



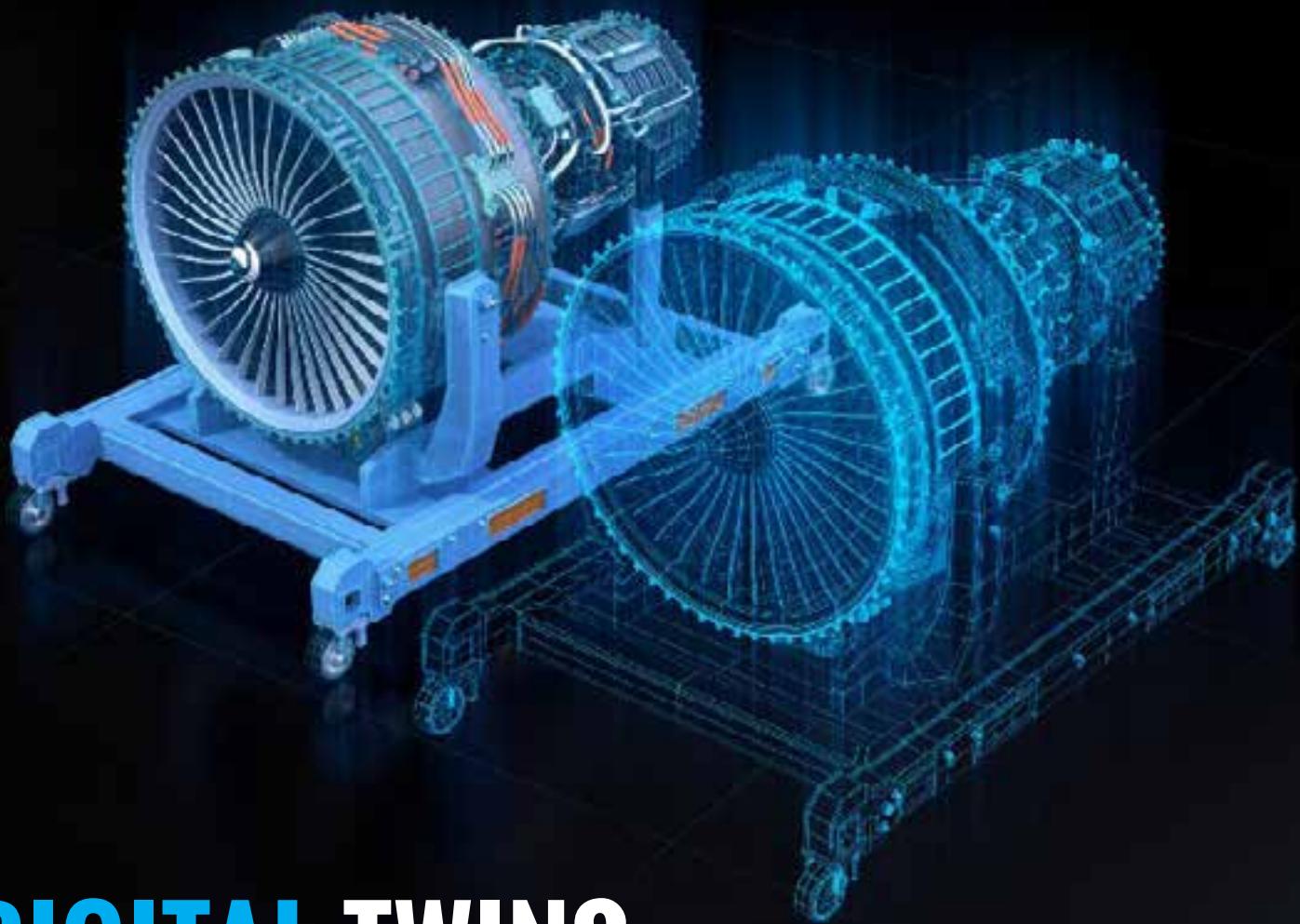
CSI Communications

Knowledge Digest for IT Community

VOLUME NO. 44 | ISSUE NO. 6 | SEPTEMBER 2020

₹ 50/-

ISSN 0970-647X



DIGITAL TWINS

INVITED ARTICLE

Titbit from the History of Computing-14 06

COVER STORY

Digital Twins: Abridged Mystery behind creation of Bridge between Physical and Virtual Worlds 8

RESEARCH FRONT

Application of Digital Twins in Industrial Technologies 19

TECHNICAL TRENDS

Role of Digital Twins in Smart City Development-A Technology for Sustainable Cities 29

Know Your CSI

Executive Committee (2020-21/22)



President
Mr. R K Vyas
(E) rkvyas05@gmail.com



Vice President cum President Elect
Dr. Anil Kumar Saini
(E) aksaini1960@gmail.com



Hon. Secretary
Dr. Vipin Tyagi
(E) dr.vipin.tyagi@gmail.com



Hon. Treasurer
Dr. Durgesh Mishra
(E) drdurgeshmishra@gmail.com



Immd. Past President
Prof. A K Nayak
(E) aknayak@iibm.in

Regional Vice-Presidents



Region-I (2019-21)
Mr. Arvind Sharma
(E) arvindsha@hotmail.com



Region-II (2020-22)
Md. Shams Raza
(E) s_raza2000@yahoo.com



Region-III (2019-21)
Mr. Jayant Bhide
(E) jayantbhide2000@gmail.com



Region-IV (2020-22)
Mr. Mukesh Kumar
(E) Mukesh.kumar@sailcet.co.in



Region-V (2019-21)
Mr. M. S. Prasadbabu
(E) profmspbabu@gmail.com



Region-VI (2020-22)
Mr. Pradeep Rathi
(E) pjrathi61@gmail.com



Region-VII (2019-21)
Prof. Dr. M Sundaresan
(E) bu.sundaresan@gmail.com

Division Chairpersons



Division-I (2019-21)



Division-II (2020-22)
Dr. P. Sakthivel
(E) sakthi_velp@yahoo.com



Division-III (2019-21)
Prof. Suresh Chand Tyagi
(E) sct_35_2000@yahoo.com
sctyagi1963@gmail.com



Division-IV (2020-22)
Dr. B. Chidhambararajan
(E) dbcrajan@gmail.com



Division-V (2019-21)
Dr. Subhash Chandra Yadav
(E) scy123@gmail.com

Nomination Committee (2020-2021)



Mr. Anand Rao
(E) nanandrao@yahoo.com



Mr. Anil Ji Garg
(E) aniljigarg@gmail.com



Dr. Sharvari C Tamane
(E) hodit@jnec.ac.in,
sharvaree73@yahoo.com

From the Desk of Chairman, Publication Committee



Dear Fellow Members,



Greetings.

The three publications of CSI viz., CSIC, Jrl. of Computing and Adyayan are coming out well – thanks to Prof. A. K. Nayak and Prof R.K.Vyas as well. The July-Sept issue of Adyayan is under print and will shortly be released.

Prof. V Rajaraman informed me that he has written a book "Groundbreaking Inventions in Information and Communication Technology". In his book Prof. Rajaraman addresses in detail questions such as: how did the IT revolution happen, what are the ground breaking revolutions, who are the innovators and innovations etc. I hope this book will be an asset to all educational institutions' libraries, and students and academicians find it informative.

A word about Carl Sassenrath - Founder and CTO of REBOL Technologies.

If our personal computers are able to multi-task, the credit goes to Carl Sassenrath.

Though Sassenrath started his career as a Multi-Programming Executive in the Computer Systems Division at Hewlett he is the founder and CTO of REBOL Technologies.

He is best known for his original design and implementation of the Amiga Multitasking Operating System. There, he created the Amiga Computer operating system kernel, from which the technologies for multi-tasking personal computers were developed.

I do hope that these contributions of legends in Computer Science/IT will motivate our student community/members /professionals.

With best compliments

Dr. D. D. Sarma

Chief Scientist (R), CSIR-NGRI, Hyderabad



CSI COMMUNICATIONS

VOLUME NO. 44 • ISSUE NO. 6 • SEPTEMBER 2020

Chief Editor

PROF. (DR.) S S AGRAWAL

Director General
KIIT Group, Gurgaon
F. Emeritus Scientist & Advisor CDAC, (N)

Editor

DR. RITIKA WASON

Bharati Vidyapeeth's Institute of Computer Applications and Management (BVICAM)
E-mail: rit_2282@yahoo.co.in

Published by

AKSHAYA KUMAR NAYAK

For Computer Society of India

Editorial Board:

Arun B Samaddar, NIT, Sikkim
Bhabani Shankar Prasad Mishra, KIIT University, Bhubanewar
Debjyoti Mukhopadhyay, Dean, School of Engg. & Applied Sciences, Bennett University
J Yogapriya, Kongunadu Engg. College, Trichy
Vivek Varshneya, MD and CEO VTS-Global
M Sasikumar, CDAC, Mumbai
R Subburaj, SRM University, Chennai
R K Samanta, Siliguri Inst. of Tech., West Bengal
R N Behera, NIC, Bhubaneswar
Sudhakar A M, University of Mysore
Sunil Pandey, ITS, Ghaziabad
Shailesh K Srivastava, NIC, Patna
Vishal Mehrotra, TCS

Design, Print and Dispatch by GP OFFSET PRIVATE LIMITED

Please note:

CSI Communications is published by Computer Society of India, a non-profit organization. Views and opinions expressed in the CSI Communications are those of individual authors, contributors and advertisers and they may differ from policies and official statements of CSI. These should not be construed as legal or professional advice. The CSI, the publisher, the editors and the contributors are not responsible for any decisions taken by readers on the basis of these views and opinions.

Although every care is being taken to ensure genuineness of the writings in this publication, CSI Communications does not attest to the originality of the respective authors' content.

© 2012 CSI. All rights reserved.

Instructors are permitted to photocopy isolated articles for non-commercial classroom use without fee. For any other copying, reprint or republication, permission must be obtained in writing from the Society. Copying for other than personal use or internal reference, or of articles or columns not owned by the Society without explicit permission of the Society or the copyright owner is strictly prohibited.

CONTENTS

Invited Article

Titbit from the History of Computing-14	06
--	-----------

V. Rajaraman

Cover Story

Digital Twins: Abridged Mystery behind creation of Bridge between Physical and Virtual Worlds	08
--	-----------

Namratha S. Khasnis and Sowmya M.

