatically sustainable computing or Information Technology. It refers to the review of designing and developing; manufacturing and consuming and later scraping of personal computer, high capacity servers and its associated subsystems. This may include devices like display screens, printers, bulk storage devices, and communications devices and systems - resourcefully and efficiently with negligible or no impact on built architecture [1]. Green Information

Technology further struggles to accomplish financial sustainability and improves performance of the system and its utilization, while enduring by our communal and principled liabilities in buildings structures. Thus, green IT integrates the aspects of ecological sustainability, the financial side of energy effectiveness, and the cost of possession, which contains the cost of discarding and reusing within useful constructed architecture. It is the analysis and method of utilizing computing assets effectively in civil structures to lower the

operating expenses and climate impact.

Green Building (GB) describes to both a construction and the application of procedures which are climatically accountable and full of effective sources looking at a process of any civil construction site. This involves procedures from effective preparing plan to designing, building structure, functioning, maintaining and restoration. It also includes renovation and later demolition. With ever increasing acknowledgment that man-made green house gas emission are the most important



Fig 1. Clean and Green Campus of KJEI Trinity Academy of Engineering Pune

component of global warming, businesses, government authorities, and communities largely now have established an essential modern program which involves confronting ecological problems and accepting environmentally sensible methods. Adapting to green revolution; our IT commodities, applications, service sectors, and activities in civil structures are profitable and environmentally essential with respect to our societal obligation. Hence, increasing quantity of IT suppliers and consumers are turning towards greening out technology and thus supporting in construction of building a green society and financial system. AICTE has started Clean and Smart Campus Award from academic year 2019-2020 to encourage cleanliness in technical institutes and promoting green and smart use of technology. Many colleges have participated for these awards. Fig. 1 shows the cleaner and beautiful greener campus KJEI's Trinity Academy of Engineering Pune.

A review [2] presents a detailed and extensive literature that leads to the acceptance of green building practices amongst construction collaborators. A conceptual model named 'Green Building Sustainability Model' has been established by [3] for Indian green building scenario which reveals that collective efforts of government agencies and other stakeholders play a key role in creating a tactful-mix for green buildings that lead us to sustainable development.

### **Need of Green Technology**

Even though innovative techniques are continuously being established to supplement current methods in crafting structures towards green technology, the mutual intent of greener buildings is to decrease the whole effect of the developed ecosystem on our social well being and in turn on the ecosystem by:

- Effective utilization of planning and distribution of water, energy, and other reserves
- Safeguarding inhabitant wellbeing and enhancing worker efficiency
- Decreasing trash, pollution and environmental deprivation

Building Information Modeling (BIM) is a procedure that integrates the creation and managing regarding digital interpretations of natural and operational attributes of areas. BIM's are the important statistics that can be mined, swapped or interacted to assist

making important decisions concerning a construction or other built resource. Existing BIM tools are utilized by people, companies and federal organizations that plan, design, build, manage and keep varied physical structures like water, trash, electricity power, networking services, streets, railways, overpasses, docks and subways.

The most complained problem about building ecologically sustainable architectures is the cost. Photo-voltaics, novel machines, and state of the art inventions have a tendency to amount for additional capital. Many of the green structures price a payment of less than 2%, however generate 10 times as far throughout the whole life cycle of the architecture. In apprehensions to the economic advantages of green structure, above 20 years, the financial gain usually surpasses the supplementary price of greening out by a component of 4-6 times. And wider advantages, like cutbacks in Greenhouse Gases (GHGs) and additional contaminants result in huge optimistic influences on nearby areas and on globe. The disgrace is among the awareness of capital expense vs. return on investment. The reserves in cash arrive from extra effective utilization of services that result in reduced energy charges. It is estimated that various type of consumers could put aside \$130 billion on power payments. Also, superior operative or student efficiency can be itemized in savings and tax deduction.

A case study on building a greenhouse using their local resources and new sustainable technology in Jammu region using indigenous material presented in [4] where the issues of sustainability is new. In small towns and cities across India such concept is still in its natal stage. With the ever increasing population and urbanization, the requirement of affordable sustainable houses is need of the hour. This research article aims at developing a green residence in Jammu city, where the concept of sustainability is new. The research focuses on local resources available and utilizing natural resources efficiently; establishing green roofs, planting trees to control the overall temperature and provide better air quality; and making an effort towards conserving resources and reducing the carbon foot print." Various investigations have demonstrated the noticeable advantage of green building programs on worker efficiency. In common it has been found that, there is a direct

connection between enhanced productivity and workers who enjoy being in their work area. In particular, employee productivity can be substantially impacted by several attributes of green building design such as better illumination, decline of pollutants, sophisticated air circulation systems and the usage of non-toxic building supplies. The U.S. Green Building Council provides an additional particular illustration of how industrial energy retrofits improve employee health and thus production because people in the U.S. spend around 90% of their time indoors. EPA studies indicate indoor levels of pollutants may be up to ten times higher than outdoor levels. LEED – accredited constructions are intended to have healthier, cleaner indoor ecological condition, which implies health advantages for residents [3].

Investigations have demonstrated for last 20 years of life span, certain green buildings have generated \$53 to \$71 per square foot return on investment. Authorizing the ability to renting of green structures investments, supplementary surveys of real-estate marketplace have determined that LEED accredited buildings accomplish expressively developed rents, sale prices and tenancy rates as well as lesser capitalization rates hypothetically showing reduced investment risk.

### **Green building in India**

Working towards green building is beneficial in decreasing carbon footprint leading to an eco-pleasant atmosphere [5] using green building layout which can easily implemented in India. Few agencies have also been formulated by the government of India over the last decade to encourage the energy effective, eco-responsive and green building procedures. To name the most significant one, *Confederation of Indian Industry (CII)* established *The Indian Green Building Council (IGBC)* in 2001. The council is founded at CII Green Business Centre, Hyderabad that is India's 1<sup>st</sup> Platinum rated green structure. The idea of the council is to facilitate sustainably developed ecosystem for all. GRIHA (Green Rating for Integrated Habitat Assessment) aims to reduce a building's resource expenditure, garbage production, and total environmental effect to inside some nationally tolerable restrictions.

IGBC is the topmost organization for accreditation of green structures and associated customer services. Presently, through sturdy foundation from several

collaborators, they have accomplished the subsequent substantial objectives:

- Building sites more than 5500 have been enlisted with IGBC from different regions of India and abroad, costing to an overall area of 7 billion sq. ft.
- Around 25 IGBC green construction rankings to incorporate all categories of projects - residential, commercial, industrial, healthcare, etc.
- More than 2000 IGBC Affiliate Establishments comprising of real estate developers, corporate, consultants, institutes, government, architects etc.
- Over 4,150 skilled IGBC Accredited Green Building Experts; farther than 30,000 collaborator shave been trained by IGBC till date.

IGBC endorses the green ventures that are abstracted, planned, built and operated as per IGBC Ratings. Till the time, around 1,250+ventures (around 400 million sq. ft) are ranked by IGBC. These IGBC-tiered ventures, as related to traditional constructions, have shown enormous fund reserves to the magnitude of up to:

- 15,000 MWh of electrical power per million sq. ft. per year
- 45,000 KL of rain water per million sq. ft. per year
- Commissioning of 100 MW of nonconventional energy resources in IGBC accredited ventures
- Decreased CO<sub>2</sub> discharges by 12,000 tons per million sq. ft. per year
- Redirected 500 Tons of construction garbage from landfill per million sq ft.

The primary aim of IGBC Green League (IGL) is "Learning & Growing: Together". This specific program has been undertaken by IGBC Mumbai Chapter. The suburban construction field is the biggest customers of electrical power in India. Constant urbanization and expansion of residences causes to escalate electrical energy utilization in cities. Hence, whilst specialists say about the enormous capacity for electrical energy savings in this area, the confidence still prevails between collaborators that energy-effective constructed sites are more costly as compared to traditional buildings, which negatively influences "greening" civil and architectural segment. This principle is challenged by investigations discovering proofs for contrary being the argument.

### Conclusion

Green building is beneficial to lower energy usage, protecting land reserves and water utilization, can decrease the generation of soil and water contamination and air pollution, to fulfill the needs of the times and to improve people's class of living. In future prospect of the construction business, green building will turn out to be its major artistic model, to appeal people to purchase, for the coordination between man and environment and general development circumstances. There is an urgent need for defining well integrated policy and official scheme to safeguard the ecosystem and develop a greener India.

Green building is a modern architectural model, as well as the advancement path of new construction business. It will be the

novel technique thought of construction industry in current times. Green building is all the way through the building design, construction and usage, from the entire procedure to accomplish the full span of green building. We still need to formulate few procedures that permit more substantial advantages to the customers and re-organization of the credit-point method for green building stakeholders.

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### About the Authors



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# An Energy Efficient Relaxation-based strategy for Green Computing

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## 1. Introduction:

Green Computing is the term used to represent the proficient utilization of resources in computing. Green computing technology watches out for the powerful utilization of computing resources. In computing gadgets for example, PCs, cell phones and other electronic materials utilization of energy is the prominent need due to the high battery consumption, limited power supply and lifetime.

Because of the computational difficulties of data innovation equipment, the prevalence of vitality increases significantly. Although most customers are aware of the fact that the energy consumed by the smaller devices are more and therefore are looking for plans to increase the battery life. Energy management estimates can be made in several stages, for example at hardware level, flexibility level, operating system and client level [1]. Eco-friendly technologies are being used as a change of perspective to reduce energy consumption and improve the life cycle of estimated small gadgets.

The objective of this article is to analyze and quantify the energy discarded during day by day routine exercises of conventional residents on the web, since they need different instruments and applications with various equipment arrangements on unmistakable operating systems.

## 2. Need for Green Computing

Utilization of PC and IT administrations has made people life simpler and more comfortable. It speeds up and controls energy utilization. This huge measure of energy utilization expands the emanation of greenhouse gases and expands the contamination as well [2]. Energy utilization is also increasing because of, leaving the system on even when they are not being utilized. Alongside this, a lot of energy squandered in IT, since data centers require lots of power and coordinating cooling capacity when it isn't accessible then it causes ecological pollution. Green

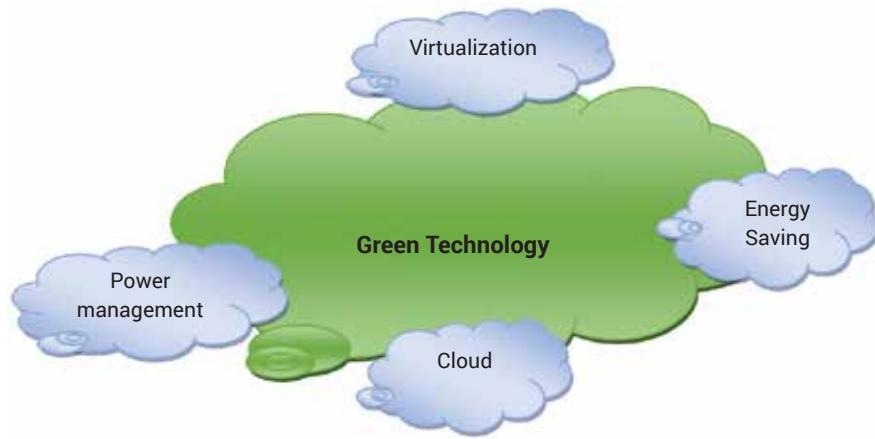


Fig. 1 : Green Computing

computing manages the idea of decreasing energy utilization [3], recycling reduces risky components yet it additionally manages to lessen in the business travel sharing the resources and improvement. There are number of fundamental steps that can be taken to significantly diminish the power utilization and impact on the environment. Fig. 1 shows the parts of green computing which are examined beneath.

### 2.1 Energy Consumption

As indicated by the ecological security organization around 30%to 40% of PCs are kept ON during the weekends and even after office hours and around 90% of these PCs remain inactive On the off chance that we build up any application in a green computing environment, it will utilize ideal physical resources.

### 2.2 E-waste recycling

Many developed countries are more grounded in innovation technologies subsequently a colossal measure of PC systems and, related items are disposed of consistently. These items are sold out to other developing nations. In this way, reusing of electronic items are accomplished. Along

with this, reusing materials utilized in the development of PC equipment, for example, tin, silicon, iron, aluminum and so forth and electronic things, for example, broad media segments, cell phones and other handheld electronic gadgets contribute a great deal in lessening energy proficiency. Reusing of computing equipment such as lead and mercury empower to supplant hardware that generally would have been made. The reuse of such types of equipment permits sparing energy and diminishing impact on the environment, which can be due to electronic squanders.

### 2.3 Virtualization

Virtualization is to consolidate few physical systems into virtual system in a single server to run numerous operating systems and make it all the more dominant. Energy proficiency can be accomplished with less physical equipment connected, which lessens power and expend less electricity. A few business organizations and open-source ventures presently offer software packages to empower progress to virtual computing. The reality virtualization alone doesn't expand vitality and resource efficiencies.

Therefore, combined with the right abilities and operational and engineering models, automation minimizes the need for a physical framework that thusly augments the energy and resource efficiencies from server virtualization.

#### 2.4 Cloud as Green computing:

Organizations are rapidly moving from conventional framework to cloud-based framework on account of its quicker scale-up/downsize limit, pay-per-use, and access to cloud-based administrations without acquiring and overseeing on-premises structures. The compensation per-use office of cloud foundation gives resource efficiencies and energy simultaneously and Promote consumer to spend as it were those assets which are required. The IT association can accomplish energy effectiveness and maintainability objectives by moving the heap from standard servers to cloud servers. IT companies are getting maximum percentage of their power from materials which emanate fossil powers, on the off chance that cloud suppliers has to put their resources into feasible sources of power. This can be accomplished by producing power from natural recourses. A combination of assets can improve usage and give more space, power and cooling limits inside a similar office envelope.

#### 3. Relaxation-based Algorithm

A Relaxation-based algorithm has been proposed for the low-cost energy consumption of system devices. When the system topology gets perplexing or the schedule vacancies |IT| increases, the complication in computation of taking care of the Cost-Min issue straightforwardly will also increase because of the paired factors.

##### 3.1 Approximation Ratio

The minimum and maximum network hops of two nodes are represented as  $H_{min}$  and  $H_{max}$  respectively. Consider  $C^*$  is the desirable total energy cost function, and it has been described as,

$$C^* \geq M.E + V.H_{max} + T.H_{min}.M$$

Now energy cost  $C$  is determined by using the following equation,

$$C \leq M.E + V.H_{max} + T.H_{min}.M$$

The calculation of approximation ration is defined below,

$$\frac{C}{C^*} \leq \frac{M.E + V.H_{max} + T.H_{min}.M}{M.E + V.H_{max} + T.H_{min}.M}$$

#### Algorithm

Require: Network Graph  $G_n = (V, E)$ , Green Energy  $G_e = (V, E)$   
Ensure: green energy which is transferring between the nodes of edges  
Relax the integer variable  $x_i(t)$ , solve the Cost-Min-LP problem

$$\text{Min: } \sum_{t \in T} (\alpha \sum_{i \in I} (s_i(t) - g_i(t)) + \beta \sum_{i \in I} \sum_{j \in I} \mu_{ij}(t)), \quad 0 \leq x_i(t) \leq 1.$$

for all time  $t \in T$  do

sort  $x_i(t), i \in I$  decreasingly  
counter = 0

for all  $i \in I$  do

if counter < 1 then  
counter ++,  $x_i(t) == 1$

else

$x_i(t) = 0$

end if

end for

end for

Take  $x_i(t)$  into the Cost-Min, and obtain the energy transmission  $\mu_y(t)$

$$\begin{aligned} &\leq \frac{M.E}{M.E} + \frac{(V + T.M).H_{max}}{(V + T.M).H_{min}} \\ &= 1 + \frac{H_{max}}{H_{min}} \end{aligned}$$

Therefore,

$$C \leq \left(1 + \frac{H_{max}}{H_{min}}\right)$$

$$G^* \leq (1 - A_{min})G_o$$

$$G \geq (1 - A_{min})G_o$$

The approximation ratio for the ideal solution can be determined in two distinct ways: with and without adequate green energy.. For this case, the approximation ratio can be calculated as,

$$\begin{aligned} \frac{G_r}{G_o} &\leq \frac{1 - A_{min}}{1 - A_{max}} \cdot \frac{G}{G^*} \\ &\leq \frac{1 - A_{min}}{1 - A_{max}} \cdot \frac{C}{C^*} \\ &= \frac{1 - A_{min}}{1 - A_{max}} \cdot \left(1 + \frac{H_{max}}{H_{min}}\right) \end{aligned}$$

Then again, when green energy runs out we have to consume brown energy ( $G_o - G_r$ ),

$$\begin{aligned} \frac{G}{G^*} &\geq \frac{(1 - A_{max})G_r}{(1 - A_{min})G_o} \\ &= \frac{1 - A_{max}}{1 - A_{min}} \end{aligned}$$

$$\begin{aligned} G &\geq \frac{1 - A_{max}}{1 - A_{min}} \cdot G^* \\ C - G &\leq \frac{\left(1 + \frac{H_{max}}{H_{min}}\right) \cdot C^* - \frac{1 - A_{max}}{1 - A_{min}} \cdot G^*}{C^* - G^*} \\ &= 1 + \frac{H_{max}}{H_{min}} + \frac{\left(1 + \frac{H_{max}}{H_{min}} - \frac{1 - A_{max}}{1 - A_{min}}\right) \cdot G^*}{C^* - G^*} \end{aligned}$$

Here,

$$\alpha = \frac{1 - A_{max}}{1 - A_{min}}, \beta = \frac{H_{max}}{H_{min}} \text{ and } K = \frac{C^*}{G^*}$$

The approximation ratio  $\Gamma$  can be described as,

$$\Gamma = \begin{cases} \frac{K \cdot (1 + \beta) - \alpha}{K - 1}, & \text{without green energy} \\ \alpha \cdot (1 + \beta), & \text{with green energy} \end{cases}$$

#### 4. Experimental Discussion

The topology of Abilene Network with 15 hubs is experimented here. Two hubs among the hops is haphazardly set inside range [1, 10], hub pair range for the proportion of attenuation is [0.001, 0.05]. The efficient green energy rate as well as the task arrival rate is in the range[0, 1000] and[0, 30] respectively. The energy efficiency of the Relaxation-based algorithm, with green energy and without green energy has been depicted in Fig. 2

The performance of the Relaxation-based algorithm has been investigated under various settings for energy consumption. Due to the local green energy utilization the Relaxation-based algorithm produces less energy efficiency. It can also be observed that

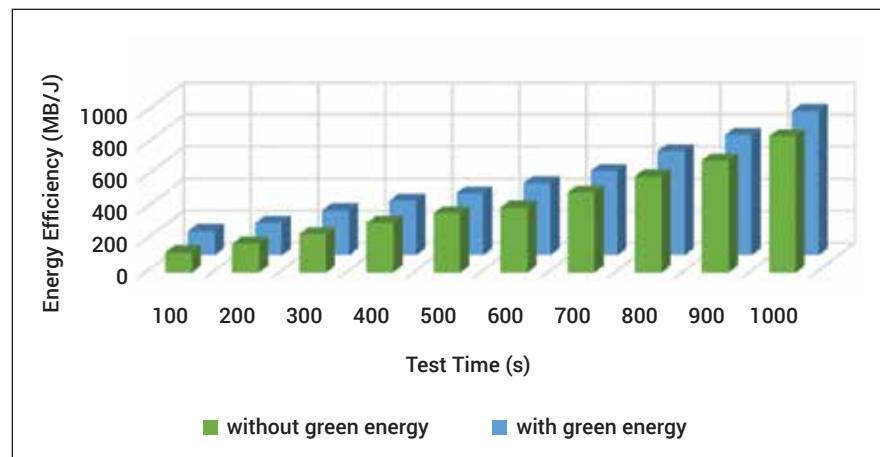


Fig. 2 : Energy Efficiency

with Relaxation-based algorithm the energy consumption of both with and without green computing increases in a fastest rate.

### 5. Conclusion

Green computing is an idea that is utilized in scarcely any associations however in the event that everybody utilizes its parts

then it could be valuable for everybody. When the quantity of PCs approaches 5 Billion by 2025, the potential related to energy use,  $CO_2$  outflows and e-waste are unquestionable. Thus, legitimate usage of Green computing will help turn to save energy and remove pollution. Brown energy consumption is the

cause of concern in future and this article demonstrated the minimization of brown energy using relaxation based algorithm.

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### About the Author



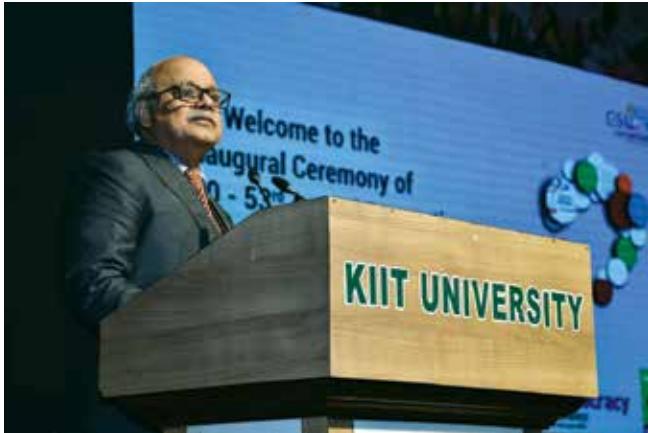
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### Themes for CSI Communications

2020

Month & Year	Theme	Month & Year	Theme	Month & Year	Theme
January, 2020	Computer Assisted Education	March, 2020	Big Data Analytics	May, 2020	Semantic Web
Feburary, 2020	Green Computing	April, 2020	IoT	June, 2020	Quantum Computing



**Hon'ble Justice Shri. Pinaki Chandra Ghosh, Chairperson, Lokpal, India is delivering the inaugural address in the CSI Annual Convention 2020**



**Hon'ble Chief Minister Shri. Naveen Patnaik addressing the gathering in e-Governance award function of CSI Annual Convention 2020**

The 53<sup>rd</sup> Annual convention CSI2020 was held at Bhubaneswar KIIT University Campus during 16<sup>th</sup> to 18<sup>th</sup> January 2020. The theme of the convention was "Digital Democracy – IT for Change" is a burning topic of present day. Though democracy was started 2500 years back in Greece present day Digital Democracy will make a reformation in democratic process. The event was basically classified into three categories i.e. Convention, Conference and award Ceremonies.

The convention was started by pre-conventional tutorial on 15<sup>th</sup> January, 2020 and was formally inaugurated by Hon'ble Justice Shri. Pinaki Chandra Ghosh, Chairperson, Lokpal, India with various dignitaries including Hon'ble Minister of Electronics & IT, Odisha, Dr. Sasmita Samanta, Pro-VC, KIIT University, President IFIP, Dr. Subash Pani, Secretary AICTE and many others. Key note address was given by Prof. K K Agrawala, Chairman, NBA and Mrs. Rajita Kulkarni, President Sri Sri University and Prof. L. M. Patnaik

Various topics were covered in this 3 days conference including Future of AI, ML & Robotics, Entrepreneurship, Implementation of AI and robotics in industry and Startup Meet.

The Digital Democracy session was very exciting with Shri. Tarun Vijay, Chairman National Monuments Authority and Ex. M. P. and Shri. Vineeth Goenka, Governing Body Member CRIS and Sofocol. Panel Discussion on ICT for sustainability and IT for under privileged with SIG eGov Track were very good with eminent speakers. YITP and IT Excellence Award Ceremony were completed successfully.

SIG CSI eGovernance Award ceremony was the centre point of excitation organised by Shri. S. N. Prabhu and Dr. R K Vyas, VP CSI. Shri. Naveen Patnaik, Hon'ble Chief Minister of Odisha was Chief Guest with Hon'ble Minister E&IT, Odisha, Dr. Achyuta Samanta, Hon'ble MP Shri. Tarun Vijay and Shri. Vineeth Goenka, Shri. B. P. Acharya, Spl Chief Secretary Telengana, IT Secretary Odisha were other guests. eRatna award was given to Shri. Naveen Patnaik. Life Time Achievement Awards were given to Shri. Achyuta Samanta.