Hurried Look of Digital Twin	12
-------------------------------------	-----------

A. R. Revathi, M. Shwettha and P. Rajalakshmi

Digital Twin: The Revolution with Reflection Twin	15
--	-----------

Sharadhi A M and Snigdha Sen

Digital Twins: An Overview	18
-----------------------------------	-----------

Himani Mittal

Research front

Application of Digital Twins in Industrial Technologies	19
--	-----------

R. Umamaheswari, M. Senthil Kumar and B. Chidambara Rajan

Future with Quantum Computing	22
--------------------------------------	-----------

R. Sathya, V. Surya and Ghanta Hari Chandana

Future of work "Phygital"	26
----------------------------------	-----------

Sushree Patnaik

Technical Trends

Role of Digital Twins in Smart City Development-A Technology for Sustainable Cities	29
--	-----------

Archana Sasi and Sathish Kumar Ravichandran

The Prognostics of Digital Twin Technology for Industry 4.0	33
--	-----------

S. Balakrishnan and J. Janet

Digital Twins – A Paradigm approach in Industrial Automation	36
---	-----------

Vishakha Yadav, Thippeswamy G., Banuprakash R. and Siddiq Iqbal

PLUS

Know Your CSI

2nd Cover

Prospective Contributors of CSI Communications and Themes for CSI Communications	11
--	----

25

CSI SIG eGovernance Awards 2019-2020	25
--------------------------------------	----

28

Call for Paper for CSI Journal of Computing	28
---	----

32

Call for Contributions in CSI Adhyayan	32
--	----

38

CSI Annual Convention (CSI-2021) – Call for Papers	38
--	----

40

NSC, RSC & SSC for the year 2020-21	40
-------------------------------------	----

42

Online Technical Hackathon (OTH) and Webinar on "Data Science and AI" - A Report	42
--	----

43

BVICAM, New Delhi - Webinar Reports	43
-------------------------------------	----

44

National FDP on "Research Directions in Security and Computational Intelligence" - A Report	44
---	----

45

CSI IT Excellence Awards-2020 – A Report	45
--	----

46

CSI STPI YITP Awards-2020 – A Report	46
--------------------------------------	----

47

Welcome to new CSI members during Lockdown	47
--	----

48

CSI Service Awards 2019-2020	48
------------------------------	----

48

Welcome to new CSI Academic Institutional Members during Lockdown	48
---	----

49

National / Regional / State Level CSI Student Conventions and Important Announcement	49
--	----

50

CSI Academic Awards 2019-2020 – Call for Applications	50
---	----

51

One Month Faculty Induction / Orientation Programme (FIP) - A Report	51
--	----

52

Webinar on Transforming Relationship Between Human and Robots Amid COVID-19 - A Report	52
--	----

53

CSI Patna Chapter	53
-------------------	----

54

Online Workshop on "Data Analysis & Visualization Using Pandas, Seaborn and Plotly in Python"	54
---	----

55

Allahabad Chapter Webinar Series	55
----------------------------------	----

56

National Webinar on Therapeutic Goals of COVID-19	56
---	----

57

BVICAM, New Delhi - Webinar Reports	57
-------------------------------------	----

58

Chapters Report	58
-----------------	----

From CSI Student Branches	62
---------------------------	----

62

CSI YITP Awards 2021	69
----------------------	----

69

CSI-IT Excellence Awards 2021	70
-------------------------------	----

70

54th CSI-2021 Convention	70
--------------------------	----

Back Cover

Printed and Published by Prof. Akshaya Kumar Nayak on behalf of Computer Society of India, Printed GP Offset Pvt. Ltd. 269, 2nd Floor, A-2, Shah & Nahar Industrial Estate, Sitaram Jadhav Marg, Lower Parel, Mumbai 400 013 and Published from Samruddhi Venture Park, Unit No. 3, 4th Floor, Marol Industrial Area, Andheri (East), Mumbai 400 093. • Email : hq@csi-india.org

Chief Editor: S. S. Agrawal

♦ 3 ♦

CSI COMMUNICATIONS | SEPTEMBER 2020

Editorial



Prof. (Dr.) S. S. Agrawal

Chief Editor

Dr. Ritika Wason

Editor

Dear Readers

"Digital twins are becoming a business imperative, covering the entire lifecycle of an asset or process and forming the foundation for connected products and services. Companies that fail to respond will be left behind."

- Thomas Kaiser

The above quote By Thomas Kaiser, SAP Senior Vice President of IoT depicts the importance of digital twins in the current smart world. As per Wikipedia, a digital twin is a digital replica of a living or non-living physical entity. It refers to a digital replica of potential and actual physical assets, processes, people, places, systems and devices that can be used for various purposes.

In today's world digital twins have already penetrated into enterprises in a big way. We dedicate this issue to understanding and appreciating the role digital twins are playing in this smart computational world. Continuing with our invited series Titbits from the History of Computing –XIV by the legendary Prof. V. Rajaraman, this issue discloses, "Who coined the term Artificial Intelligence?" This article uncovers the development of artificial intelligence. The first article, "Digital Twins: Abridged Mystery behind creation of Bridge between Physical and Virtual Worlds" by Namratha S. Khasnis and Sowmya M. details the origin of digital twins. The article, "Hurried Look of Digital Twin" by A.R. Revathi, P.Rajalakshmi and M. Shweththa uncovers the type and potential of digital twins. The next article, "Digital Twin: The Revolution with Reflection Twin" by Veeresh Kumar B.V. and Snigdha Sen details how Digital Twins are driving value in various domains. The next article, "Digital Twins: An Overview" by Himani Mittal unveils the components of Digital Twins.

The research front showcases, "Applications of Digital Twins in Industrial Technologies" by R. Umamaheswari, M. Senthil Kumar and B. Chidambara Rajan delves into the rise of digital twins in IIOT. The next article uncovers the future with quantum computing, "Future with Quantum Computing" by R.Sathy, V. Surya and Ghanta Hari Chandana unveils the potential of quantum computing. The last article, "Future of Work Phygital" by Sushree Patnaik delves into the altering scenario of human lives in 2020.

The technical trends section commences from the article, "Role of Digital Twins in Smart City Development-A Technology for Sustainable Cities" by Archana Sasi and Satish Kumar Ravichandran traces how the Digital Twins are contributing towards the realisation of smart cities. The next article, "The Prognostics of Digital Twin Technology for Industry 4.0" by S. Balakrishnan and J. Janet elaborates the role of Digital Twins in Industry 4.0. The article, "Digital Twins-A Paradigm approach in Industrial Automation" by Vishakha Yadav, Thippeswamy G., Banuprakash R. and Siddiq Iqbal highlights the role of Digital Twins in Industrial Automation.

Computer Society of India (CSI) has always endeavoured to promote knowledge dissemination among the computing professionals and students throughout the nation. In this endeavour, the current issue also welcomes its new individual, institutional and life members of 2020. We also declare the national, regional

and state student coordinators for the year 2020-2021. Heartiest congratulations to all. We hope to see growing number of student activities under your able leadership.

The issue also reports various webinars, student branch inaugurations and faculty development programmes conducted by various regions of CSI. A new trend in education / communication is very clearly visible that people have resorted to "online mode and the virtual mode for teaching and learning" at various levels. The experts in computer science and the CSI are assisting and showing the way for its effectiveness. It is very encouraging to see the reports from various chapters, specially the student chapters. We applaud all chapters and branches for conducting such activities even in these hard times. Varied student branch activities as well as workshops carried by different regional chapters of CSI like industrial visit and programming competitions have also been reported.

The call for papers for CSI 2021 and other student conventions has also been included for the information of readers and prospective authors. We would also like to congratulate the winners of CSI Fellowship Awards. We value the continued association of these distinguished experts with CSI. The authors are also introduced to the various CSI Committees for the year 2020-2021.

We are extremely thankful to all our contributors as well as readers. We are continuously receiving so many good quality articles each month that selection becomes a difficult task. May God bless you all with extreme strength and well-being to overcome these hard times safe and sound. 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, Immediate Past President, CSI for his constant encouragement, support and guidance in publication of September, 2020 issue.

We look forward to receive constructive feedback and suggestions from our esteemed members and readers at csic@csi-india.org

With kind regards,

Prof. (Dr.) S. S. Agrawal

Chief Editor

Director General KIIT, Former Emeritus Scientist CSIR,
Advisor CDAC, Noida

Dr. Ritika Wason

Editor

Associate Professor, BVICAM, New Delhi



President's Desk

From : President, Computer Society of India

Date : 01 September, 2020

Email : president@csi-india.org / Cell : (91) 98105 92760

Dear Members,

After the difficult phase of pandemic Covid-19 in the country, more and more relaxation are being given by government. Most of us are moving towards our daily routines as before the pandemic and started moving to our Institutes & offices working as per guidelines of safety issued by government. Most of the places teaching learning proses has started in mixed mode, by conducting examinations and other process in organization in physical mode. But we should properly follow guidelines which will keep all of us safe and will allow us to work with safety.

The current issue is on Digital Twins which can be termed as a form of physical object or system. Items like buildings, factories, even cities, also people and process can have digital twins. They are virtual forms of physical assets such as duplicates of machines, physical sites or equipment with sensors. The Digital assets can be developed as a prototype before physically creating an assets, like Digital twin prototype (DTP), the Digital Twin Aggregate (DTA) and Digital Twin Instance (DTI). Digital Twins will help cost & time effective transformation in manufacturing process, IOT is the one of the enabler for Digital Twins

Researchers & professional has contributed in CSI communication with more enthusiasm, in the current issue on theme of Digital Twins, we had a very good response.

Their work on Digital Twins had been thoroughly reviewed by the experts and quality papers are published in current issue, These papers & articles will encourage other researchers and professional to move forward in the this area.

I must congratulate our Chapters & Student Branches for continuing their dynamism & vibrant contribution during the period for organizing quality activities at local to International level in mixed mode. The activity reports of chapters & student Branches published in this issue once again gives excellent picture of CSI activities. It is my duty to motivate the respective organizers & members of the chapters & student branches for their hard work & significant contribution for their own professional growth & growth of CSI. In the current issue we are publishing the names of members who have volunteered themselves for the post of State & Regional Student Coordinators. As per past practice we are issuing the for call YITP Award , IT-Excellence Award, e-governance Awards and call for organizing State Student Convention & Regional Student Convention. Hope this will lead to wider participation of IT professionals, students and Institutions across the strata to in CSI activities.

We are continuing with 15% concession in the life membership during pandemic period to attract more & more professional & bring them together for the growth of IT, the details are available on our portal www.csi-india.org.

It's my privilege to thank all Past Presidents, Fellows & Senior Members of CSI for their continued guidance & support.

Stay Safe, Stay Connected.

With warm regards,

Mr. Ram Krishan Vyas
President, CSI



Titbit from the History of Computing—14

Who coined the term Artificial Intelligence?

► **V. Rajaraman**

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

“We would like to live as we once lived, but history will not permit it”- John F. Kennedy

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

Prologue

Speculation on designing a machine that will simulate a human brain is as old as mankind. In each era of history scientists and philosophers tried to use the then prevalent mechanisms to simulate a brain and its functions. In the twentieth century Warren McCullough, a neurophysiologist, and Walter Pitts, a mathematical prodigy, collaborated to model the function of a brain using a neural net in 1943 and formally established that it can be used for computation. When the first analog computers and feedback systems appeared Norbert Wiener, a mathematics professor at the Massachusetts Institute of Technology, defined the term Cybernetics in 1948 as “the scientific study of control and communication in the animal and the machine”. He primarily used analog communications in his studies. Alan Turing working in England wrote a paper, Computing Machinery and Intelligence, in 1950 which starts with the question “Can machines think?” and goes on to argue that trying to answer such a question may lead to absurd conclusions and instead he designed an imitation game between a woman, a man, and an interrogator in which the interrogator has to decide who is the man and who is the woman based on the answers to questions posed by the interrogator. This has been modified as Turing Test [1] in which the woman is replaced by a computer. The interrogator asks a series of questions that are randomly sent to the man or to the computer. At the end of the interrogation if the interrogator is not able to decide which answers were given by the computer and which by the man then one may conclude that the machine exhibits intelligent

behaviour. Passing the Turing Test involves the computer being able to understand language and having a huge repository of knowledge including cultural nuances.



Alan Turing Norbert Wiener

(Left photo courtesy Wikipedia.org)
(Right photo courtesy bri.ee.washington.edu)

Another stream of work was related to the fundamental limitation on what are computable by machines based again on the seminal work of Turing in 1936-37 in which he described an abstract machine called the Turing machine that in principle can compute anything that a computer can compute and showed that there exist some problems that are not computable.

Automata Studies

John McCarthy entered this scenario in 1952. He had obtained a PhD in mathematics from the Princeton University in 1951 and was an instructor there during 1951-52. He spent the summer of 1952 at the Bell Telephone Laboratories where he worked with Claude Shannon, the father of Information Theory, and one of the early pioneers in computing who wrote a computer program to play chess. He convinced Shannon of the need to publish a volume of invited papers on this emerging area of cybernetics and automata. Shannon and McCarthy invited active researchers in these areas to contribute papers that would be refereed by peers. They received thirteen papers and categorised them into

three broad areas: Finite Automata, Turing Machines, and Synthesis of Automata. The first set of five articles were related to neural network models treated mathematically; the second set of four were on extensions of Turing machine models; and the third set of four were on cybernetic models of machines. There was a debate between Shannon and McCarthy on the title of the volume [2]. McCarthy suggested “Towards intelligent Automata” but was overruled and the final title was Automata Studies[3].