Fellowship award were given to Justice B K Patel, Prof. Sasmita Samanta, Dr. Gulsan Rai, Dr. Ajay Singh, Dr. R. N. Behera, Shri. A.K. Saini, Shri. Anirban Mukherjee and others. State and other awards were given at National level.

There was a good session on Cyber Security Dr. R. N. Behera as Chair and speakers Shri. Gulsan Rai, D G Prisons etc. Panel discussion on eGovernance and Connecting the Unconnected was done successfully. The valedictory Session was very exciting with lots of CSI level awards with Hon'ble Shri. Justice Sanjay Mishra, Odisha High Court was Chief Guest. The entire event was co-ordinated by Shri. R. K. Vyas , VP CSI, Convener CSI Shri. Manas Patnaik, Prof. P. K. Behera, Prog. Chair, Dr. R. N. Behera, Industry Chair with advise of other dignitaries Prof. Sasmita Samanta, Dr. Samarth Mishra, Dr. Subash Pani, Prof. L. M. Patnaik etc. Prof. A. K. Nayak, President CSI and Shri. Sanjay Mohapatra, Past President CSI were present on this occasion.

There was a good cultural programme in the evening followed by KIIT Founder Dinner.

## Report on Technical Program CSI2020

The 53<sup>rd</sup> Annual convention CSI2020 brought together eminent personalities and remarkable scholars during 16<sup>th</sup> to 18<sup>th</sup> January 2020 at KIIT University, Bhubaneswar. The theme of the convention was "**Digital Democracy – IT for change**" is not just trending but also time relevant. This will set the tone for the upcoming generations and many research topics in this field for years to come. Digital Democracy is reflective of where the computer society and communities are heading, emphasizing on the need to adapt to changing times both nationally and internationally, to keep up with the ever changing demands and challenges.

Prof. L. M. Patnaik (Adjunct Prof. IISc, Bangalore) graced the convention as the general chair and provided his guidance and invaluable advises. Prof. Prafulla Kumar Behera (Utkal University, Bhubaneswar) led the convention as Programme chair. The track chairs namely – Prof. Manas Ranjan Patra (Berhampur University), Prof. Siba Kumar Udgata (University of Hyderabad), Prof. Annapa B (NIT Surathkal), Prof. Durga Prasad Mohapatra (NIT Rourkela) have contributed immensely with their sincere efforts in the review process. Purna Chandra

Sethi (Rama Devi Women's University, Bhubaneswar) shared the responsibility as Convener of Technical Programme. A large number of approximately 188 reviewers gave their priceless efforts and humbling expertise.

The convention had an array of renowned professors for the invited talks – Prof. Amit Mishra (University of Capetown, South Africa), Prof. Sukumar Nandi (IIT Guwahati), Prof. Sudeep Mishra (IIT Kharagpur), Prof. S. K. Udgata (University of Hyderabad) and Pragati Gokhle (Advisor Science & Tech. Comm.). The papers were presented in 14 sessions and were chaired and judged by 28 eminent professionals from different Universities across the country.

The authors and presenters have submitted exceptional papers, which truly made this convention a success. We had received a total of 144 papers, out of which we shortlisted 40 regular papers, 15 short papers and 13 poster papers. All the papers were reviewed by number of subject experts and tested for similarity index using Turnitin. Total 46 number of papers were presented during the Convention. All the presented papers will be published in the coveted Springer CCIS series.



Chief Guest of the valedictory function Justice Shri. Sanjay Kumar Mishra, Hon'ble Judge of Odisha High Court is releasing the Journal of Computing along with other dignitaries on the dias.

## Award Ceremony – School Model Examination

Reported by Prof. J. Jerald Inico, Chennai Chapter Secretary



CSI, Chennai Chapter was very proud to organize its 25<sup>th</sup> School Model Examination on Computer Science on Jan 07, 2020. These initiatives are helpful to the schools and students to know various other dimensions to look in to before appearing for the regular board examination. Many schools were volunteered to conduct this model examination to help their students to score more than expected. The questions were prepared by the school teachers from various corners and were edited by team of experts before finalizing the question paper. The printed question papers and answer sheets were sent to the schools in a sealed cover to maintain the secrecy of the questions. The schools were instructed to conduct the examination on Jan 07, 2020 and have returned the answer sheets for central evaluation held at SSSS Jain College for Women, T. Nagar, Chennai. The Principal, staff members and students of Sri Venkateswara Higher Secondary School, Chennai, Velammal School, Chennai and D.A.V School, Chennai were invited to receive the prizes. Prof. Mythili Prakash, former MC member and former secretary, CSI-Chennai Chapter coordinated the examination for the last 16 years with the help of CSI Education Directorate and MC members of Chennai Chapter.

The award ceremony for the same is organized on Saturday 25th January 2020 at 10.30 am at CSI-Education Directorate, Taramani, Chennai. Prof. J. Jerald Inico, Hon. Secretary, CSI Chennai Chapter welcomed the gathering and Chairman Dr. E. Iniya Nehru distributed the prizes for the winners. The first Prize was secured by Ms. Gayathri M - Sri Venkateswara Mat. Hr. Sec. School, second prize was shared by Master Nareesh U. D - Vellammal Mat. Hr. Sec. School, Mugapair and Ms. Avesha Tanseera A - DAV Mat. Hr. Sec. School, GillNagar, and the third prize was shared by Ms. Joshikha V and Master Shashank Harihara - DAV Mat. Hr. Sec. School.

The teachers were honored with memento and certificates by Past Chairman Mr. H. R. Mohan, Mr. Vasudeva Rao, Mrs. Latha Ramesh, and Vice Chairman Prof. P.V. Subramanian the event was witnessed by many including Treasurer Mr. Ananda Padmanaban and MC members Mr. Rajaraman, Dr. A. Prema Kirubakaran. The award ceremony ended with a group photo and grand lunch.

## A Report on Presentation and Demo on IoT (Drones)



Memento presented to the resource person by the office bearers of CSI Chennai chapter

CSI Chennai Chapter organized a "Presentation and Demo on IoT (Drones)" on Saturday 25<sup>th</sup> January 2020 at 8.30 am at CSI Education Directorate, Taramani, Chennai. Prof. J. Jerald Inico, Hon. Secretary, CSI Chennai Chapter welcomed the gathering and Chairman Dr. E. Iniya Nehru, gave an introduction about IoT and its real-time uses. He also emphasized on how Government and private sectors are utilizing and expanding their wings into IOT, Robotics and Drones. Prof. P. V. Subramanian, Vice-Chairman, CSI-Chennai Chapter, introduced the resource person Mr. Harish Vardhana D, Manager, SP Robotics with his credentials.

The session started with very interactive Ice Break Questions about Bizarre Innovations in the present and future to participants. Revolution of the Internet in India and History of IoT were briefed. Glimpses about regulatory of IoT enabled devices - mandatory of encrypted cloud key and registration of cloud key were discussed. Speaker also insisted that Data is the magic which is more important.

After the tea break, he demonstrated the IoT devices by using the "Blynk" app and also the board used in the device like Arduino, Raspberry pi. IoT Drones with image capturing video, 2D safety measure using 'Scratch Software' were narrated. He was also kind enough to illustrate it with the IOT kits to the participants.

57 participants including Treasurer CSI Chennai Chapter, Mr. Anantha Padmanaban, MC members, past office bearers, senior CSI members and other delegates were witnessing the presentation. To encourage punctuality, a lucky draw was organized and prizes were distributed. Participation certificates were issued to all. The presentation ended with Vote of thanks proposed by Dr. A. Prema Kirubakaran, MC member, CSI Chennai Chapter, followed by lunch.



Group photo: CSI - Presentation and demo on IOT(drones)

## One day Workshops at various reputed schools and colleges by CSI Agra Chapter (Region-I)

Conducted by : **CSI Agra Chapter in association with Faculty of Computer Application, R.B.S. Management Technical Campus, Agra, U.P. on December, 2019**

Reported by **Prof. (Dr.) B.B.S. Parihar**, Chairman, CSI Agra Chapter and **Dr. K. K. Goyal**, Secretary, CSI Agra Chapter

Computer Society of India, Agra chapter in association with R.B.S. Management Technical Campus, Agra conducted one-day workshops for intermediate and graduate students to make them aware about cyber-crimes in following schools and colleges of Agra in the month

of December, 2019. Dr. K. K. Goyal (Associate Professor and Dean, Faculty of Computer Application, RBSMTC, Agra) was the keynote speaker of these workshops.



M. D. Jain Inter College, Hari Parvat on "Cyber Security" on 3<sup>rd</sup> December 2019.



Agra Public School, Artoni on "Cyber Security and Data Privacy" on 4<sup>th</sup> December. 2019.



Shri Dan Kunwari Inter College, Anwal Khera on "Cyber Security and Ethical Hacking" on 7<sup>th</sup> December 2019.

# CSI RSC2020

## Regional Student Convention of Region-III

Reported by **Prof. Ashwin Makwana**, Student Branch Counselor, CSI SB- CSPIT



**Prof. A. K. Nayak, President CSI inaugurating the Regional Student Convention with the other dignitaries**

The CSI accredited student branches of Chandubhai S. Patel Institute of Technology (CSPIT) & Devang Patel Institute of Advance Technology and Research (DEPSTAR) have hosted "COMPUTER SOCIETY OF INDIA: REGIONAL STUDENT CONVENTION 2020 (REGION -III)" at Charotar University of Science and Technology (CHARUSAT), Anand, Gujarat, under the theme of "Industrial IoT, Data Science and Machine Learning" on 24th and 25th January, 2020.

Prof. A. K. Nayak, President of CSI graced the event as the Chief Guest. He delivered motivational inaugural speech and shed light on the importance and role of Computer Science in today's era. The guest of honor Mr. Jayant Bhide, Regional Vice President of Region-III, CSI, the dignitaries - Dr Mamta Chandraprakash Padole, Regional Student Coordinator, Region-III, Shri Naginbhai M Patel President: Shri Charotar Moti Sattavis Leuva Patidar Samaj – Mathrusanstha and CHRF, Shri Ashok Patel-Vice President, Kelavani Mandal and IT Advisor, CHARUSAT adorned the event with their presence. CHARUSAT was announced as Winner in Performance of Excellence award in Region III for 2019-20 and GLS University was announced as Runner Up for the same.

In this Regional Student Convention more than 800 participants participated in the convention from different colleges of Gujarat, Rajasthan and Maharashtra. 16 events were conducted simultaneously. Workshops on 4 major areas of Computer Science - Human-Computer Interaction with AWS Alexa, Image Classification using Machine Learning with TensorFlow and Keras, Internet of Things (IoT) and Recommendation System were conducted. College



**Dignitaries on the dias in the Regional Student Convention of CSI Region-III**

students participated in Codemantra, Poster Presentation, Project Presentation, Quiz Technova, Group Discussion, SDLC or UML Design Context. Each participant was provided a registration kit, breakfast and lunch for both the days of convention.

Total of 225 School students from different cities of Gujarat participated in competitions on Programming in C and Python, HTML, Paper or Poster presentation on Technological trends in IT and Debate etc. As a social initiative, registration fees for school students were waived off. Team of CSI student volunteers showed the autistic kids a short animated movie. The kids visited entire campus and felt happy to see the lush green campus of CHARUSAT.

Participants got the platform to showcase their talent and got on futuristic technologies. They interacted with the industry experts and learned a lot about industrial environment.

The convention was sponsored by Gujarat Council on Science and Technology (GUJCOST) and major IT industries which are Meditab Software (India) Pvt. Ltd, Thomson Reuters, Crest Data Systems, Infostretch, Bitscape, iSystem India Pvt. Ltd, and Rishabh Software.

The convention was a huge success and this was possible due to the constant guidance of Dr. Pankaj Joshi (Provost-CHARUSAT), Dr. Devang Joshi (Registrar-CHARUSAT), Dr. Amit Ganatra (Dean-FTE & Principal-DEPSTAR), Dr. A. D. Patel (Principal-CSPIT) and hard work of faculty coordinators Mr. Ashwin Makwana (SBC- CSPIT), Mr. Parth Goel (SBC-DEPSTAR), Dr. Ritesh Patel, Dr. Parth Shah, Mr. Amit Nayak, Ms. Dweepna Garg, Ms. Mitali Dave, Mr. Aniruddh Fataniya along with very enthusiastic team of student coordinators.



# Workshop on Virtual Labs at Amity Institute of Information Technology, Lucknow (Region-I)

In association with CSI Lucknow Chapter on 09<sup>th</sup> January 2020

Reported by Shri. Vinay Kumar Johri and Dr. Nilu Singh



A Workshop on Virtual Labs, IIT Delhi was conducted at Amity Institute of Information Technology, Lucknow on 09<sup>th</sup> January 2020 in association with CSI Lucknow Chapter.

The workshop was inaugurated with the lighting of lamp and chanting of Sarawati Vandana. The brief description of the workshop was presented by Brig. U. K. Chopra of Amity University, Lucknow. Prof. Dr. Sunil Dhaneshwar, Pro Vice Chancellor of Amity University, Lucknow was the keynote speaker of the event.

Mr. G. P. Singh, Chairman of Computer Society of India, Lucknow Chapter shared the important information regarding activities of the CSI right from beginning of set up of the Chapter in Lucknow and its growth during 36 years starting from the inception of the Chapter. He also shared and declared that the Knowledge Research Centre has been established by CSI Lucknow Chapter and this particular event is the starting programme of knowledge sharing and spreading the information among all sectors of Computer fraternity.

Virtual Labs Scheme is the initiative of Human Resource Ministry at Govt. of India with the aim of connecting students of Technical stream and people from the Industry together and making available the Technology to the people and spreading its usage.

Mr. G.P.Singh, Chairman CSI Lucknow Chapter also explained how Computer Society of India is working in the field of Technology and making aware the various Industries/Institutions/Colleges, Students, Entrepreneurs and others about the availability of Technology and its usage by conducting various Technical Sessions on the relevant topics and inviting participants from various fields. The CSI Lucknow Chapter is also considering providing cost effective solutions in Information Technology to various departments of Uttar Pradesh Government in consultation with National Informatics Centre, Indian Institute of Management, Indian Institute of Technology etc.

Mr. Prateek Sharma from Virtual Labs explained in detail about various functionalities of Virtual Labs to the Students, Professors, CSI Members present in the event. He also gave an opportunity to the participants to experience hands on activity also.

The Convenor of the event Virtual Labs Dr. Pankaj Goswami (also Vice Chairman of CSI Lucknow Chapter) successfully concluded the event. Mr. Pavan Kumar Nigam (Secretary CSI Lucknow Chapter), Mr. Vinay Kumar Johri, Dr. Nilu Singh and other CSI Members contributed a lot under the leadership of Mr. G. P. Singh (Chairman CSI Lucknow Chapter) to make the event successful.

# CSI SSC-2020

## Gujarat State Student Convention (Region-III)

Reported by **Dr.Ashwin R. Dobariya**, Vice Chairman, CSI Rajkot Chapter (Gujarat)



### Event-1 : Two Days Hands-On Workshop

Expert : Akash Padhiyar, Founder, Akash Technolabs  
 Topic : Node JS and Express JS  
 Date : 17<sup>th</sup> and 18<sup>th</sup> January, 2020

Total 100+ students participated in the workshop.

The following topics are covered in the seminar:

- 1) What is Node JS? , Introduction of Node JS
- 2) Working with Node JS, What is Express JS?
- 3) How to Create Website using Express Generator
- 4) Get Post method, Modules in Node JS (Core Module, Local Module and Third Party Module) Create Server using http & nodemon npm, Basics of MongoDB

At the end of session, Prof. Maulik Parekh expressed a sincere thanks to speaker for delivering a nice session and also appreciated students for active participation.



### Event-2 : Technical Session on RPA(Robotic Process Automation)

Expert : Prof. Seema Trivedi, Asst. Professor, FCA, Marwadi university Rajkot  
 Topic : RPA (Robotic Process Automation)  
 Date : 2<sup>nd</sup> January, 2020

Session was arranged at AVPTI College Rajkot. Approx 75+ students and 10+ faculties attended the session. The following topics got covered during the session:

- 1) What is RPA?
- 2) RPA Tools.
- 3) Working with Swift Playground
- 4) Applications of RPA
- 5) What is Automation Anywhere?
- 6) Automation Anywhere IDE.
- 7) How to Create Software BoT?
- 8) Demo of BoT

After the technical session, Dr. Ashwin Dobariya, Vice Chairman – CSI Rajkot Chapter gave a presentation on CSI along with importance to become a member of CSI and different activities carried out under CSI Rajkot Chapter. At the end of session, Dr. R. Sridaran, Dean, FCA & Chairman – CSI Rajkot Chapter motivated students by his motivational speech and encourage students to be a part of CSI.



### Event-3 : Faculty Development Program (FDP)

Expert : Sanket Chauhan, MCA, Marwadi University  
 Topic : IOS  
 Date : 21 December, 2019

FDP was started with welcome speech by Dr.R.Sridaran, Dean,FCA & Chairman – CSI Rajkot Chapter. There were total 11 faculties from various institutions of Rajkot attended the session. The following topics are covered.

- 1) What is iOS, SWIFT, X-CODE?
- 2) Working with X-Code
- 3) Working with Swift Playground
- 4) Working with Swift Command Line Tool
- 5) Apple's different different Platforms
- 6) History of iOS Development
- 7) Application Designing
- 8) Application Development using SWIFT
- 9) Application Testing on Simulator
- 10) Features and Functionality of iOS Development
- 11) Current market of iOS Application Development.

At the end of session, Dr.Ashwin Dobariya, Vice Chairman – CSI Rajkot Chapter delivered a vote of thanks.

## BOOK REVIEW

Book Name: **Cyber Security: An Introduction**

Author: **Prof. (Dr.) Subhash Chandra Yadav**

Professor and Head

Dept. of Computer Science and  
Tech. Central University of Jharkhand,  
Brambe, Ranchi - 835205,

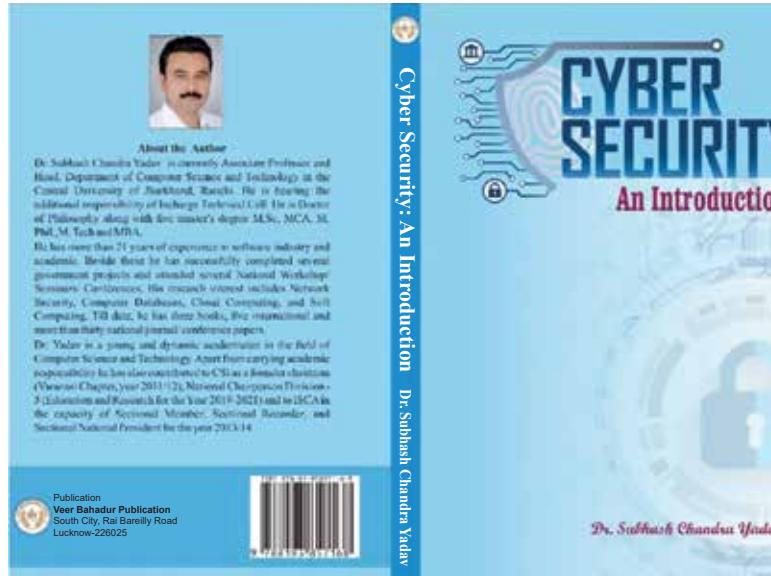
Publisher: **Veer Bahadur Publication**, Lucknow, UP

The book seems to be reach in depicting the concepts of Cyber Crime, Cyber Security, Cyber Law, Social Network Security, and the like very beautifully. The book comprises of seven chapters, staring from brief introduction about Information System, Network Security and Cyber Space. Particularly the Emerging Technologies and Cyber Security. Book also covers Ethical Hacking, IPR, IT Act & Cyber Laws issues related with cyber security.

It has been obvious that for emerging computer technologies, internet is the backbone and its create an online virtual world of computers and elements with no boundaries, mass, or gravity; that simply represents the interconnected space between computers, systems, and many other worldwide computer networks termed as Cyberspace.

This virtual word is not immune with criminal activities. Any crime on this cyberspace is known as cybercrime. In today's world, there is immense increase in the use of Internet in every field of the society and due to this increase in usage of Internet, a number of new crimes have emerged. Such crimes where use of computers coupled with the use of Internet broadly termed as Cyber Crime. Cyber Crime is a crime which involves the use of digital technologies in commission of offence, directed to computing and communication technologies.

The modern techniques that are proliferating towards the use of internet activity results in creating exploitation, vulnerability making a suitable way for transferring confidential data to commit an offence through illegal activity. Such offense including criminal activity against data, attacking on Information centre, Data System, theft, infringement of content and copyright, fraud, unauthorized access,



child pornography, online transaction fraud, internet sale fraud, deployment in internet malicious activities such as virus, worm and third party abuse like phishing, email scams and cyber stalking are referred as Cybercrime.

The universal approach of network like internet at all levels of network needs to recover from committing illegal activity all over the world and to stop the criminal nature by protecting unlawful activity by enforcing security measures in order to monitor and prevent crimes carried out in cyberspace. Cyber law is the part of the overall legal system that deals with the Internet, cyberspace, and their respective legal issues. Cyber law covers a fairly broad area, encompassing several subtopics including freedom of expression, access to and usage of the Internet, and online privacy. Generically, cyber law is referred to as the Law of the Internet. Along with all new technological developments of the era, the book is intended to provide basic knowledge of all such emerging technological developments and the security aspects related with them.

### About the Book Reviewer



**Dr. Bhagwan Singh** is the founder Dean of School of Commerce & Management Studies (SCMS), Central University of Himachal Pradesh (CUHP), Dharamsala, H. P. He is also the member of the Executive & Academic Council of CUHP and also Coordinator MOOCs Prakoshtha of CUHP. He is State Students Coordinator of Himachal Pradesh, CSI. He has also been Former Chairman & Vice Chairman, Computer Society of India (CSI), Varanasi Chapter, Region-I.

He has also authored TWO books namely: "Web based Advertising: A tool of Digital and Internet Based Marketing" and "Internet Based Marketing: Trends, Issues and Challenges for Digital Marketing & Web Based Advertising".

# Life Time Achievement Award

## Prof. Achyuta Samanta



**Prof. Achyuta Samanta** went on to serve KIIT as its first Chancellor and has had the distinction of being the youngest Chancellor of any Indian University. He served University Grants Commission (UGC) as Member for two consecutive terms (2008-11 & 2011-2014) and was a Member of the Executive Committee of All Indian Council for Technical Education (AICTE). He was also member of several other Government of India bodies like, NCTE, ISTE, ISCA, COIR BOARD, CAPART and many more. He has been a Member on the Academic Council of Central University, Silchar, Assam and the Central University, Odisha. He was the first Indian to be Member of both UGC and AICTE simultaneously and the first Odia to become Member of UGC and many other statutory bodies. Currently he is the President of World Congress of Poets 2019.

Prof. Samanta has been conferred with 33 Honoris Causa Doctorate awards from different University across the globe. He has also been decorated with prestigious Civilian Awards from many countries

including, Gusi Peace Prize International, the highest Civilian Award from Bahrain besides over 50 national and international and over 200 State honors and accolades.

He is the Founder of Kalinga Institute of Industrial Technology (KIIT) and Kalinga Institute of Social Sciences (KISS), Bhubaneswar – the fully free and fully residential tribal institute. He has converted the remote village 'Kalarabank', Cuttack into a Smart Village and the entire Manpur Panchayat into a model Panchayat (cluster of villages).

He has already started working to establish 12 branches of KISS in different districts, besides establishing KISS-Delhi for the underprivileged sections of the society. Besides providing around 10,000 direct employment in KIIT and KISS, he has created over 1,00,000 indirect employment and more than 100 successful entrepreneurs across the country. His hobby is to give happiness and smiling face to the millions of poor.

Prof. Samanta has been working relentlessly for Zero Poverty, Zero Hunger and Zero Illiteracy.

Mr. Sanjay Mohapatra

Chairman, Awards Committee, CSI

Prof. A K Nayak

President, CSI

Bhubaneswar, 17<sup>th</sup> January 2020



**Prof. B. L. Deekshatulu** has distinguished himself through his research and technological contributions in the field of Control Systems, Remote Sensing and Digital Image Processing. He was born on 31 October 1936 at Aska, Odisha. He obtained B.Sc. (Engg. Electrical) degree in 1958 from the Banaras Hindu University, M.E. and Ph.D. degrees from the Indian Institute of Science (IISc.), Bangalore. He was awarded the Martin Foster Medal by IISc., for best Ph.D. thesis. He joined IISc. as Lecturer in 1964, became Professor in 1970, and continued in that position until 1976.