The experience of editing this volume convinced McCarthy of the need to have a broader discussion on these topics. He was disappointed that no paper described possibilities of computers exhibiting intelligence. He was inclined towards using digital symbolic processing in future research on automata and away from analog cybernetic models of Wiener. In 1952 he accepted the position of an assistant professor of mathematics at Stanford University. He was busy editing Automata Studies till late 1954. The volume was published by the Princeton University Press in 1956.



John McCarthy Claude E. Shannon

(Left photo courtesy engadget.com)
(Right photo courtesy ias.edu)

Genesis of the Dartmouth Workshop on Artificial Intelligence

McCarthy was denied tenure by Stanford University and moved to Dartmouth

College in Hanover, New Hampshire as an assistant professor of mathematics in February 1955. He talked to Shannon about the possibility of organizing a workshop on automata and brain modelling. He had a meeting with Warren Weaver of Rockefeller Foundation in early April 1955 about the possibility of the foundation funding a workshop at Dartmouth College in the summer of 1956 on automata and brain modelling that would have around ten researchers working together for six weeks. Weaver felt that it would be more appropriate for McCarthy to discuss the proposal with his colleague Robert Morison who was in the area of funding biological and medical research [2]. A proposal titled : "A proposal for the Dartmouth Research Project on Artificial Intelligence" was written by McCarthy along with Marvin Minsky who was a faculty member at MIT, Nathaniel Rochester who was with IBM and had designed the IBM 701, and Claude Shannon. After discussions among Shannon, McCarthy, and Morison it was agreed in principle that Rockefeller Foundation would fund the workshop. The requested amount of US\$13,500 was reduced to US\$7,500 [2]. The formal proposal to the Rockefeller Foundation was sent in September 1955 by McCarthy and stated in its introduction – I quote

"We propose that a 2-month, 10-man study of artificial intelligence be carried out during the summer of 1956 at Dartmouth College in Hanover, New Hampshire. The study is to proceed on the basis of the conjecture that every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be

made to simulate it. An attempt will be made to find how to make machines use language, form abstractions and concepts, solve kinds of problems now reserved for humans, and improve themselves. We think that a significant advance can be made in one or more of these problems if a carefully selected group of scientists work on it together for a summer."

This was the first time that the term Artificial Intelligence was used and it was coined by John McCarthy the main proposer. The term was used to describe a set of diverse topics stated in the proposal that included natural language understanding by computers, neural networks, computational complexity, self-improvement or learning by computers, abstraction, randomness and creativity.

As it transpired many of the persons who were invited attended for short period of two weeks scattered over the eight weeks. Only a few including McCarthy, Minsky, and Ray Solomonoff were present throughout the eight weeks from mid-June to mid-August, 1956. Notable participants included Allen Newell and Herbert Simon who later did seminal research on programming computers to prove theorems in elementary symbolic logic and machine learning. No report giving the conclusions of the workshop was sent to the Rockefeller Foundation. However, many papers based on the research done during those eight weeks were presented in conferences [2].

Epilogue

The Dartmouth College Artificial Intelligence conference is considered as a turning point in the history of computing. The term Artificial Intelligence came into general

use after this conference. Cybernetics with analog processing waned and symbolic processing using digital computers thrived in AI research. In July 2006 a conference titled "The Dartmouth College Artificial Intelligence Conference: The next 50 years (AI@50)" [4] was held at Dartmouth College and was attended by five of the original participants including McCarthy and around 50 active researchers in AI. The state of AI research was discussed by the five participants of the 1956 conference and others present. It was generally agreed that AI is thriving. It is interesting to observe that the topics discussed in the Dartmouth workshop are now active areas of research.

Acknowledgment

I thank Professor T.V.Prabhakar of IIT/ Kanpur for reviewing this article and his perceptive comments.

References

- [1] V. Rajaraman, "Turing test and after", Resonance, Indian Academy of Sciences, Volume 2, No.8, August 1997, pp.50-59.
- [2] Ronald R. Kline, "Cybernetics, Automata Studies, and the Dartmouth Conference on Artificial Intelligence", IEEE Annals of History of Computing, Volume 33, Number 4, October-December 2011, pp.5-16.
- [3] C. E. Shannon and J. McCarthy (Editors), "Automata Studies", Princeton University Press, Princeton, New Jersey, USA, 1956.
- [4] James Moor, " The Dartmouth College Artificial Intelligence Conference: The Next Fifty Years", AI Magazine, Volume 27, Number 4, 2006.

About the Author



Prof. V. Rajaraman (CSI Fellow) Ph.D. (Wisconsin) is Emeritus Professor, Supercomputer Education and Research Centre, Indian Institute of Science, Bangalore. Earlier Prof. Rajaraman was Professor of Computer Science and Electrical Engineering at IIT, Kanpur (1963-1982), Professor of Computer Science and Chairman, Supercomputer Education and Research Centre, Indian Institute of Science, Bangalore (1982-1994) and IBM Professor of Information Technology, Jawaharlal Nehru Centre for Advanced Scientific Research (1994-2001). A Padma Bhushan awardee in 1998, he is also a recipient of the Shanti Swarup Bhatnagar Prize in 1976. He is a lifetime contribution awardee of the Indian National Academy of Engineering and the Computer Society of India. (A detailed biodata may be found in en.wikipedia.org/wiki/Vaidyeswaran_Rajaraman).



Digital Twins: Abridged Mystery behind creation of Bridge between Physical and Virtual Worlds

► Namratha S Khasnis

B.E. Student, Global Academy of Technology, Bangalore
Email: namratha.khasnis25@gmail.com

► Sowmya M

Assistant Professor, Global Academy of Technology, Bangalore
Email: sowmyam@gat.ac.in

This article starts with an introduction about Digital Twin concept followed by riveting anecdotes about its origin. The focus of the article is to bring out creative ways of applying the digital twin concept to ease research on the pandemic resolution. It demonstrates the role of Digital Twin strategy in developing the vaccine for COVID-19, talks about the optimization of ventilator resources, and the importance of Digital Twin in the health care industry.

A Glimpse on Digital Twin

Digital Twin, the term designated to a ubiquitous strategy, owing to the vast array of its applications in various fields, essentially means that it is a virtual representation employed to understand and foretell the behaviour of its physical equivalent. In simpler terms, Digital Twin is a digital replica of a physical product in all its aspects. The latter half of the sentence implies that the digital twin observes the entire life cycle of its physical counterpart through sensors and stores it in the form of data that is thereafter used to simulate the behaviour and even optimize some actions in the behaviour if required.

Unravelling the Mystery behind the Origin of Digital Twin Technology

The concept of Digital Twin was introduced by Michael Grieves in 2002 when

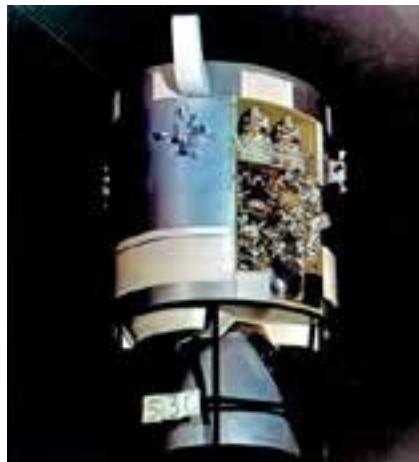


Fig. 2: An image of the damaged Apollo 13 spacecraft^[3]

he presented a topic that depicted virtual

The scientists were daunted by this. The



Fig. 1: A representation to understand the concept of digital twin^[4]

modelling. However, the origin of Digital Twin Technology dates to 1960s^[2]. This technology was already being employed by NASA, the largest space organization in its projects. NASA used the basic replication ideas during this period as a development strategy for many of its space programs. NASA created duplicates of the systems in space to study their behaviour on the ground. An illustration of this strategy was when NASA developed a virtual twin to analyze and replicate the behaviour of Apollo 13.

Apollo 13 was one of the most promising projects taken up by NASA and its launch was scheduled in April 1970. Alas, due to technical glitches it was broken and rendered damaged in the middle of the mission, as oxygen tanks blew up (Fig. 2).

rescue mission was a critical one. The whole world sat tight watching, as these damages were to be repaired from nearly 200,000 miles away. A ray of hope, the critical piece that fitted the jigsaw of this fiasco, was a digital twin model of Apollo13 which was created by prudent scientists. This replica was used by engineers and technicians to test an array of feasible solutions from the Earth. The possible operations that could shape into a solution were tested on this replica, which helped the engineers to visualize the impact of their modifications on the original Spacecraft. This replica was a physical model, unlike the present Digital Twin virtual models. Thus, emerged a breakthrough in the technology sector, a strategy that would revolutionize the modern

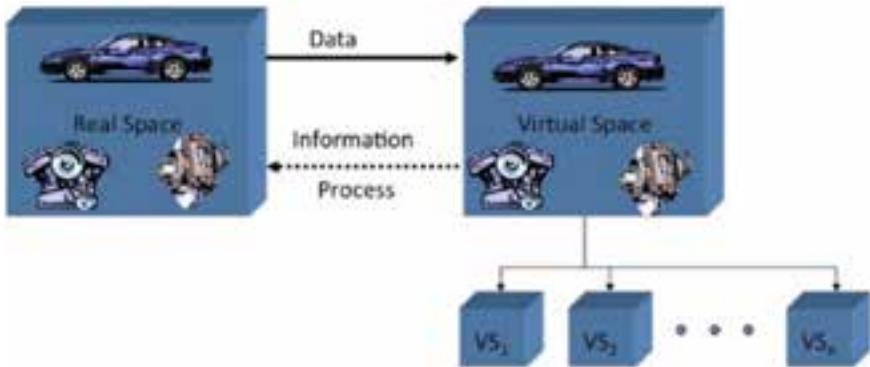


Fig. 3: The presentation slide titled “Conceptual Ideal for PLM” used by Dr Michael Grieves at the University of Michigan in 2003

industry and would lay the foundation for the field of IoT. The strategy of Digital Twin modelling is now successfully utilized to find solutions to various problems in the sectors of Aerospace, Defence, Automotive, Consumer Products, Agriculture, and Energy.

Grieves' Concept of Digital Twin [1]

The concept of Digital Twin was first introduced at a presentation held at the University of Michigan in the year 2002. The crux of this was to present the development of a *Product Lifecycle Management (PLM)* centre (Fig. 3). The presumption behind the creation of this model was the idea that each system could be viewed as two systems, the actual, physical system that is in our hands right now and a digital replica of this system that encompasses all data of the physical system. This achieves the replication process between the physical space to virtual space and vice versa. The title *Product Lifecycle Management* emphasized the fact that digital and physical systems would be connected throughout the lifecycle of the system. The digital version monitors and adapts the characteristics and behaviour of the physical system.

After the presentation by Grieves, Digital Twin concept attained heights of popularity as the benefits of it in the manufacturing sector were recognized. Since then, it has been serving its purpose as a notional basis in Aeronautics and Aerospace areas.

Digital Twin's Role as the Elixir of Covid-19

Digital Twin strategy strikes again during the development of the Covid-19 vaccine!



Fig. 4: Digital Twin Modelling for vaccine manufacturing [9].

A situation like the Apollo13 crisis, that determines the life and death of humans, is the COVID-19 pandemic. Developing a vaccine to combat the virus is a research-intensive process and this can be accelerated using Digital Twin strategy. To understand the requirement of Digital Twin technology in the vaccine development process, let us first understand the procedure involved in the production of any vaccine. Typically, a vaccine is accepted as a combat to a virus after conducting several tests with the developed sample. Once this is accepted, there is a requirement to produce this in

massive quantities to quench the demand. It is of critical importance to the pharmaceutical industries to accelerate the *production rate*. Pharmaceutical companies have a *Bioreactor* plant which is a system that supports a biologically similar environment to examine reactions between chemical and biological substances. Every reaction that takes place between the ingredients in a bioreactor must be monitored which involves a significant manual effort. The Digital Twin can aid the monitoring process [8]. The initial conditions of a Bioreactor are duplicated and fed as data to a Digital Twin model. Any change in the digital twin's data value indicates a reaction has taken place in the original bioreactor. This reaction is immediately recorded, stored in a database and a notification is sent to a pharmaceutical engineer who has a mobile application associated with this digital twin. This application takes the help of Machine Learning techniques to foretell the value of important process parameters and even make decisions to improve the performance of the process that is in progress. Researchers can use this data to determine the compatibility of a vaccine.