Dr. Deekshatulu joined the National Remote Sensing Agency (NRSA) Hyderabad as Head, Technical Division in April 1976 and subsequently became its Director in January 1982. He retired as "Distinguished Scientist" (Secretary Grade- Govt. of India) & Director NRSA, in October 1996. As Director NRSA Hyderabad, he was also responsible to transform former IPI and now IIRS at Dehradun, from using aerial photos into a modern Satellite Remote Sensing Institute IIRS with facilities for visual and digital analysis in 1983. Dr. Deekshatulu served as the first Director of the Centre for Space Science and Technology Education in Asia and the Pacific (CSSTE-AP), Affiliated to the United Nations, IIRS Campus, Dehradun India, from November 1995 to April 2002. From 2002 to 2010 Dr. Deekshatulu was a Visiting Professor in the Dept. of Computers & Information Science, Univ. of Hyderabad, pursuing research and teaching in Image Processing, Machine Learning and Neural Networks. Since 2011, he has been working as Distinguished Fellow at IDRBT Hyderabad (an R&D Institution under RBI (Govt. of India) on Computer/ IT Applications in Banking.

He has over 160 research publications, guided 22 Ph.Ds. and over 80 MTech. student dissertations. He has visited 27 countries in the world. He is Fellow of 15 Scientific and Engineering Academies including Fellow, Institution of Electronics and Electrical Engineers (IEEE, USA), Fellow of the World Academy of Sciences (ITALY), Distinguished Fellow, Institution of Electronics and Telecommunication Engineers (IETE, India) and Distinguished Fellow of Astronautical Society of India (ASI). Hon. Member Asian Association for Remote Sensing, Japan, Hon. Fellow Indian Society of Remote Sensing (ISRS). He is mentioned as "Living Legend in Indian Science" in Current Science Journal, 25 June 2014.

### Major Contributions

- IISc. Bangalore (1960 to 76): Prof. Deekshatulu promoted through research & teaching; Control Systems, Non-Linear Control Systems

and Systems Engineering in all their facets, as well as Experimental Remote Sensing. Contributed during 1968-70, in establishing the School of Automation (currently the Department of Computer Science and Automation). He was also instrumental in starting the M E degree programme at IISc in "Applied Electronics & Servomechanisms" in 1964, and promoted various aspects of "Control Systems". Between 1972-75, he designed and fabricated, for the first time in India, a Gray scale and a Color Drum Scanner for Computer Picture Processing that subsequently won him and his research group, a National Research and Development Council (NRDC) Award.

- NRSA, (ISRO), Hyderabad (1976 to 96): Prof. Deekshatulu has been responsible for nurturing the National Remote Sensing Agency (now NRSC) in all its dimensions, and for executing National and State level projects in various disciplines of Remote Sensing applications. He has contributed significantly in fostering Remote Sensing, Data Processing techniques and Data Analysis Instruments for use by various User Agencies and for advocating Users to adopt Remote Sensing in their main stream activities.
- CSSTE-AP (United Nations), Dehradun and Ahmedabad (1995 to 2002): Teaching and promotion of Remote Sensing to M. Tech participants from various countries in Asia-Pacific region, making CSSTE-AP a role model of UN in the Asia-Pacific region.
- University of Hyderabad (2002 to 2010): Taught current subjects such as Machine Learning, Document Analysis, Neural Networks, Color Image Processing, etc. at M. Tech level, and conducted research.
- IDRBT (RBI-Govt. of India), Hyderabad (2011-till date): As Distinguished Fellow/Mentor, he has been interacting with the Faculty, Staff and M. Tech and Ph.D. students in promoting techniques such as Machine Learning, Deep Learning, Biometrics, Sentiment Analysis etc. in Banking and Financial Applications.
- Organized CSI Annual Convention at University of Hyderabad, 2005

### Awards

Dr. Deekshatulu received over 22 awards,besides PADMASRI award. In grateful recognition of his contribution to the growth of Computer Applications in the country and for his service to CSI, the Awards Committee is pleased to bestow the **Life Time Achievement Award** to Prof. B. L. Deekshatulu on this Seventeenth day of January 2020 at its Annual Convention at Bhubaneswar.

Mr. Sanjay Mohapatra  
Chairman, Awards Committee, CSI

Bhubaneswar, 17<sup>th</sup> January 2020

Prof. A K Nayak  
President, CSI

# Life Time Achievement Award

## Mr. H. R. Mohan



**Mr. H. R. Mohan** was born in 1954 to Alamelu and Ramachandran. He graduated from IIT Madras in 1976 as one of the toppers in the class with specialisation in Numerical Control Machines, a field that was only making an entry into the country then.

In 1976, Mohan joined Seshasayee Paper and Boards Ltd., a large integrated pulp and paper mill and became the key person in data processing, management information systems, process control & optimization, and energy management. He established the systems department with an in-house hard disc based computing facility, the first in the industry.

In 1982, Mohan joined India's national newspaper, The Hindu, as head of EDP department. He spearheaded the automation of business, editorial & library and developed various applications through the introduction of Unix based minicomputer and Oracle relational database which were cutting-edge for its time. He was instrumental in publishing The Hindu on the Internet in 1995, making it the first newspaper from India to go on the Internet. He designed and executed the digitisation strategy for the 125 years of The Hindu archives involving over million pages of broadsheet newspaper. Through various print, digital and online initiatives, he monetized the newspaper's assets.

He is currently engaged in ICT consulting, helping organisations in digital transformation initiatives and continues to support professional associations.

His association with CSI started as a student volunteer at the CSI-73 convention and became a student member in 1975. From 1983 to 1994, Mohan was actively involved in the Chennai Chapter in various roles including its Chairman. From 1995, he served in the national executive committee as Regional Vice President, Chairman of the Divisions on Micro-Computers, Software and Communication & Security. In 2013, he was elected as the national Vice President and became the President in 2014. It deserves a mention that Mohan is the only person who joined CSI as a student member

who eventually became President through his active roles in the society.

Mohan was elected as a Fellow of CSI in 2000 (then the youngest fellow). He received the Meritorious Service Award from IEEE Computer Society (2012) and was included as a prestigious Golden Core Member of the IEEE CS.

In over 40 years of service, Mohan served CSI in various capacities and contributed for its growth. Some of these include:

- Organized over 1000 ICT events for CSI, IEEE CS, ACM and other organisations;
- Editor of CSI Chennai Newsletter Infoline, CSI eNewsletter, Infodairy, CSI Digest and Member in editorial support team of CSI Whizkid;
- Chairman of Publications, Inter-Society and International Collaboration, e-Newsletter, CSI Awards, and Academic Committee.
- Member in Membership Development, CSI Digital Library, e-Governance Awards, YITP Awards, HQ Building, CSI Discover Thinking Inter School Quiz and Education & Research Committees;
- Pioneered the SEARCC/School Software Contest, CSI Banking Course, School Model Exam, Chapter level IT Exhibitions, egroups, CIO Forum and Bulletin Board facility;
- Assisted the Education Directorate in all its initiatives including DOEACC, NSTPC, and Student Research Projects;
- Conceptualized and set up the initial CSI Website;
- Director at CSI Publications;

In grateful recognition of his contribution to the growth of Computer Applications in the country and for his service to CSI, the Awards Committee is pleased to bestow the Life Time Achievement Award to Mr. H. R. Mohan on this Seventeenth day of January 2020 at its Annual Convention at Bhubaneswar.

**Mr. Sanjay Mohapatra**  
Chairman, Awards Committee, CSI

Bhubaneswar, 17<sup>th</sup> January 2020

**Prof. A K Nayak**  
President, CSI

# Life Time Achievement Award

## Mr. Rabindranath N. Lahiri



**Mr. Rabindranath N. Lahiri** did his B.Sc. in Mathematics from Calcutta University in 1972. In 1978, he received his B.E.E (Hons) Degree in Electrical Engineering from Jadavpur University. He obtained P.G. Diploma in Computer & Control Engineering from Institute of Radio Physics & Electronics, Calcutta University in 1980. He has almost four decades of experience in diverse fields of Information Technology, Power Engineering and Manufacturing Sector.

Mr. Lahiri initially worked as System Professional at Regional Computer Centre, Kolkata and then in Larsen and Toubro. He worked as Dy. Manager, EDP in NTPC, Delhi for six years. For more than two decades, he has worked with Tata Consultancy services in various capacities such as Principal Consultant and Business Unit Head for India in Energy and Utilities Sector. He was responsible for Business Development, Strategy Formulation, Relationship Management, Project Management, Project Monitoring, Development of End-to-End IT solutions and other Software Products/Services and Liaison with Multilateral Funding Agencies.

Mr. Lahiri has led several successful business initiatives with overseas consulting companies as well as large domestic clients for partnerships and project awards. His consulting experience spans over diverse ranges from Government Departments, Public Utilities to Private Sector in Power, Telecom, Manufacturing lines of Business in India and UK. He is a Certified Quality Analyst (Quality Assurance Institute, USA), SEI-CMM certified professional and assessor.

Mr. Lahiri has so far published multiple papers as author or co-author in International Journals and Conferences Proceedings, mostly of IEEE Power Engineering Society, in the area of IT Applications in Power Distribution and Power Generation with Indian Power Scenario in the background.

He is a Fellow of CSI and has served as the Past-Chairman of CSI Kolkata Chapter of the year 2001-2003. He was the Regional Vice President (East) for two terms and Divisional Chairman for two terms. He was the Chairman of Organizing Committee of CSI Convention 2006 and the Event Chair of CSI West Bengal State Student Convention 2019. He has been instrumental in CSI YITPA programmers, particularly with Eastern Region since 1999. He has organized many programs of CSI Kolkata Chapter at Regional, National and International Levels. Mr. Lahiri, a Patron of Kolkata Chapter, is a Fellow of Institute of Engineers (India). He is presently serving the body as the Chairman of the Membership Committee, Computer Division, State Center, WB. He has also received the Lifetime Achievement Award of the society very recently. He was the former chairman at Institute of Engineers (India), Computer Engineering Division. He is also Fellow of IETE also has served as the Chairman of IETE Kolkata. He is associated with various other societies of India also member of IEEE. He is associated with large number of educational institutes in West Bengal and involved in many academic programs. Presently he is the Director of Techno International, Batanagar, a unit of Techno India Group. He is also the Founder, Trustee and Vice Chairman of Batanagar Education and Research Trust. He is the Chairman Emeritus of the IT Committee of Bengal Chambers of Commerce & Industries (BCCI). He has also received the President's Award for the President – Scout & President Rover from Bharat Scouts and Guides.

In grateful recognition of his contribution to the growth of Computer Applications in the country and for his service to CSI, the Awards Committee is pleased to bestow the **Life Time Achievement Award** to Mr. R. N. Lahiri on this Seventeenth day of January 2020 at its Annual Convention at Bhubaneswar.

**Mr. Sanjay Mohapatra**  
Chairman, Awards Committee, CSI

Bhubaneswar, 17<sup>th</sup> January 2020

**Prof. A K Nayak**  
President, CSI

## Mr. Satish Kumar Khosla



**Satish Kumar Khosla** did his Honours in Mathematics from PGDAV College, Delhi University and joined the Indian Military Academy. He withdrew from the Academy on medical grounds following a knee injury while playing soccer. Not letting the disappointment of an Army career not materializing weigh him down, he did his Post-Graduation Certification in Operations Research and Mathematical Statistics from Delhi University and joined the nascent IT Industry.

Satish has over Five Decades of experience in the IT industry across functional areas, and has held CXO positions in multi-billion-dollar organizations. His keen analytical skills and business acumen were evident in the success of many start-ups he handled in leadership positions.

He is a very experienced, tech savvy business executive with a deep understanding of state-of-the-art technologies. He has rich experience in transforming businesses into profitable ventures.

He runs his own Independent Consultancy since 2008.