This depicts how digital twin modelling can be employed in the pharmaceutical industry to aid vaccine manufacturing research.

Digital Twin Strategy to Stabilize Ventilator Demand Amidst Pandemic

A Cloud Engineering company called OnScale has come up with a project called BreathEasy [6] which aims at developing Digital Twin models of lungs of COVID-19 patients to help doctors monitor the patient and optimize ventilator resources. A Digital Twin model of a patient's lungs is built from a combination of medical reports such as CT scans, X-rays. The airflow, blood flow mechanism of lungs is also simulated into this model. This model is then trained by AI to

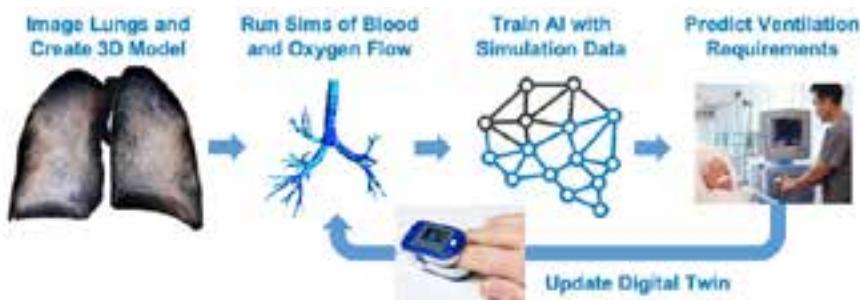


Fig.5: Simulation of the Behaviour of the Lungs

make an accurate prediction on the oxygen level and blood flow level of the patient. If these values are critical then ventilator can be allotted to the patient, otherwise, a noncritical value would mean that ventilator is not required for the said patient. During this pandemic, there is news related to ventilator shortage every day which is a problem faced by most hospitals in different countries. Employing Digital Twin technology to create a simulation of the lungs to accurately predict when a patient would truly require ventilation due to the drop in oxygen levels is a life-saving strategy. (Fig. 5).

Digital Twin as a Replica of Covid-19 Affected Cities

The variation in the number of people affected during the pandemic corresponds to the cities that they live in. Some cities have a surge in the number of cases while some cities barely have any cases at all. A digital twin model is created to represent a city [5] and this model will have the parameters that are the exact values of the original city's attributes such as *temperature, humidity, number of people affected, and number of people recovered*. The model is constantly updated with the changes in these values and when these changes reflect a surge, immediate measures are taken to optimize the city's condition that would favour the reduction in the number of cases. The people of the city can also have a mobile application whose backend is connected to the Digital Twin's database. The changes in the values can be seen on the dashboard of the app so that people can take precautionary measure to adapt to these changes. This will be of utmost significance amidst the pandemic to create awareness and make people prudent. Virtual Singapore (Fig. 7) is one such digital

replica of the island city which simulates its infrastructure and weather changes.

Conclusion

The concept of Digital Twin is the result of thorough, ingenious research and it has played a vital role in shaping today's technology including Artificial Intelligence, the most sought-after research field. Though it started as a concept to optimize the product manufacturing process, with the integration of sensors and data collection mechanisms, it is now able to virtually predict everything that will happen in the physical world. The insights gained from this will provide a firm ground for future planning and development. The optimization achieved through Digital Twin minimizes the downtime and cost of development. The best use case of Digital Twin was already demonstrated in the case of NASA's Apollo 13 project and this is what makes the history of Digital Twin so pronounced, so substantial to read. It laid a firm foreground to how Digital Twin strategy will revolutionize the era of technology. The health industry has also realized the significance of Digital Twin modelling amidst the Coronavirus situation. Digital Twin has the potential to become the protagonist in the field of vaccine manufacture and also in the research about the origin of the virus. The results achieved by incorporating simulations and optimizations in the drug manufacturing process are proven to be significantly optimal and it reduces the production time. This reduction is crucial during a pandemic that has put the economy of a country on hold. Just how the strategy resolved the Apollo 13 crisis and saved many lives, Digital Twin strategy will play a major role in vaccine development which can save millions of lives. Thus, understanding the

story behind the origin of technology helps the development of creative ways of utilizing it.

Digital Twinning is metaphorically the process of installing the brain into a simple machine!

References

- [1] Grieves, Michael. (2016). Origins of the Digital Twin Concept. 10.13140/RG.2.2.26367.61609.
- [2] Digital Twin History- <https://www.challenge.org/insights/digital-twin-history/>
- [3] Apollo 13 crisis- <http://www.collectspace.com/ubb/Forum29/HTML/001684.html>
- [4] Insights and industry news- <https://insights.thirdrepublic.com/digital-twins/>
- [5] 'Digital twins' can help create healthier cities after coronavirus-<https://www.reuters.com/article/us-health-coronavirus-tech-trfn/digital-twins-can-help-create-healthier-cities-after-coronavirus-idUSKBN22Y0VR>
- [6] BreathEasy project- <https://www.enterprisai.news/2020/04/15/onscale-launches-project-breatheeasy/>
- [7] Virtual cities-<https://www.smartcitylab.com/blog/digital-transformation/singapore-experiments-with-its-digital-twin-to-improve-city-life/>
- [8] Digital Twin strategy in the pharmaceutical industry- <https://www.infosys.com/insights/iot/documents/building-digital-twin.pdf>
- [9] Data Analytics to accelerate vaccine development- <https://blog.umetrics.com/using-data-analytics-to-accelerate-covid-19-vaccine-development> ■



Fig. 7: Virtual Singapore-A Digital Twin model of the city^[7].

About the Authors

Namratha S Khasnis is pursuing her bachelor's degree in Computer Science and Engineering at Global Academy of Technology, Bangalore.

Passionate about Web Development and building resilient software, her interests lie in the field of Big Data and Hadoop, Cloud Computing, Agile Software Engineering.



Sowmya M (Life member no. I1504343) has obtained B.E in Computer Science and Engineering from VTU and M.Tech in Computer Network Engineering from VTU in the years 2009 and 2011 respectively. She has a teaching experience of 7 years and she is currently working as an Assistant Professor in the Department of Computer Science and Engineering at Global Academy of Technology, Bangalore. Her research interests include Natural Language Processing and Machine Learning.

KIND ATTENTION !**Prospective Contributors of CSI Communications****Forthcoming Issues : October 2020 : Robotics**

Please note that Cover Theme for the October 2020 issue is **Robotics**. Articles may be submitted in the categories such as: Cover Story, Research Front, Technical Trends, Security Corner and Article. Please send your contributions by 30th September, 2019.

The articles should be authored as original text. Plagiarism is strictly prohibited.

Please note that CSI Communications is a magazine for members at large and not a research journal for publishing fullfledged research papers. Therefore, we expect articles written at the level of general audience of varied member categories. Equations and mathematical expressions within articles are not recommended and, if absolutely necessary, should be minimum. Include a brief biography of four to six lines, indicating CSI Membership no., for each author with high resolution author photograph.

Please send your article in MS-Word format to Chief Editor, **Prof. (Dr.) S. S. Agrawal** in the email ids **csic@csi-india.org** with copies to the Publisher **Prof. A. K. Nayak**, in the email id : **aknayak@iibm.in** and Editor **Ritika Wason**, Associate Professor Bharati Vidyapeeth's Institute of Computer Applications and Management (BVICAM) in the email id : **rit_2282@yahoo.co.in**

Issued on the behalf of the Editorial Board, CSI Communications.

Prof. (Dr.) S S Agrawal
Chief Editor

**Themes for CSI Communications**

Month & Year	Theme	Month & Year	Theme
October, 2020	Robotics	December, 2020	Industry 4.0
November, 2020	Deep Learning		



Hurried Look of Digital Twin

► A. R. Revathi

Associate Professor, Department of IT, SRM Valliammai Engineering College

► P. Rajalakshmi

UG Student, Department of IT, SRM Valliammai Engineering College

► M. Shweththa

UG Student, Department of IT, SRM Valliammai Engineering College

“Being human in the digital world is about building a digital world for humans”

— Andrew keen, Entrepreneur and Author

Prologue

During past times one had to finish implementing the complete product to know whether it operates in a proper manner. Only then the faults and issues in the product can be discovered. Imagine if there is a possibility to identify and determine how the product functions before the final aggregation of all the required components of the product. Dr. Michael Grieves in 2002 introduced the concept of “Digital Twin” which overcomes the flaws of Product Lifecycle Management (PLM) in the early era. But the concept was named as “Digital Twin” by John Vickers of NASA in 2010 Roadmap Report. The research of digital twin is blooming around all technologies like Artificial Intelligence and Internet of Things etc.

What is Digital Twin?

A digital twin is a copy of living or non-living physical parameters. It is a virtual representation of a product which can be used in product design, optimization, servicing and simulation. They collect the data to create a “twin” which can be used to determine the working of processes, product or service. Digital twin plays a vital role in industrial Internet of Things (IoT). They make use of sensors and actuators to provide a real time project while integrating the industrial Internet of Things, computational intelligence and software analytics.

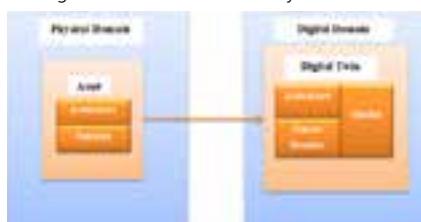


Figure 1: Digital Twin Model

Digital twin is the asset that available

on virtual world as confirmed in [1]. They optimize the behavior of assets by applying the real time environment to the digital twin to modifying the behavior through the sensors used. By running the simulations on the digital twin, prediction of future assert can be done. The live behavior and rank of the asset can be understood with the assistance of sensor reading to the digital twin as represented in Figure 1.

Digital Twin Potential

The history of Digital Twin may look simple but it has greater capabilities compared to other growing technologies.

These abilities provide a higher value throughout the Product Lifecycle Management. Let's take a look at them in short:

- **3D Representation:** The measured features of a physical object can be mapped to a 3D model.
- **Visualization:** A graphical representation of the product can be portrayed either on a physical device or in system.
- **Data Model:** The data model is simulated for visualization, connection and analytics.
- **Model Synchronization:** The digital twin model is aligned with some real world parameters.
- **Simulation:** The object is viewed in the simulated environment to record its behaviour.
- **Document Management:** All the information regarding the Product Lifecycle Management is maintained for future reference.
- **Model:** The performance and stuffs of a physical device are characterized in digital manner.
- **Connected analytics:** The measured

properties of an object helps to compute the algorithm and artificial results.

Types of Digital Twins

Digital twin works in bottom-up approach, which provides the more knowledgeable and multiple types of information with each and every layer. The four types of an emerging hierarchy of digital twins are depicted in Figure 2.

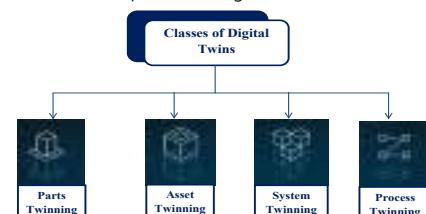


Figure 2: Sorts of Digital Twin

a. Component/ parts twinning

The term “component” in Component twinning represent that they are the twin of a single component in the entire system. They have the significant impact on the performance of the asset to which it belongs. The physical representations of individual components allow the engineers to recognize the physical, electrical and mechanical characteristic of a component.

They highly concerned on stability and durability of individual component. Nowadays many Computer-aided design or manufacturing solutions allow viewing the factors like durability, performance including static stress and thermal stress which is the suitable example of component twin. Component twinning is also known as parts twinning.

The next higher level of digital twins is Asset twinning. Asset twinning can be defined as a collection of component twin or it

can gather the information from component twin. An engine is a best known example of asset twin. To give a better outcomes asset twinning make use of individual products to work together as an entire asset. They show the visibility at an equipment level. Asset twinning has the capable of analysing the working of individual products together in order to improve the model without having to screw around with real engines. Thus create a way to reduce the mean time between failures and time to replace as well as fuel consumption in case of increasing the factors like performance, quality and scalability as said in [2].

c. System or Unit twinning

The next higher level of digital twin arise after asset twin is system twinning that permits the engineers to run and operate the entire fleets of disparate products to work together to achieve the best outcomes. They show the visibility across a collection of equipment. System twin has the capable of analysing the working of individual assets together. They can be applied for various types of applications.

System twinning is also known as unit twinning. Let us consider the car factory as an example of system twinning. They collect all the units necessary for production of a component of the finished product. They also improve the collaboration between single assets in order to improve the performance by reducing the time consumption.

d. Process twinning

Process twinning is the high level twinning that represents a whole production process and provides insight into the collaboration of all other system. The far most important factor to be considered here is timing. In other words process twin can be expressed as a set of asset or system twins but they mainly focus on process rather than the equipment. They become more functional and effective when all the system, assets and parts fulfil their requirements which make the level of analysing the entire process via digital twins much easier.

Use cases

The use cases and applications of digital twin are wide. There is not a single place where it cannot be implemented and it can be combined easily with other top technologies in the world such as IoT, Cyber security, big data and so on as confirmed in [3]. It has plenty of advantages that

make everyone choose this over other technologies.

Smart Cities

With the help of digital twin it is possible to build a sustainable smart city.

It is nothing but a replica of the physical city to visualize the environment as shown in Figure 3.



Figure 3: Smart city digital twin

These digital twin models guide the future issues and complexity of the city from every aspect. At the time of any natural disasters, the places and areas that will be affected can be easily determined and the state and city authorities can take immediate action regarding the problem. Even more it can be used to monitor the traffic and the other resources that will be essential to develop the city. The smart cities which were just stories have turned real with the help of IoT technology and digital twin is making this easier and comfortable.

Healthcare

Nowadays the healthcare industry is just more than hospitals, doctors and patients. There is no field in this world without the application of technology and one such important place where technology is helping a lot is healthcare. Digital twin is being used by doctors to predict the emergencies and complexity of a patient health condition.



Figure 4: Patient twin model

Before doing an operation it will be useful for doctors to know the issues they will be facing and different ways they can avoid that. It is also used for patient monitoring

where the improvement of a patient can be observed and necessary treatments can be provided as represented in Figure 4. Thus implementing an effective 'Remote Patient Monitoring' (RPM).

Building Construction and Utilities

Another major use of digital twin is construction of buildings where a digital model of the building is developed in order to complete the building process easier and faster as depicted in Figure 5. The amount of materials needed to build can be identified approximately and the man power and number of days to finish the work can also be calculated.



Figure 5: Construction twin model

The safety aspect of every building is necessary and it can be monitored well by looking at the model in various dimensions and views.



Figure 6: Education Twin Model

Even after the building is constructed it is quite easy to find whether the quality is good. The progress of the building is very important to finish the work in given time thus it can be automated to make the process simple.

Education

Looking at how digital twin will be used in the education is that will be via the help of tools that are used in virtual reality. Students practicing medicine will not be encouraged

to practice their lessons on humans directly, using digital twin will surely help them to perform the lessons they learnt during classes. A model of a human body can be made to learn how each and every organ in the body works and the process happening inside the body can be observed. Learning this way can be very helpful and everyone can easily remember the concepts forever. While doing projects they can visualize the prototype and further continue with the work flow.

Industries

Focusing on the product industries, digital twin technology play a vital role in creating and manufacturing the products starting from small toys till large machines as shown in Figure 7.

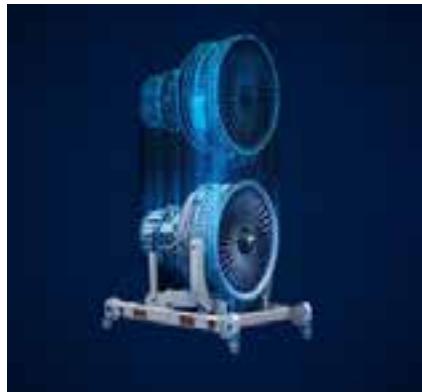


Figure 7: Machine digital twin

These help the engineers to know about the inner working and the faults and repairs to be done inside the product rather than segregating all the parts and taking time to find which one has the fault. This helps the stakeholders to identify the problems in the products. Even while designing new products the design of the previous similar models will be really helpful. For example, when a car is not starting then the fault can be figured out by taking a look at the digital twin model of the car.

Pros

- It manages creative ideas from different fields such as supply chain industries, service industries, manufacturing industries and research and development.
- It helps to view the current status and performance of the products during the development stage as said in [4].
- Digital twin mixes well with other trending technologies like IoT, Machine Learning and business analytics.
- In disaster management, it helps to find out the causes and future issues that will arise during that time before the disaster occurs.
- Customer services are increased and the cost for maintenance is less.

Cons

- The tools required for creating the digital twin models are very expensive.

- Considering the security of digital twin technology, it is at stake.
- This technology is completely dependent on the network connectivity.
- It is built on 3D Computer Aided Design and not on 2D drawings.

Epilogue

In modern years, there has been an unanticipated advancement in the technologies and potential of both the physical product and digital model, the Digital Twin. Digital Twin is generally handled by ML, AI, actuators, and big data analytics and depends on the IoT industries. It is applied in almost all fields and has numerous use cases. By 2030, it is expected that more than 30% of the companies will be using Digital Twin models for the assets to improve the Product Lifecycle Management (PLM).

References

- [1] <https://www.pbctoday.co.uk/news/bim-news/digital-twin-4-0/64519/#:~:text=What%20are%20digital%20twins%20and,facilitating%20monitoring%2C%20diagnostics%20and%20prediction>.
- [2] <https://www.iotforall.com/what-is-digital-twin-technology/>
- [3] <https://bernardmarr.com/default.asp?contentID=1870>
- [4] <https://www.aeris.com/news/post/benefits-of-a-digital-twin-strategy/>

About the Authors



Dr. A. R. Revathi [I1502200] is currently working as Associate Professor in Department of Information Technology at SRM Valliammai Engineering College. She has completed Ph.D in Anna University, MIT campus, Chennai. Her research interests are mainly focused on motion detection, human detection, vision and IoT.



Ms. M. Shwetha [01491590] is currently pursuing B.Tech in SRM Valliammai Engineering College. Her areas of interest include IoT, Web Engineering and Cyber Security.



Ms. P. Rajalakshmi [01517799] is currently pursuing B.Tech in SRM Valliammai Engineering College. Her areas of interest include IoT, Web Engineering and Cyber Security.



Digital Twin: The Revolution with Reflection Twin

► Veeresh Kumar B.V.

B.E Student, Global Academy of Technology, Bangalore, India
Email: veereshvijay565@gmail.com

► Snigdha Sen

Assistant Professor, Global Academy of Technology, Bangalore, India
Email: snigdha.sen@gat.ac.in

Introduction

The rapid growth of technology has made human being more social and technical. Convergence of real and virtual world have an huge impact for significant progress of technology. Basically, the term digital signifies the bit value of 0's and 1's and twin refers to the carbon copy of physical and virtual entity assets. The term was coined by Dr. Micheal Grieves in the year 2002. The physical model stores the real time data in cloud or in decentralized system and the data is simulated and evaluated as a virtual copy model assets, then it is compared with real assets model to optimize the business performance.



Fig.1: Interaction Between Physical Model and Digital Twin

The above diagram represents the fabrication of physical world and the digital twin technology, the physical world contains the real data assets and behavior model and the user interacts with the twin technology. Different communicating channels helps in interacting with physical and digital assets and intelligence part in the channel performs minimal tasks such as language translation, decision making, natural language processing, visual perception and so on.

Types of Digital Twin

1. **Process twin:** The twin process is majorly used in manufacturing industries in integrating all units, they work in timing factor thus it helps in real time 3D warehouse visualization, highlighting the trouble spots and accelerates overall efficiency and control of the system.

2. **Component twins:** It is a unit of asset ie rotation of bearing equipment, combined cycle plant or crude unit.
3. **Asset twin:** It is single entity that work as a core for entire asset. Thus integrates all the components for the workflow in the entire system.
4. **System twins:** The system unit fabricates all the single elements for the production of entire product of the system and it checks whether all the elements are working well or not, this is also called unit twin.

Role in industry 4.0

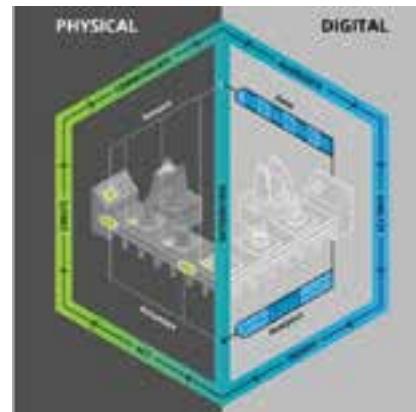


Fig.2: Digital Twin in Industry 4.0

In the digital world things are getting smarter, while to confront with the traditional practices of manufacturing, latest smart technologies like AI and analytical tools are adapted that accelerates the industry in much more reliable and productive way. As physical and virtual model are collaborated, the real-time data assets are analyzed and processed, if any threats or faults are detected alerts are generated prior in the workflow to ensure less human intervention. Therefore this technology helps in optimizing business growth with minimal loss in productivity.

Digital Twin in cyber security

As the data are stored in virtual assets,

the necessary securities must be given in order to avoid the attack. The attackers may provide invalid data to the system that might crash the physical asset of the system and display the junk value instead of original values. Working with sensitive instrument with greater risk plays a major role, there are several aspects in maintaining the security like data encryption, identity and authentication, principle of least privilege, security audit, monitoring of live events and responding to incidents and management of devices etc. The involvement of sensors and micro electronic components in the system is necessary in decision making without human intervention and proper structure must be granted to the asset to maintain data integrity in the physical asset.



Fig.3: digital twin in cyber Security

Applications



Fig.4: Applications of Digital Twin

1. Automobile: In supply chain, each process requires precise and accurate results for further workflow, hence the information gathered by the system are analyzed and measure to improve the overall performance of the system.
2. Smart cities: The deployment of digital twin in smart cities play a major role in incorporating simulation of environment with smart devices for reliable usage to the society, it drives out the problems arising around the city and provides a systematic plans to enhance the citizen's life.
3. Health: The IOT and virtual models helps in monitoring the patients to provide proper medication and usage of the adequate resources in the health equipments.
4. Manufacturing: While modernizing machineries, this technology helps industries to accelerate the process by comparing with virtual and physical model with the proper instance of troubleshooting the problems.
5. Retail: This technology supports people to save their time by providing a composite view and demonstrating various styles.

How digital twins are driving the future of engineering



Fig.5: Future Engineering of Products

The clone of physical models helps in reengineering and improves overall performance of business process and design a finite structure for exploring new ways of productivity. Management of assets is done by using virtual tools like real time simulation of with for accessing the products for example: electric motor's rotation of shaft from center and arc thereby detecting the anomalies and control all the functions. This technology not only unleash the power of 3D printing of the model, blending of new technologies like AI, machine learning algorithm models and automation of data but also can improve the real time functioning

as well. The concurrency of physical and virtual model visualizes the asset, checks the status, provides overall insights of assets and requires instant updating multiple sources like sensors of data for smooth functioning of the process.

Digital twins in telecommunications

The design of spatial graphical structures like nodes in network is useful in visualizing transformation of data and working of physical model. New techniques are implemented for further development of telecom industry for example, Nokia in collaboration with BOSCH for enhancement of IOT platform like industrial automation and tracking environmental control. Hence the system computes the data in very less time and access various multiple systems without intervening the individual systems and improves the scalability of business. Encompassing of latest techniques like AI, deep learning can help the system in predicting the fault in the network.