Of late, Satish has donned multiple hats of an investor, governing council member, strategic advisor for start-ups, academia and government verticals. Satish has been honored with PGDAV Ratan Award by PGDAV College.

Presently he is:

- Vice Chairman – WiseKey India – (Semi-conductors, Blockchain, Cybersecurity) Director on their Board
- Strategic Advisor – Ensurity Technologies which provides cutting edge security solutions for Space Technologies, Defence and Enterprise
- Chairman, Kambria IO, India-Robotics, AI Data Analytics
- He is member Governing Council KIIT Group of Colleges, Gurgaon

Special Interest

- Angel Investor in Start-ups: Digital Media, Cybersecurity
- Guest Speaker at Academia to bridge the gap between industry and curriculum

**Mr. Sanjay Mohapatra**

Chairman, Awards Committee, CSI

Bhubaneswar, 17<sup>th</sup> January 2020

Some of the position held:

- Regional Vice President & Head of Central Asia and EMEA at ACS (Now Xerox)
- CTO/COO at Keane India (Now NTT Data)
- Sr. Vice President Birla Horizons (Now Birla Soft),
- Director at Unisys India Ltd,
- Sr. Vice President at Tata Unisys Ltd (Now Tata Consultancy Services)
- Managing Director, Cognilytics Consulting and Services Private Limited (Acquired by CenturyLink – world's 3rd largest Telco)

Advisor Qualfon SE, Promoter Qualfon Technology Support Services  
Satish was key player for multiple Government Project implementations for the Central Board of Direct Taxes and Central Board of Indirect Taxes Departments. He did software implementation at Controller General Defence Accounts, Indian Navy and Indian Army.

Satish has served on the Governing council of the first IIIT Hyderabad from 2000 to 2004 and has also served on the Amity University Information Technology Board from 2000 to 2005.

Satish is Life member of Computer Society of India and was National Secretary of the CSI from 1992-1994. He was awarded Fellowship of the Society in 1997.

He was Chairman Exhibition Committee of Annual Conventions held in New Delhi in 1991 & 1998. He was very actively involved in DOEACC initiative of Computer Society of India.

In grateful recognition of his contribution to the growth of Computer Applications in the country and for his service to CSI, the Awards Committee is pleased to bestow the **Life Time Achievement Award** to Mr. Satish Kumar Khosla on this Seventeenth day of January 2020 at its Annual Convention at Bhubaneswar.

**Prof. A K Nayak**

President, CSI

## Life Time Achievement Award

### Dr. Utpal K Banerjee



**Dr. Utpal K Banerjee**, born of Nirupama Devi and Shyamakanta Banerjee, earned his Physics Hons. Degree from Presidency College, Kolkata, 1955; Graduateship of British Instt. Of Management, London, 1966; and Ph.D. in OR and Quantitative Management, from University of Manchester, UK, 1972.

He joined superior civil services in 1957 and while serving as Deputy Secretary, Ministry of Defence, he was selected as "Commonwealth Scholar", 1968, to join University of Manchester for his doctoral programme on Defence Management for India. He studied advanced computerized systems, by travelling widely in the UK, France, Germany, Netherlands, Sweden, Norway, Finland and all over the USA (from IDSA in East Coast to RAND in West Coast). On return to India in 1972, he was deputed as Adviser (Information Systems), Min. of Heavy Industry, when Dept. of Electronics invited him to formulate National Information System for Industry, and National Information System for Social Sciences, in consultation with TISS, Mumbai and Gokhale Institute of Economics, Pune, – leading to India's massive UNDP grant for creating National Informatics Centre (NIC) in Delhi and its counterparts in the State capitals and districts. He was Chairman of the Inter-Ministerial Committee on Industrial Commodity codification & Classification, under Dept. of Statistics.

Relinquishing civil services to plunge into the emerging mainstream IT activities in India, he joined the major user industry Tata Steel, 1975-78; and Administrative Staff College of India, 1978-79, where he initiated Operator Guidance System in Nangarjunakonda dam-site and Decision Support Systems in APSEB and AP Board of Secondary Examinations. His chance in pioneering introduction of IT for "e-governance" in India came when "IAS Refresher Courses" were introduced in 1985-86. As Director General, All India Management Association, 1985-89, he almost single-handedly handled computer modules in LBSNAA, Mussoorie (for Foundational Courses); Indra Bhavan, Mussoorie and AIMA (for IAS Refresher Courses); State IAS training academies all over India; for IA&AS officers in Shimla; and for IPS officers at Mt. Abu. LBSNAA published his monograph "Computer for Non-computer Executives"; computer terminals were given to every probationer at LBSNAA; and eventually created the essential leadership for nucleating wide-spread

"e-governance" in India.

He Served UNESCO as their IT emissary in developing countries like Sri Lanka, Maldives, Nepal and Afghanistan; helped Commonwealth Secretariat, London, for East African countries at ESAMI, Tanzania and KIM, Kenya; and assisted SAARC in conducting management modules in Bangladesh. He taught at almost all Indian IITs, IIMs, XLRI, IMI, IMT, MDI, and in Industry – besides taking full-time post-graduate courses on "Management Strategy for IT" in JNU, and then six leading Chinese universities (including the topmost Xinhua University) in Beijing, Nanjing, Shanghai, Dalian and Kunming, 2001-2 and 2002-3. He chaired sessions at International Conferences under both IFIP and IFORS: on informatics, computer management and OR in Dublin (Ireland); Leiden (Holland); Hamburg (Germany) and Brisbane (Australia).

His association with CSI began in 1972 and remained very fruitful in various capacities. He was member of several national management committees and a popular public speaker for CSI conventions; Program Chair at CSI-78; and Regional Vice- President of CSI, 1981-83, when he organized Regional conference of CSI on "Computer Applications for Techno-Economic Development" with ONGC and others. For CSI-85, he organized pre-convention National Workshop on "Computer Advancement of Rural Society" in association with DoE, CART, ICMR, IIT Kanpur and UNESCO. These highly successful conferences led to his popular books on those subjects, as did his other lectures and serial articles in "The Hindu". For IETE, he edited "Computer Education in India: Past, Present & Future". He was invited by IIT, Kanpur for evolving broad strategy for industry-academic collaboration, followed by national-level industry-academic colloquium for GGS Indraprastha University. He evaluated on-line, inter-active courseware by Carnegie-Melon University, USA, for Indian universities, 2005.

In grateful recognition for his enormous contribution in ICT education and strategic planning for ICT in distributed environment at Indian academia, business and industry, and for his service to CSI, the Awards Committee is pleased to bestow the **Life Time Achievement Award** upon Dr. Utpal K. Banerjee on the Seventeenth Day of January 2020, at the Annual Convention in Bhubaneswar.

**Mr. Sanjay Mohapatra**  
Chairman, Awards Committee, CSI

Bhubaneswar, 17<sup>th</sup> January 2020

**Prof. A K Nayak**  
President, CSI

# CSI STPI - YITP AWARD 2020

## REPORT ON REGIONAL ROUND



Reported by  
**Mr. Apoorva Agha**  
National convener, YITP Award

### GHAZIABAD CHAPTER (REGION-I)



CSI STPI - YITPA 2020 Regional round for Region - I was organized by Ghaziabad Chapter on January 4, 2020 at Sharda University, Greater Noida. Seven nominations were received out of which six were called for presentation.

Event was inaugurated by Mr. Apoorva Agha, National Convener, CSI YITPA Awards. He spoke about background of YITPA awards and its significance in today's technologically advanced world. Ms. Manjeet Ratan, Regional Convener, YITPA Region-I welcomed the participants and introduced the judges.

The jury members were: Mr. Rishikesh Patankar, Chief Operating Officer, Education, Skill & CSC Academy, Ministry of Electronics and Information Technology, Gol, Mr. Vijay Rastogi, Entrepreneur & Director, Sisoft Technology Pvt. Ltd., Mr. Gaurav Jain, IoT Consultant, TCS

There were Six presentations in all in the day programme. The names of the titles of the presentations and the team members are as follows.

1. Prayagraj Smart City Project by Mani Shankar Tripathi of Prayagraj Smart City Ltd./Nagar Nigam, Prayagraj Allahabad.
2. Xcubator by Shubham Singh of IINCORE labs, Noida
3. Underground water discharge rate and water quality Data acquisition system using IOT by Avneesh Mishra Rajneesh Kumar Mishra of Cosmic Robotics and Technologies
4. Ayushman Bharat - Pradhan Mantri Jan Arogya Yojana by Manu Shukla of General Manager, National Health Authority
5. Intelligent Farming solutions by Abhay Agarwal, Shakti Arora, Himanshu of panipat institute of Engineering & Technology, Sonipat
6. Matchmaking using Artificial Intelligence by Eshu Verma ME Research Scholar Chandigarh

The recipients of the prizes were:

**Winner:** Mr. Manu Shukla (General Manager, National Health Authority) for his presentation on Ayushman Bharat - Pradhan Mantri Jan Arogya Yojana

**Runner up:** Mr. Shubham Singh of IINCORE labs, Noida for his project on Xcubator

**Special Mention :** Mr. Avneesh Mishra and Mr. Rajneesh Kumar

Mishra for their project on Underground water discharge rate and water quality Data acquisition system using IOT

The awards were presented by Chief Guest Mr. R K Vyas, Vice President, CSI in the presence of Mr. Arvind Sharma, Regional Vice President, Region-I, Mr. S C Tyagi, Chairman, Division Chair III, Mr. Saurabh Agrawal, Past Chairman & Patron, Ghaziabad Chapter, Mr. Anil Ji Garg, Past Chairman, Ghaziabad Chapter, Dr. Kavita Saxena, Chairperson, Ghaziabad Chapter, Mr. Gaurav Sharma, Secretary, Ghaziabad chapter and Prof. Parma Nand, Co-Convener – YITPA Region-I and Dean – SET, Sharda University.

The programme concluded with a vote of thanks by Prof. RPS Tomar, Vice Chairman, Ghaziabad Chapter. The Winner of this Regional Round will participate in the National Round to be held at Bhubaneswar on 17<sup>th</sup> January 2020.



### KOLKATA CHAPTER (REGION-II)



CSI Kolkata Chapter, organized the CSI STPI - Young IT Professional Awards (YITPA) 2020 for Region II on 4<sup>th</sup> January 2020. This is one of the most prestigious awards in India for young professionals in the field of IT under 35 years of age and is yet another occasion where CSI recognizes excellence in innovation and development in the field of Information Technology.

This year, Eleven (11) papers were received for presentation before the judges. The judges invited from academics and industry, were Mr. Prodip Mukhopadhyay, Managing Director WEBEL, Kolkata, Dr. Debasish De, Professor, Department of Computer Science and Engineering, Maulana Abul Kalam Azad University of Technology, Prof. D D Sinha, Former HOD of Department of Computer Science & Engineering, University of Calcutta and Prof. Debottosh Bhattacharjee, Professor, Department of Computer Science and Engineering, Jadavpur University and IEEE Computer Society. There were eleven presentations in all in the day-long programme.

The names of the titles of the presentations and the team members are as follows.