How Digital Twin Drives Value



Fig.6: Physical Asset deriving value

Deriving value to business process can accomplish the work in greater heights,

The main areas focused are:

1. **Design:** The envision of product can be brought to real world, digitalizing of technology helps world in accessing technology in fingertips and improves the customers overall experience with device.
2. **Data:** The large amount of data are processed using physical and virtual devices as well, It connects the working environment in track and reduce rebuilding of work again.
3. **Simulation:** The interaction with physical and virtual asset helps in checking the overall efficiency of the system by series of validation and testing and measures the performance of system.

4. **Convergence of your digital ecosystem:** The integration of several elements in ecosystem reduce the amount of work and increases the productivity and accelerates the performance of the system, the early forecast of faults and errors further avoided in the process.

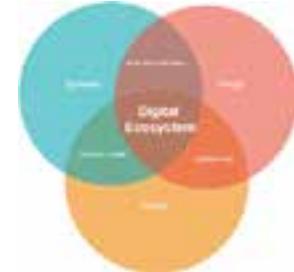


Fig.7:Digital Ecosystem of digital twin

Important use cases of digital twin

Nuclear clean up: The nuclear elements are highly reactive and can cause harmful problems to biotic and abiotic components in the nature. The first solution was provided by BRAD SURAK who is chief product and strategy officer in Hitachivantara, brief how this technology can be used to clean up Fukushima reactor in japan 2011. The robot called Pmorph was unsuccessful and then they decided to implement digital twin reactor which can train robots and track the position of space and capture the necessary materials.

Asset life time maintenance: Most of the automotive and manufacturing industries often face a challenging problems in aging of instruments and faults as well, so in order to maintain the asset life periodically it must be checked and updated. Especially in oil and gas industries, they face problem like leakage of oil, to ace it up new potential technologies like GPU's and AI algorithms can be implemented for early detection of leakage.

Streamlining manufacturing design and build: The key is knowing how to improve without reducing the quality of your product. Streamlining involves reducing waste, improving quality, and using the technology available to keep all team members working together, this involves in greater profits to the manufacturing industries. Sage automation industry collaborated with university of Adelaide work to improve their process radically.

Leveraging data in predictive models: Every industry wants customer satisfaction

with their key resources. One of the use cases is managing the blockage of water as well as sewage water in Tasmania country, alerts are provided before the spill and current and old data's are provided to asset which will be trained by the algorithm models to detect. The below diagram represents application developed using utility API servers[7]

Digital twin and Modern Life



Fig.9 A New Era of prescriptive analysis

In this modern era of life this technology is widely used in automotive and manufacturing industries in designing the prototype before implementing it. Nowadays people use predictive and prescriptive analysis in capturing data to improve overall performance of vehicle with new features like exhibiting the oil capacity and wear and tear of parts in app that is designed by the manufacturer.

Conclusion

Every century gets revolutionized with

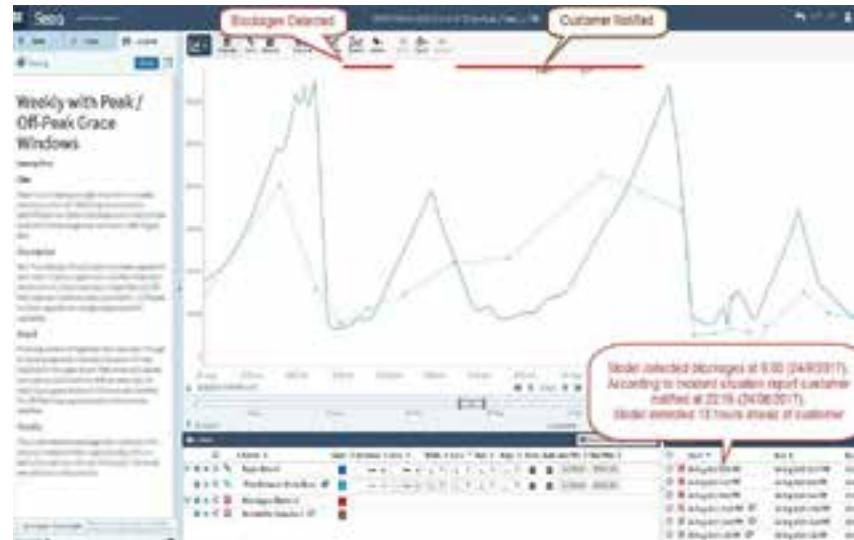


Fig.8: Application Software for managing Spill of Water

smarter things, people starts getting adapted to new technologies, thereby industries are expected to bloom in technology. Thus, digital twins are much reliable and faster to access and give the results in time. The step of twins in current and upcoming days can accelerate business process faster and easier.

References

- [1] <https://www.tributech.io/the-4-types-of-digital-twins/>
- [2] <https://www.arup.com/perspectives/publications/research/section/digital-twin-towards-a-meaningful-framework>
- [3] <https://www.vizexperts.com/blog/digital-twin-and-its-impact-on-industry-4-0>
- [4] <https://www.happiestminds.com/insights/digital-twins/>
- [5] <https://www.futurithmic.com/2020/04/14/how-digital-twins-driving-future-of-engineering/>
- [6] <https://www.sageautomation.com/blog/what-is-the-digital-twin-and-how-does-derive-value>
- [7] <https://www.nukon.com/success-stories/predictive-analytics-set-to-prevent-spills-save-environment>

About the Authors



Veeresh Kumar B.V. BE VI Semester, Global Academy of Technology.

He is pursuing Bachelor's degree in Computer Science Engineering at Global Academy of Technology, Bengaluru. He is creative and passion in exploring with upcoming technologies motivated towards learning and helps with new ideas to society. Currently, He has a profound interest towards Internet of Things and Machine Learning.



Snigdha Sen (Membership No: I1504345) is currently working as an Assistant Professor in Department of Computer Science and Engineering, Global Academy of Technology, Bangalore, India. She is having around 10 years of teaching experience. She is pursuing PhD in Machine Learning from IIIT, Allahabad. She completed her Masters in Information Technology from Jadavpur University, Kolkata. Her area of interest lies in Machine Learning, Bigdata, Internet of Things and Cloud Computing.



Digital Twins: An Overview

► **Himani Mittal**

Assistant Professor, GGDSD College, Chandigarh, India. Email: research.himani@gmail.com

1. Definition

The digital Twin is the technology of creating mock technological replicas of powerful systems (living or non-living) using simulation. These help in accessing the actual problems which may be faced when the technology is actually implemented and deployed. It helps to deal with design issues. The term was first used in NASA for their early space endeavors. They would create simulated replicas of their space mission before building the actual system. Later this term became popular in 2017 when Gartner [1] through its survey claimed that most of the technology will have digital twin based research.

There are three ways in which digital twins are implemented:

- **digital twin prototype (DTP):** It consists of the design and processes of the physical system even before it exists.
- **digital twin instance (DTI)** is a complete replica of the each digital product that is implemented.
- **digital twin aggregate (DTA)** is a collection of digital twin instances that can generate data of actual working of these dummy prototypes.

An example of the digital twin is replicas of self driven car. The replica may be a miniature robotic car or a software simulation. This replica will actually put the self driven car to test in a virtual environment where the interaction of the car with its controlled environment can be tested. This can help with the design issues of the car, optimization of decision making and performance issues in simulated environment. The digital twin of the car will work on the realtime input data provided to it using sensors.

Yet another example is designing a network topology in simulator and testing how the network traffic moves and how decision making like packet transferring takes place. Here the optimization and performance issues can be handled. This can be taken a step further by actually developing miniature robotic devices that simulate the actual nodes.

2. Applications of Digital Twin Technology

The digital twin technology has the

potential of being used in a wide variety of areas. Some of them are enumerated below:

- a) **Manufacturing:** The digital twins can be used in design of heavy machines and optimizing different manufacturing lines by simulating the same using digital twins.
- b) **Computer aided designing:** The digital twins technology can help in designing better products by testing different scenarios using the simulation.
- c) **Healthcare:** The surgery and imaging process can be planned and optimized using digital twins.
- d) **Automotive industry:** To design better end products and test for features like ABS system and sensors used in automobiles.
- e) **Psychological Analysis:** Create model of human patients and analyse how they person is expected to perform in a given scenario.
- f) **Internet Of Things:** The digital twin technology can simulate the sensors and actual decision making servers and test any IOT application.
- g) **Smart city:** The city models can be built and the optimization and design issues in the smart city implementation can be solved.

3. Real Digital Twin Initiatives

Some real life projects actually in place using digital twin technology are discussed below:

- a) **Siemens [2]:** Siemens Digital Enterprise Suite offers to solve all the manufacturing units digital twin designing and testing solutions. Defense in depth is another offering of the company where they test the security issues of the products specially designed for military purposes. Mind

sphere is another offering of Siemens for testing of data-driven products for IOT applications.

- b) **IBM [3]:** IBM has a ongoing project with Airbus for optimization of airplane design using digital twins.

Some other endeavors for digital twin usage are discussed in [4]. It discusses usage of digital twins for smart city design and formula1 car racing.

4. Technology that makes Digital twins possible

The technology necessary to make digital twins possible includes the following:

- a) Cloud computing
- b) Sensors
- c) Pervasive connectivity
- d) Big data
- e) Cognitive analysis

5. Conclusions

The use of digital twins for design and optimization of a wide range of products and planning is inevitable. It is already in place in a number of industries and its base is growing. Some of the products offered by companies like Siemens and IBM is not exhaustive list. There are products from Microsoft as well.

References:

- [1] <https://en.wikipedia.org/wiki/Gartner>
- [2] <https://new.siemens.com/global/en/company/stories/industry/the-digital-twin.html>
- [3] [https://www-01.ibm.com/events/www/grp/grp309.nsf/vLookupPDFs/am%20IBM%20Eran%20Gery%20%20CE%20strategy/\\$file/am%20%20IBM%20Eran%20Gery%20%20CE%20strategy.pdf](https://www-01.ibm.com/events/www/grp/grp309.nsf/vLookupPDFs/am%20IBM%20Eran%20Gery%20%20CE%20strategy/$file/am%20%20IBM%20Eran%20Gery%20%20CE%20strategy.pdf)
- [4] <https://www.forbes.com/sites/bernardmarr/2019/04/23/7-amazing-examples-of-digital-twin-technology-in-practice/#12af6dd76443>

About the Author



Dr. Himani Mittal is an Assistant Professor at Goswami Ganesh Dutta SD College, Chandigarh. She has 10 years of teaching experience. She did MCA and Ph.D. from Panjab University, Chandigarh. She has a research interest in Artificial Intelligence and Networking. She has a dozen papers to her credit.



Application of Digital Twins in Industrial Technologies

► R. Umamaheswari

Assistant Professor in Department of Electronics & Instrumentation Engineering at SRM Valliammai Engineering College

► B. Chidhambararajan

Professor/Principal, SRM Valliammai Engineering College, An Autonomous Institution, Affiliated to Anna University, Chennai

► M. Senthil Kumar

Associate Professor in CS and Engineering Department at SRM Valliammai Engineering College of Tamil Nadu.
Email : Email: senthilkumarm.cse@valliammai.co.in

Digital Twins – most exciting frontiers in simulation of Industrial Internet of Things (IIOT). Digital Twin is a simulated model of an actual working product in the field. This enables us to design the devices of tomorrow, into a comprehensive framework by applying simulation to IIOT. Quite simply, Digital Twin is a virtual model of a product, process or service. It acts as a bridge between physical and digital world, develop new products for the future by using simulations. Digital twins place a solution for developed industry in simulation technology- integrates them to provide competitive solutions in the market within the companies to overcome the challenges faced today. Simulation based development approach is quite interesting in industries to forecast the future model. Digital Twin Simulation tools along with IIOT will be promisingly improve the performance of products, reduce cost and save time and energy.

1. Introduction

Simulation software has been in the front of digital twin technology. Enabled by the rise of IIOT products, digital twins represent an idea of revolutionizing the field of maintenance, design challenges, reduction of resources. Researchers have accepted digital simulation to develop world's new product in a virtual design environment. This economic impact of this new revolution is estimated at more than US\$10 trillion per year. Simulation based digital twin offers a packaged approach of visualizing physical data or components in virtual environment. This optimizes system design, predictive maintenance, prevent down time and develop new opportunities for tomorrow's world. NASA was the first to experiment digital twin – pairing technology.

The vision for the digital twin is to build, verify and deploy. Digital twin coupled with simulation allows IIOT around the globe in the range of sectors like portable smart devices, medical implants, automobile, aerospace, telecom. IIOT comprises of three elements: Networks, Cloud, and Components. The Network is a gateway for community within the components. The cloud consists of data centers and software codes which run complete IIOT ecosystem. Components can

be cars, phones, robots, motor, sensors. This integration platform requires simulation to designing successful products for IIOT.

2. Needed: Solution for leveraging Digital Twins

The solution for leveraging digital twins should be:

- Developed by an industry leader in simulation.
- Integration of IIOT components with third party tools and system.
- Feasible learning environment for

employees.

- Cost – effective, mainly from portable and home devices.
- Easy to implement.
- Capable of accelerating complete life cycle of services, from twin creation to end product.

3. Rise of Digital Twin in IIOT

Academia and industry persons define digital Twin in different ways. Digital Twin is a dynamic model that derives business outcomes. Driven by physical data- for

Simulation Powered Digital Twin Benefits

Monitoring the asset performance in real time against engineering model

Troubleshoot problems at system and 3D component level

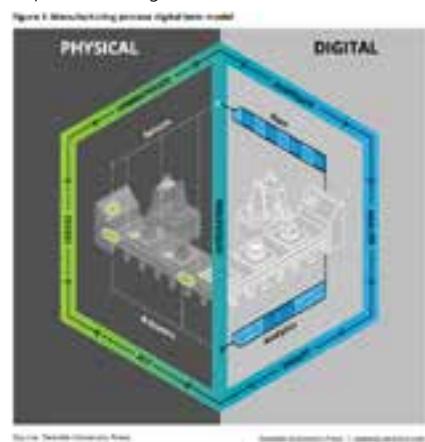
Optimize maintenance decisions and Asset Life

Understand deviations from "as designed" model

Unlimited Number of Virtual Sensors to feed analytics

Optimize maintenance decisions by simulation before implementing them

example, data from sensors, camera or IIOT connected technology – digital twins act as virtual model of real-world process or systems. This helps you to gain insight into how something behaves under a variety simulated conditions, which in turn results in self – learning of systems. Digital Twin can optimize anything – any single machine, plant, company, home or even an entire city. It creates a highly accurate bridge between physical world data and virtual data. Digital Twin is changing the appearance of manufacturing industry. The technology allows the industries to make digital replica of the components used in the industry. For example, if a technician wants to check the engine. After making the exact virtual part of the engine, technician can gather data, blend data and check for the efficient working of the engine. This opportunity can reap for high potential in the industry. Digital Twins become a key in the industry 4.0 and Industrial IIOT. Consider a plant with IIOT connected sensors, engine, pumps or generators, we will have multiple digital twins. The IIOT data send/receives across the equipment to analyze overall operations. This true integration is not easy, it requires digital simulation tool. This high-level sophistication from one single piece engine to complete plant can be evaluated by predictive simulation. Digital Twin simulation combined with IIOT ecosystem provides in-depth knowledge of real – world assets.



Digital twin integrates with IIOT platforms and contains run time deployment options, allowing you to perform predictive maintenance on your physical product. Digital twin simulation tool is provided with high preference in modern day industrial units. Some of the vendors for digital twin tools are: 1. General Electric, 2. Azure Digital

Twins, 3. ANSYS Twin Builder, 4. IBM, 5. Oracle.

4. Building A Digital Twin

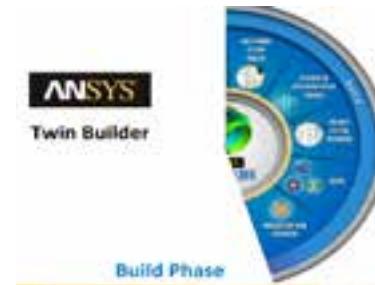
The best possible solution for the design and integration of IIOT product is simulation. There have been lot number of practices across IIOT leaders for applying engineering simulation to IIOT products. One of the best simulations based digital twin is "ANSYS TWIN BUILDER". Ansys awarded with "Best Internet of Things Breakthrough" award in March,31,2020. Ansys is the global leader in Digital Twin technology. Recently, Microsoft Azure Digital Twin joined working with ANSYS Twin builder to build, maintain and track IIOT enabled products or services. Azure Digital Twin requires comprehensive field data to find insights in the IIOT ecosystem. ANSYS Twin builder promises the best virtual prototype simulator to improve the product development. ANSYS Twin Builder was developed in the year 2019. This is a complete product for your digital twin strategy.



Twin Builder easily integrates with IIOT to build an accurate model. Simulation based Digital Twin is the virtual replica of integrated multi – domain system simulation. The three basic key point in ANSYS Twin builder are Build, Validate and Deploy.

4.1 Building phase

For IIOT system simulation, the first step is Building phase. The building phase composes the entire system using multiple domains and languages with extensive.



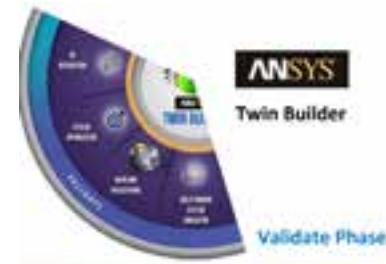
The first step in IIOT product development is building phase. The model of physical system is built on 3D view. This

resembles like a block diagram of complete IIOT system. The input, output, data are mentioned in the block diagram. If necessary, third party tool integration through standards is also done. According to the physics of the devices connected, simulation of the system model is obtained by providing appropriate inputs. This preserves essential accuracy of the system. When combined with embedded software, ANSYS Twin Builder creates an own system of your IIOT product.

4.2 Validate phase

The first step in IIOT product development is building phase. The model of physical system is built on 3D view. This resembles like a block diagram of complete IIOT system. The input, output, data are mentioned in the block diagram. If necessary, third party tool integration through standards is also done. According to the physics of the devices connected, simulation of the system model is obtained by providing appropriate inputs. This preserves essential accuracy of the system. When combined with embedded software, ANSYS Twin Builder creates an own system of your IIOT product.

4.2 Validate phase



In validation system, Twin Builder combines the multi domain system model simulation with integrated post processing. It analyse and optimize the interactions among input/output of the system. Rapid HMI prototyping enhances the simulation experience, system optimization and validate the output of the system. This advanced simulation manifests an easy – to – use solution where digital twins can be built fairly and easily.

4.3 Deploy phase



This is the final phase in Twin Builder. Connect your twin with real time data. Twin Builder configure connection with IIOT platform and send and receive operational data. This contains run time deployment options, allowing you to perform predictive maintenance on your physical product.



Thus, ANSYS Twin Builder provides a solution to allow companies to build digital twins of their products.

5. Discussion



One interesting & popular IIOT device is smart home automation. In smart home, appliances such as phones, air conditioners, televisions, computers, camera, light, cars, kitchen appliances – all communicate with

one another using a reliable network. The network is integral to IIOT infrastructure. The design of smart home can be integrated from scratch. Components, both electronic and structural includes switches, sensors, batteries make up the whole system.

The first step in ANSYS Twin builder is Build phase. Each device within its operating environment conditions has to be verified with digital data. Integrate all the devices in smart home using digital twin multi – mode analysis which shows the complete block diagram of smart home. This integrated simulator platform is superior to physical testing.

The second stage in ANSYS Twin builder is validate phase. In which, analyze and optimize among the input/output data to the complete smart home block diagram. This advanced simulation integrating with post processing validates simulation integrating with post processing validates the smart home hassle free.

The third step is Deploy phase. Using ANSYS Twin builder, run time deployment access prior to installation is performed. This will reduce costs, increases reliability and save time. On narrowing down the smart home, to emphasize the importance of ANSYS Twin builder.

Let us take an example. An example is video doorbell. This doorbell works synchronously with smart phone. When visitor rings the doorbell, you will get notification in the smart phone which completely relies on the Wi-Fi router, antenna, distance of the person inside the home. In particular, using ANSYS Twin builder, it is possible to simulate

and identify the performance of the devices through the above said procedures of ANSYS Twin builder.

6. CONCLUSION

Digital Twin Technology is totally new brand compared to other simulation tools like CAD/CAM. Digital Twin platform is capable of developing the future world. Digital Twin makes the engineers to get in sights of the real-world products. Simulation tools proven to work in IIOT platforms. When incorporated in a digital twin, simulation provided the companies to make confident predictions about their future product. In future, virtual aspect of the world will connect with real world, infusing AI – based capabilities.

References:

- [1] <https://www.ansys.com/-/media/ansys/corporate/resourcelibrary/whitepaper/>
- [2] Fei Tao ; He Zhang ; Ang Liu ; A. Y. C. Nee, " Digital Twin in Industry: State-of-the-Art", *IEEE Transactions on Industrial Informatics*, Volume: 15 , Issue: 4 , April 2019
- [3] Jiangyi Du, Zhangping Wang, "Applying the ANSYS simulation to study the cushion performance of paper-pulp on the structural unit", IEEE Xplore, June 2019
- [4] Joshua Salant, Manohar Raju, Dr. Fred German, Dr. Matthew Commens, and Shawn Carpenter, "Solving Interference Issues in a Smart Home with EMIT", ANSYS WHITE PAPER
- [5] <https://meticulousblog.org/top-10-companies-in-digital-twin-market/>

About the Authors



Dr. R. Umamaheswari [I1505773] is currently working as Assistant Professor in Department of Electronics & Instrumentation Engineering at SRM Valliammai Engineering College. She specializes herself in the core area of soft computing techniques. She is an innovative person with deep knowledge in Neuro-fuzzy systems and IoT.



Dr. B. Chidhambararajan (LM-00063930) working as a professor/Principal at SRM Valliammai Engineering College, Affiliated to Anna University, Chennai. He has 30 years of teaching experience in government and reputed private institutions. He is a member of professional societies like CSI, IEEE, IETE, IEI, ISTE, ISOI, etc. He has published several technical papers in national and international journals and conferences. His research interests include IOT, Big Data, Software Engineering and Networking.



Dr. M. Senthil Kumar (LM- I1504760) is currently working as an Associate Professor in Computer Science and Engineering department at SRM Valliammai Engineering College of Tamil Nadu. He is a CSI-Student Branch Counselor of the College. His research interests are in IOT, Cyber Security, Software Engineering and development of new tools for effort estimation.



Future with Quantum Computing

► R. Sathya

M.Tech., (Ph.D.) Senior Assistant Professor
SRM Institute of Science and Technology, Ramapuram Campus, Chennai

► Ghanta Hari Chandana

B.Tech Student, SRM Institute of Science and Technology, Ramapuram Campus, Chennai

► V. Surya

M.E., (Ph.D.) Assistant Professor
SRM Institute of Science and Technology, Ramapuram Campus, Chennai

1. Need for Quantum Computing:

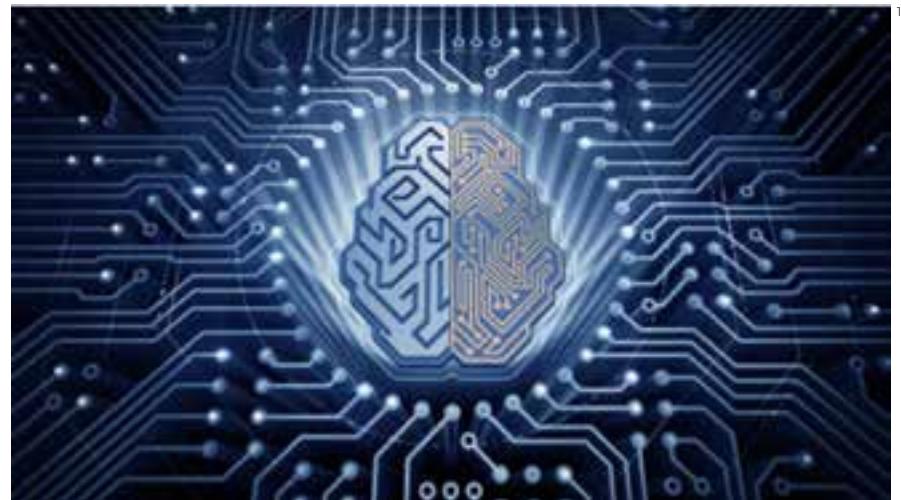
Before diving into the future trends of Quantum Computing, let us begin by understanding its worth. It is known that traditional computers make use of bits (0's and 1's) for information processing. However, Quantum computing depends on bits, called qubits that have properties of quantum physics. These qubits can be in both the states (0 and 1) at the same time, which is known as superposition. With the help of this superposition, a quantum computer of 100 qubits can solve 2100 solutions simultaneously through exponential parallelism thus augmenting its speed tremendously. They are evolving from theoretical to empirical transition and are on their way to change the technological trends for real.