1. IoT Platform for Data Acquisition, Storage, Analytics and Actuation by Suvra Dutta Tania Ghosh, Abhisek Das and Sangram Gaikwad of TATA Consultancy Services Ltd. (Innovation Lab), Kolkata
2. **e-Measure:** A Visual-Inertial Fusion Method for Mobile Phone Based 3D Measurement of a Wound's Dimension by Soumyadip Maity,Vivek Chandel,Junaid Ahmed Ansari and Gourav Kumar of TATA Consultancy Services Ltd. (Embed System & Robotics), Kolkata
3. **WRAP:** A task allocation framework for warehouse by Marichi Agarwal,Sayan Paul and Ruchira Singh of TATA Consultancy Services Ltd. (R & I), Kolkata
4. **LiSSense:** A Paradigm Shift in Unobtrusive Liveliness Monitoring by Anwesha Khasnobish Raj Rakshit and Smriti Rani of TATA Consultancy Services Ltd. (R & I), Kolkata
5. **PI-Sole:** Instrumented Insole For Ambulatory and Pathological Gait Analysis by Oishee Mazumder, Varsha Sharma and Shivam Singhal of TATA Consultancy Services Ltd. (R & I ), Kolkata
6. **Saathi:** A Telepresence Robotic Avatar for a Convenient, Safe and a High-Tech Society in Future by Ruddra Dev Roychoudhury, Hrishav Bakul Barua and Ashis Sau of TATA Consultancy Services Ltd. (R & I ), Kolkata
7. **Optumeratm Recognize :** A Computer Vision Based Mobile Application For The Retailers To Identify Products Placed On Store Shelves by Bikash Santra of Indian Statistical Institute, Kolkata and Pranoy Hari and Avishek Kumar Shaw of TATA Consultancy Services Ltd., Kolkata
8. Intelligent Diabetic Olfactory Device (iDol) by Ravi Sankar,Sangit Saha and Tapas Sutradhar of C-DAC, Kolkata
9. **Karkat Nirnay Yantra :** Infrared Imaging based Breast Cancer Screening System by Sangam Kumar Chaturvedi and Abishek Hazra of C-DAC, Kolkata
10. Real Time Stream Analytics with IOT by Krishnendu Mukherjee of Pricewaterhouse Coopers Pvt. Ltd., Kolkata
11. A System for Recognizing Online Handwritten Bangla Documents by Ankan Bhattacharyya of Cognizant Technology Solutions and Himadri Mukherjee of West Bengal University of Technology, Barasat, West Bengal

In the inaugural session Mr. Gautam Hajra, Chairman CSI Kolkata Chapter, in his welcome address, spoke about CSI and the genesis and rationale of organizing the programme since 1999. Mr. D P Sinha, Fellow CSI & Convener, YITPA 2020 Region II introduced the judges and arranged for the order in which the papers to be presented.



The winners of the contest were announced by Mr. Prodip Mukhopadhyay, on behalf of the Judges. The recipients of the prizes were:

**Winner :** Ruddra Dev Roychoudhury, Hrishav Bakul Barua and Ashis Sau of TATA Consultancy Services Ltd. (R & I), Kolkata

**Runner up :** Ravi Sankar, Sangit Saha and Tapas Sutradhar of C-DAC, Kolkata

**Special Mention :** Sangam Kumar Chaturvedi and Abishek Hazra of C-DAC, Kolkata

The awards and mementos were presented by senior members of CSI including Mr. Sourav Chakraborty, Secretary, Patron, CSI Kolkata Chapter & Convener, YITPA 2020 Region II. At the end, two participants also spoke on the organization of the entire programme. The programme concluded with a vote of thanks and group photograph of the organizers, judges and participants. The Winner of this Regional Round will participate in the National Round to be held at Bhubaneswar on 17th January 2020.

### TIRUCHIRAPPALLI CHAPTER [REGION-VII]



The National competition for young IT professionals instituted by CSI in the year 1999 is conducted every year to encourage the Researchers, IT professionals, Academicians, Consultants, Entrepreneurs and IT Practitioners in an Organization, or as individuals in service/ support/training function in the field of Information Technology. The competition aims at involving young IT professionals with a quest of innovation in IT and provides them an opportunity to demonstrate their knowledge, professional prowess and excellence in their profession.

CSI STPI YITP Award 2020, Regional Round for Region VII was well organized by the Tiruchirappalli Chapter at M.A.M. College of Engineering, Siruganur, Tiruchirappalli on 7th January 2020. Twelve Nominations from academicians, professionals and consultants were received for the YITP award 2020, Out of which 7 nominations were selected.

The Regional YITP Awards 2020 was inaugurated with the lighting of lamp by the chief guest Mr. N Rajasekaran, Vice Chairman CSI Tiruchirappalli Chapter. Dr. S Ravimaran Convener, YITP 2020 welcomed the gathering and delivered a brief note on YITP Award contest. Mr. N Rajasekaran, in his keynote address was proud of the events conducted by the Tiruchirappalli CSI Host Chapter and winning many awards as best host chapter. He also expressed his desire that more number of participants take part in this contest in the future and contributing to the field of research for the welfare of our society. While addressing the gathering he insisted on innovation in teaching. The keynote address by the chief guest was followed by the presentation by YITP 2020 nominees.

The jury members of YITP Award 2020 were Mr. N Raja Sekaran, Vice Chairman, Mr. Senthil Kumar, Secretary, Mr. Sivakumar, Treasurer and Dr. S Ravimaran, Chairman, Nomination Committee of CSI Trichy Chapter. The Winner of the contest is Mr. Sudhakar M, Technical Architect, Tata Consultancy Service, Chennai, and the runner is Mr. D Boopathy, Research Scholar, Bharathiyar University, Coimbatore and the special mention award was given to V Abhiraman, P Rohit Samuel and R David Samuel from DMI College of Engineering, Chennai. The Trophy, Cash Awards and Certificates were given to the Winner, Runner and the Special mention category by Dr. M A Mohamed Nizam, Secretary and correspondent of M.A.M. College of Engineering. Mr. Sudhakar M., Technical Architect, TCS is nominated for the final round of YITP 2020 (National Round) to be held at Bhuvaneshwar on 17-1-2020. The YITP award 2020 came to an end with vote of thanks proposed by Dr. S Ravimaran, YITP Convenor, Region VII.

# STUDENT BRANCHES INAUGURATION REPORTS

## K K WAGH ARTS, COMMERCE, SCIENCE & COMPUTER SCIENCE COLLEGE, NASHIK (REGION-VII)



CSI Student Branch for the academic year 2019-2020 was inaugurated by the hands of Mr. Suresh Sonkamble, Director, VS Programming Institute. After the inauguration, two days workshop on Android Application Development was organized on 24<sup>th</sup> & 25<sup>th</sup> January 2020 at K. K. Wagh Arts, commerce, science & computer science college, Nashik. Also felicitated Dr. A. P. Rajput for Lokmat Prerana Puraskar-2020, Prof A.H.Bendale and Mst Vasim Shaikh got selected in State Level Avishkar.



## SHRI SHANKARACHARYA ENGINEERING COLLEGE, BHILAI (REGION-IV)



The inaugural function of the CSI student branch of Shri

Shankaracharya Engineering College, Bhilai, was organized on 24th December 2019, in presence of esteemed chief guest and visionary Mr. I P Mishra, Chairman SGES, Mrs. Jaya Mishra, President, SGES. The session began with the lamp lighting ceremony and which was followed by ceremonial welcome of all guests. Dr. P B Deshmukh, Director, SSTC addressed students and congratulated for starting of CSI Student Branch. Dr. Chinmay Chandrakar, Principal, SSEC stated the importance and various activities that are initiated by the CSI, which would be beneficial for students. Dr. Smita Selot, highlighted the benefits and motivated students to actively participate in CSI events. The inaugural function was followed by a guest lecture on Entrepreneurship Awareness Programme that was organized with a motive for making students aware of entrepreneurship benefits, risks and associated schemes that would help them in future. We had experts from industry Mr. Satyam Khandelwal, Startup Advisor, 36i inc, Raipur and Mr. Ankur Sinha, CEO, Retcons Technology, Raipur. There was a project exhibition of final year students of CSE department, which was evaluated by panel of judges and appreciated by Mrs. Jaya Mishra, President, SGES. The entire program was coordinated by Prof Shankar Sharan Tripathi and Prof Yogiraj Bhale. The vote of thanks was given by Prof Sreejit Panicker, HoD, CSE, and presented mementos to our speaker for sharing their ideas and views.



## USHA RAMA COLLEGE OF ENGINEERING & TECHNOLOGY, TELAPROLU, KRISHNA DISTRICT (REGION-V)



The event started with the formal Inaugural function at 10.30 a.m. on Wednesday, 27<sup>th</sup> November 2019 in R-Block, Seminar Hall. Chief

Guests Dr. J Rajesh Chowdhary, Chairman CSI, Vijayawada Chapter, Dr. A V Praveen Krishna, State Student Coordinator, Andhra Pradesh State, Dr. K Rajasekhara Rao, Director, URCET, Dr. GVKS Prasad, Principal URCET, Dr. B N Srinivas Rao, Director R&D, Dr. A Madhan Mohan Rao, Vice Principal URCET, Dr. S M Roychoudri, HOD-CSE, URCET & Dr. KPNV Satyasree, Professor were present on the dias. The function started with Prayer Song, followed by the welcome speech given by Dr. J Rajesh Chowdhary, Dr. A V Praveen Krishna, Dr. K Rajasekhara Rao, Dr. KPNV Satyasree, Professor, Department of CSE, followed Vote of thanks given by the Ms. A Bandhavi, III CSE (Joint Secretary), Department of CSE followed by tea. The function was finally ended by thanking management, Principal, HOD, Faculties, Non-teaching staff, and all student coordinators who worked for this event to make this event a grand success.



#### **UTKAL UNIVERSITY, BHUBANESWAR (REGION-IV)**

The inauguration of CSI Student Branch on 17th January 2020 was a positive move by the department of Computer Science,

Utkal University. This student branch was inaugurated during the 53rd Annual Convention of Computer Society of India (CSI2020) at Bhubaneswar. Dr. Prafulla Kumar Behera, the Head of the Department, gave the introductory speech and presented future plan of events, to be conducted by the department in association with CSI. Prof. R. K. Vyas, from Delhi University and also Vice President of CSI was the Chief Guest for the Inauguration Ceremony. He spoke thoroughly on "Why we need CSI", as well as about different activities of CSI Student Branch. Chief Speaker Prof. S. K. Udgata, from University of Hyderabad, spoke on theme "Keep Trying till You Achieve". He also spoke on the importance of having Student Chapter and going for a wider collaboration with other chapters. Other faculty member of the department, such as Dr. Mrutyunjaya Panda, Dr. BNB Ray and Mr. Haraprasad Naik were present during the occasion to encourage the students. The inaugural function was closed with vote of thanks from Mr. Biswojit Nayak, CSI Student Branch Councilor, Department of Computer Science, Utkal University.



#### **CSI President visit to Dr. Babasaheb Ambedkar Open University, Ahmedabad on 23<sup>rd</sup> January, 2020**



Dr. Nilesh Modi, Professor and Director, School of Computer Science of the University presenting momento and felicitating to Prof. A. K. Nayak, President of CSI. The Hon'y Treasurer of CSI Ahmedabad Chapter Dr. Niraj Shah is also presence on the occasion.

#### **CSI President visit to CSI Baroda Chapter on 24<sup>th</sup> January, 2020**



A group photograph with the members after discussion and interaction.



Prof. A. K. Nayak while delivering inaugural address in CSI Regional Student Convention at Anand, Gujarat on 24th Jan. 2020

## COCHIN CHAPTER



CSI Cochin Chapter has organized the technical talk on IoT (Internet of Things) was presented by Mr. Ashik Mabrook covering the areas like history of IoT, Working of IoT, architecture etc. He explained in details about the domains and applications on which IoT is being adopted at a fast phase. He also gave an introduction to Arduino and IoT sensors. The talk has given a good insight into the ever-growing network of physical objects with IP address connected to internet and the communications that happens between them. Applications of IoT supported by AI (Artificial Intelligence) is one of the fastest advancements that happens in the technical world and is also going to influence and change every facets of our life in the immediate future.

## COIMBATORE CHAPTER



CSI Coimbatore Chapter organized Student Branch Coordinator (SBC) meeting on 17<sup>th</sup> December 2019. Mr. R Ravi Kumar, Treasurer, welcomed the gathering. Dr. N R Alamelu, Chairperson in her persuasive speech pointed the following

- Appreciated KPR for conducting programs for I-year students indicating that will be helpful in inducting technical culture in early stage
- Appreciated NGP for offering Python Programming in I-year across all the disciplines of engineering and explicated ubiquity of Artificial Intelligence and Python in all domains
- Pointed that SRCAS SBC is with huge number of students and suggested the branch to conduct Hackathons
- Appreciated Karunya Institute's suggestion to implement Inter Student Brach (ISB) that activities and requested the web links in CSI website to be used for the same.

- Insisted all the SBCs to post the activities of their respective branches before and after the event to have wide reachability
- Assured SBCs may be chosen to conduct CSI meeting after examining the request thoroughly, as a reply to Erode SBC request
- Suggested that SBCs presentations be made by students rather than the faculty

The Chairperson indicated that there exists a declining interest of members due to more addiction of electronic media. To tackle the situation Chairperson emphasised that SBCs should be student centric, correct them to live with better organizing skills, people management, and financial management; further insisted that SBCs should plan for conducting meeting to cover the case studies with real data appropriate for the discipline, 3 activities/year with clear cut mechanism to assess the outcome/result, lecture/workshops on current trends in disruptive technology based on the industry demand and FDP in current IT trends for the faculty members across disciplines.

Finally Chairperson announced that Dr. R V Ramani, Sankara Eye Hospital opened SBC attachment to engage the students to collect data from the villages which will be helpful for them to look around, identify the facts, analyse the data collected and above all throw light to leverage professionalism to find the solution for real time problems. She concluded the meeting by congratulating the SBCs for their initiatives to promote the student community through their various activities.



## KANCHEEPURAM CHAPTER



CSI Kancheepuram Chapter in association with the department of Computer Science and Engineering of Anand Institute of Higher Technology, Kazhipattur organized a invited Lecture on "Benefits of CSI Membership" on 24th January 2020. Dr. S Roselin Mary, HoD-CSE welcomed the guest speaker Dr. M Senthil Kumar, Hon Secretary, CSI Kancheepuram Chapter for the event. Dr. P Suresh Mohan Kumar, Principal, AIHT felicitated the Chief Guest.

The Session started with an appreciation from the speaker for their eagerness to know about the benefits of CSI and went on with

briefing the structure of the National Executive Committee members of Computer Society of India. He also gave a glimpse of the membership fee structure for both the students and life members. He also made an elaborate presentation on the benefits of CSI to the students, Institutional and life members. He has clearly explained the different types of award nominations for students and faculty members in Computer Society of India.

Finally, Vote of thanks was given by Mr. D Anand Joseph Daniel, AP-CSE-CSI Student Coordinator. Totally 140 students and 20 faculty Members were benefited from this Guest Lecture. The Event was organized under the guidance of Dr. B Chidambararajan, Chairman, CSI Kancheepuram Chapter.



### KOLKATA CHAPTER



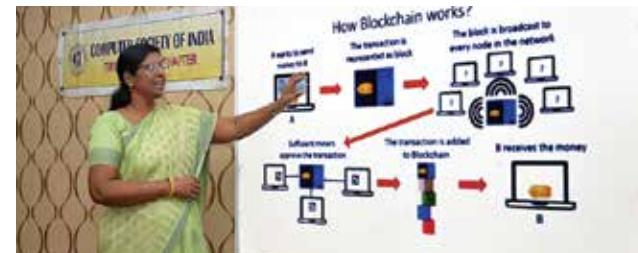
CSI Kolkata Chapter organized AGM (2018-19) on 10th January 2020 at Calcutta Rowing Club (Southern Avenue Kolkata 700029) with an attendance of 55 members. Mr Gautam Hajra, present chairman and Vice Chairman of CSI, Kolkata chapter (2018-19) has presided over the meeting. Mr Sourav Chakraborty, Secretary, highlighted the major activities and events held during the year 2018-19. Dr Madhumita Sengupta, Treasurer, presented the audited report of 2018-19 and answered all queries of members regarding Profit and Loss account. Mr. Subir Lahiri, immediate past Chairman praised



MC members for their untiring effort in managing all the activities of CSI Kolkata Chapter smoothly. Dr Ambar Duta, Chairman for the year 2018-19 was absent. From the dais, Mr Gautam Hajra announced that EAIT, the flagship International conference of CSI is going to

be organized by CSI, Kolkata chapter in the month of November 2020. He also disclosed that very soon election date will be declared for electing MC & NC members of CSI, Kolkata for the year 2020-21 under the chairmanship (NC) of Dr S Roychowdhury. The AGM ended with new Chairman's message followed by Fellowship dinner.

### TIRUCHIRAPPALLI CHAPTER



CSI Tiruchirappalli Chapter Conducted a Guest Lecture on Blockchain Technology on 10<sup>th</sup> December 2019. Speaker for this Programme is Dr. R Sumathi, Professor and Head, Department of Information Technology, Saranathan college of Engineering, Tiruchirappalli.



CSI Tiruchirappalli Chapter conducted the Lecture meeting on Big Data Analytics - What you Need to Know was delivered by Er M J DIVYA, Deputy Manager, IT Solutions & Systems, BHEL, Tiruchirappalli on 14<sup>th</sup> January 2020.

The session commenced with the welcome address by Er S Lakshmanan, EC Member of CSI, and Shri A Leelavinothan, AGM (Retd.), BHEL Tiruchirappalli, introduced the speaker. The extracts from the Speaker's session is as follows: "Big Data is a field that treats ways to analyze, systematically extract information from, or otherwise deal with data sets that are too large or complex to be dealt with by traditional data-processing application software. Also stated that the coal-fired power plant regularly produces enormous amounts of data from its sensors, control and monitoring systems. The Volume of this data will be increasing due to widely available smart meters, Wi-Fi devices and rapidly developing IT systems. Big data technology gives the opportunity to use such types and volumes of data and could be an adequate solution in these areas. Potential Benefits of Using Big Data in Power Generation includes Asset Management, Performance Optimization, Data Analysis and Visualization and Demand Response".

Er. R Selvaraj, Chairman, CSI, Tiruchirappalli Chapter along with Er Ramadoss K, General Manager (Retd.), BHEL, Tiruchirappalli felicitated the Speaker with a Memento. Er D Senthil Kumar, Senior Manager, ITS&S, BHEL, Tiruchirappalli proposed the Vote of Thanks.

## FROM CSI STUDENT BRANCHES

REGION-I	REGION-III
<p><b>Maharishi Markandeshwar (Deemed to be University), Ambala</b></p>  <p>21-1-2020 &amp; 22-1-2020 – Event on Smart India Hackathon 2020</p>	<p><b>B.V.M. Engineering College, Vallabh Vidyanagar</b></p>  <p>28-12-2019 - Workshop on Machine Learning</p>
REGION-IV	REGION-V
<p><b>Silicon Institute of Technology, Bhubaneswar</b></p>  <p>11-1-2020 &amp; 12-1-2020 - Hands on Workshop on Blockchain Technology</p>	<p><b>BVRIT HYDERABAD College of Engineering for Women, Hyderabad</b></p>  <p>4-1-2020 - Guest Lecture on Learn To build Alexa Skills</p>
REGION-V	
<p><b>CMR Technical Campus, Hyderabad</b></p>  <p>6-1-2020 - Workshop on Google Cloud Platform Study Jam-2</p>	 <p>9-1-2020 - Workshop on Machine Learning and Artificial Intelligence</p>
Anurag Group of Institutions, Hyderabad	
 <p>19-12-2019 - Data Analytics and visualization</p>	 <p>27-12-2019 &amp; 28-12-2019 – Event on Hackathon on Blockchain</p>

**REGION-V**

Aditya Engineering College, Surampalem



23-12-2019 to 29-12-2019 - Workshop on Python

Chalapathi Institute of Engineering and Technology, Guntur



2-1-2020 & 3-1-2020 - Workshop on Soft Skills

Kallam Haranath Reddy Institute of Technology, Chowdavaram



11-1-2020 - FOOD Festival



21-1-2020 – Event on Employability Skills

Narasaraopeta Engineering College (Autonomous), Narasaraopet



3-1-2020 - Event on Mini Hackathon

Jyothishmathi Institute of Technology and Science, Karimnagar



8-1-2020 - Workshop cum hands on session on Cloud Computing and Virtualisation

New Horizon College of Engineering, Bangalore



15-11-2019 - Mini Project Competition



16-12-2019 – FDP on High Performance Computing, Grid and Cloud Computing

**REGION-VI**

Sipna College of Engineering and Technology, Amravati



2-12-2019 to 7-12-2019 – Mr. Pradeep Rathi, RVP-VI as Chief Guest during FDP on Data Science



9-1-2020 - Seminar on Current Trends in IT Industry

**REGION-VI**

SNJB's Late Sau. Kantabai Bhavarlalji Jain College of Engg., Chandwad



16-1-2020 – Session on Salesforce Cloud : Career Opportunity

**REGION-VII**

Kongu Engineering College, Perundurai



11-1-2020 - Guest Lecturer on Carrier Guidance

**REGION-VII**

Adhiyamaan College of Engineering, Hosur



13-12-2019 & 14-12-2019 - Workshop on Python 3.6

KPR Institute of Engineering and Technology, Coimbatore



20-1-2020 - Seminar on Knowledge Management in Real World

SASTRA University, Thanjavur



28-12-2019 - Guest Lecture on Deep Learning & AI



10-1-2020 - Hands-on session on Virtual Reality

REGION-VII

SRM Valliammai Engineering College, Kattankulathur



8-1-2020 - Workshop on Drafting for Patent Filing



21-1-2020 - Workshop on Three-Dimensional (3D) Printing Technology

Student branches are requested to send their report to

[sb-activities@csi-india.org](mailto:sb-activities@csi-india.org)

Chapters are requested to send their activity report to

[chapter-activities@csi-india.org](mailto:chapter-activities@csi-india.org)

Kindly send **High Resolution Photograph** with the report.



#### (ADVERTISING TARIFF)

Rates effective from April, 2014

## CSI Communications

COLOUR Colour Artwork (Soft copy format) or positives are required for colour advertisement	MECHANICAL DATA		
Back Cover	₹ 50,000/-	Full page with Bleed	28.6 cms x 22.1 cms
Inside Covers	₹ 40,000/-	Full Page	24.5 cms x 18.5 cms
Full Page	₹ 35,000/-	Double Spread with Bleed	28.6 cms x 43.6 cms
Double Spread	₹ 65,000/-	Double Spread	24.5 cms x 40 cms
Centre Spread (Additional 10% for bleed advertisement)	₹ 70,000/-		

- Special Incentive to any Individual/Organisation for getting sponsorship 15% of the advertisement value.
- Special Discount for any confirmed advertisement for 6 months 10%.
- Special Discount for any confirmed advertisement for 12 months 15%.
- All incentive payments will be made by cheque within 30 days of receipt of payment for advertisement.
- All advertisements are subject to acceptance by the editorial team.
- Material in the form of Artwork or Positive should reach latest by 20th of the month for insertion in the following month.

All bookings should be addressed to :



**Computer Society of India™**

Unit No. 3, 4<sup>th</sup> Floor, Samruddhi Venture Park, MIDC, Andheri (E), Mumbai-400 093.  
Tel. 91-22-2926 1700 • Fax: 91-22-2830 2133 | Email: [hq@csi-india.org](mailto:hq@csi-india.org)

# Glimpses of CSI2020 Annual Convention



Hon'ble Justice Pinanki Chandra Ghosh, Chairman, Lokpal, India is inaugurating the CSI Annual Convention (CSI2020) at KIIT University Auditorium. Hon'ble Minister of E&IT and Sports Govt. of Odisha and other dignitaries are present.



Dignitaries on dias at the time of the National Anthem.



Hon'ble Sri Sri Ravi Shankar Ji while addressing to the delegates through video conferenceing at the inaugural function of CSI Annual Convention (CSI2020)



The organiser of CSI2020 presenting momento to the Hon'ble Chief Guest Justice Pinanki Chandra Ghosh, Chairman, Lokpal, India in the inaugural function with the presence of Shri. R. K. Vyas, Vice President, Computer Society of India.



The President of CSI, Prof A. K. Nayak with Hon'ble Justice Pinanki Chandra Ghosh, Chairman, Lokpal, India at KIIT University, Bhubaneswar



The view of delegates standing at the time of National Anthem



The President of CSI, Prof A. K. Nayak while receiving to Shri. Naveen Patnaik, Hon'ble Chief Minister, Odisha at KIIT University.



Presentation of the CSI e-Ratna Award to Shri. Naveen Patnaik, Hon'ble Chief Minister, Odisha at CSI2020.



Dignitaries are releasing the Souvenir of CSI Annual Convention in the eGovernance Award ceremony.



Dignitaries on dias while Shri. Manas Patnaik, Convenor CSI2020 delivering the welcome address.



Prof A. K. Nayak, President, CSI with Hon'ble Justice Sanjay Kumar Mishra, Hon'ble Judge Odisha High Court.



Hon'ble Justice Shri. Sanjay Kumar Mishra, Odisha High Court. is presenting Life Time Achievement Award to Dr. Achyut Samanta, MP and Founder of KIIT and KISS University