Quantum computing is going to become a cutting-edge technology for coders and cloud providers. In spite of the researchers' continuous work on quantum computers for easing various tasks, the full-fledged capability of quantum computing is yet to take off for practical real-world usage. Some cloud services like Microsoft Quantum and Amazon Bracket are looking forward to getting their developers up to date with quantum applications.

2. Existing Challenges:

Although most of the cloud services desire to achieve quantum computers on a large scale in their industries, the biggest obstacle appears to be in tailoring the alignment of the quantum states of qubits in a computer for solving the required problem. The challenge also lies in the uncertainty of quantum computers working better than the traditional ones.

Moreover, the coders are ought to learn the new mathematical concepts and



logic skills for quantum computing as the traditional digital programming skills cannot be applied. The IT teams are to adapt to new runtimes and algorithms as well as hardware to make good use of this technology. It is anticipated that Quantum computing may cause turmoil among the industries due to its novelty. However, this can be overlooked due to its numerous benefits and positive impacts.

3. Overcoming limitations:

The cloud seems to be an ideal method for quantum computing because of its lower I/O requirement. There is also an added benefit of higher computational power. Since the cloud merchants have a huge number of clients and technological resources, they would certainly become one of the first quantum-as-a-service providers in the market. This would advance the development of the best software and deployment stacks.

Quantum computing could even supplement general compute and AI services

cloud providers. In that scenario, the cloud would integrate with classical computing cloud resources in a co-processing environment.

4. Testing the Quantum filaments:

A variety of approaches using photons, electrons and ions for quantum computing are being pursued by the researchers. However, it remains unclear which one of them would emerge out first for practical applications.

It is a difficult task to judge the best approach to follow and the best materials to use as the research is still assumed to be in its budding stage. We're at the Edison light bulb filament stage, where Edison reportedly tested thousands of ways to make a carbon filament until he got to one that lasted 1,500 hours. Meanwhile, the cloud platforms permitted their developers to experiment with various approaches to get an abstraction of what lies ahead in the future.

Google has done considerable core

¹ "What is Quantum Computing and How is It Useful in Artificial Intelligence?" Dimensionless Technologies Pvt. Ltd., 18 June 2019, dimensionless.in/what-is-quantum-computing-and-how-is-it-useful-for-artificial-intelligence/. Accessed 20 June 2020.

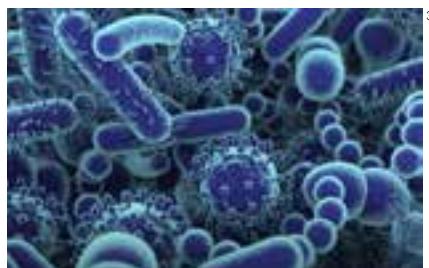
research on quantum computing in the cloud. Google has been more focused on developing its in-house quantum computing capabilities and hardware rather than providing access to these tools to its cloud users. In the meantime, developers can test out quantum algorithms locally using Google's Cirq programming environment for writing apps in Python.

5. Applications of Quantum computers:

Sundar Pichai, the CEO of Google and Alphabet once said, "The real excitement about quantum is that the universe fundamentally works in a quantum way, so you will be able to understand nature better."² On this note, quantum does not only make us understand but also help us develop the universe into a better place than it already is. Hence it is worth knowing the applications of quantum computers in the human world.

Logistical and optimization problems can be resolved among the most immediate and profitable systems using Quantum technology.

For the supercomputers to process the conventional weather and climate modeling systems many environmental variables are used. With the help of a quantum computer, the weather scientists can create more accurate long-term assessments to anticipate the effects of weather change, let alone forecast the near-term weather patterns perfectly.



It seems to be crucial for the doctors in the future to decode DNA with its unique microbiome for prescribing tailor-made drugs to the patient's body. Although the traditional supercomputers have made immense efforts to decode DNA cost-effectively, the microbiome is foreseen to be in a long way ahead. However, this is not the case when quantum computers are used.

It is assumed that the quantum computers aid the Big Pharma in the prediction of different molecule reactions with their drugs, thereby accelerating pharmaceutical developments bringing down costs. Also, the raw computing power of these quantum computers enables scientists and chemical engineers to devise new chemicals and materials, as well as better functioning engines and automated toys.

Generally, enormous data of astrological imagery is collected daily by space telescopes for tracking the planets, galaxies and the asteroid movements. Unfortunately, handling this amount of data on a daily basis is beyond the capability of existing supercomputers for meaningful analysis and discoveries. Nonetheless, when machine learning is combined with a quantum computer, efficient processes can be achieved which is estimated to the discoveries of many unknown planets in no time. Machine learning algorithms work on the basis of learning from a large amount of labeled data. If this is amalgamated with quantum computing, the learning becomes similar to that of humans whereby picking up new skills by the computer gets easier and simpler. Also, learning can be seen through less or messier data with fewer instructions. The amalgamation of machine learning and quantum computing is said to bring a wave of enthusiasm in the Artificial Intelligence (AI) field among the researchers. This is primarily due to the advancement in the natural learning capacity of a machine which indeed accelerates the progress in the research of AI.

Furthermore, the existing supercomputers would take a long while, presumably a thousand years, to crack the passwords created by the encryption services today, whereas, a quantum computer is assumed to be done with the job in approximately an hour. If the enforcement of quantum computing blooms in the encryption services, industries like communication services, Bitcoin and banking would be at a great peril as they are heavily dependent on encryptions. Thus, to cope up, quantum encryption needs to be created.

Additionally, the language barrier can be eradicated with the application of quantum computing in real-time language translation. Be it a video call or a chat through platforms like Skype or FaceTime, or through hearing aids, languages can be easily translated and various everyday interactions can be improved.

Recently, TensorFlow Quantum (TFQ) was launched by Google. It is a version of the TensorFlow framework which is an open-source library for quantum-machine learning. It focuses on quantum data and building quantum-machine learning models. It is to understand that the Quantum computers are still at their research state. They are not fully-fledged into our daily lives or any industry yet. However, when they flourish, tailor-made algorithms are required for functioning on quantum computers and TFQ has a high scope of producing them. The developers, with the help of TFQ, can create hybrid AI algorithms that are a combination of quantum and traditional computing techniques. Since TFQ is a blend of both TensorFlow and Cirq, the developers can create and run deep learning models on quantum computers with an added benefit of using minimal Python code lines in the future.

6. Quantum computing for a larger-scaledataset:

Thanks to the trending Quantum Machine Learning interest, the researchers are trying to advance the process of handling enormous unmanageable data and extracting values from it.

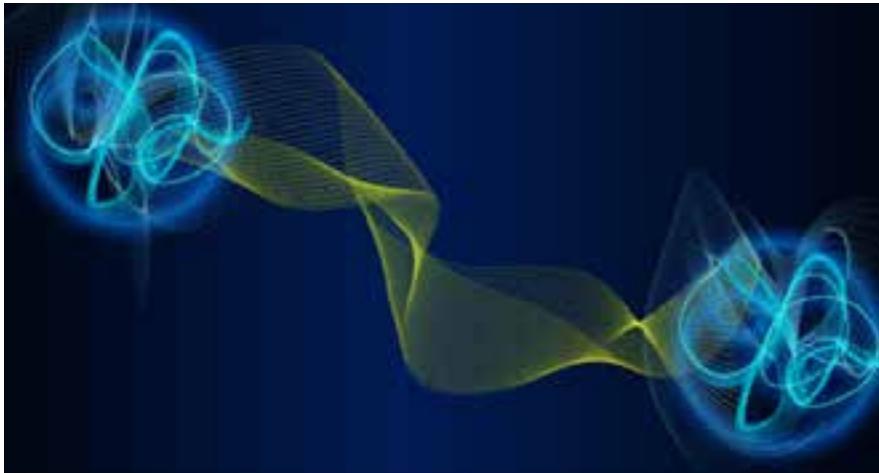
6.1 Handling Large Datasets

Quantum computers are foreseen to handle the data, uncover information or patterns remarkably faster and more efficiently than any Machine learning techniques that exist today. Apart from sampling large datasets, it will facilitate a revolution for solving all kinds of business problems.

Quantum computers have the speed to complete the tasks in a matter of seconds and the businesses seem to perceive that lately. Also, due to the size of data sets being largely greater than the available computer resources and technologies, businesses are

² "8 Quantum Computing Applications & Examples." Built In, 18 Nov. 2019, builtin.com/hardware/quantum-computing-applications. Accessed 15 June 2020.

³ "Novel Approach Can Determine the Sources of the Gut's Microbiome." GEN - Genetic Engineering and Biotechnology News, 13 June 2019, www.genengnews.com/news/novel-approach-can-determine-the-sources-of-the-guts-microbiome/. Accessed 16 June 2020.



bound to choose quantum computers over supercomputers to thrive in their respective sectors. Various calculations with multiple inputs can be performed simultaneously by quantum computers. For example, the quantum computer owned by Google is said to calculate 100 million times faster than any of the existing systems on this planet. This speed could be a requirement in the near future by the industries as there would be a tremendous increase in the data handled by an algorithm on daily accounts. This also helps in the calculations of complex problems. However, the difficulty lies in the translation of the practical problems faced by the industries to the quantum states.⁴

6.2 Building Better Models

The pace in the increasing size of data could be a challenge in the future. This could have a direct impact on industries like finance, pharmaceutical, etc and would lead to the situation in which the classical computing is out-dated. Hence, to handle complex problems, a better data framework becomes mandatory and requires complex models with potentially high processing power. Undoubtedly, quantum computers can do this job quintessential. Using quantum computers to build models would aid in the treatment of diseases in the healthcare field, cutbacks of financial implosion in the banking field, improve the logistics chain in the manufacturing industry and all the applications listed earlier.

6.3 Integration of Multiple Datasets

The majorly faced problems with the

datasets are that either the data provided is too much or too little in many cases, the data is distributed across various datasets. The integration of these datasets could consume a lot of time and would need more computational power. This is when quantum computers could be of help as they can easily integrate and manage multiple datasets. They can also process and analyze quicker and easier. So, the usage of quantum computers could be of great aid in various business fields. This, in turn, would improve and transform machine learning and artificial intelligence capabilities. All in all, quantum computing could be a suitable choice in any of the business fields.

7. Conclusion

It can be considered that quantum computing, at this stage, is in a locked-in syndrome condition as the operation of quantum computing is through the quantum states and not on the conventional human-readable data. It is unfortunate that the translation from the human-readable data to the quantum states and vice versa is assessed to nullify its mentioned advantages. However, developing effective algorithms provide beneficial results. The prevailing research proves that there exists a lot of scope in Quantum computing in the future. In fact, most of the tech giants like Google, Microsoft and IBM are showing their interest in quantum machine learning through their tremendous research and heavy investments in this field. The blending of Quantum mechanics with Artificial intelligence created, and shall continue to

create, a vast wave of excitement in the field.

8. References:

- [1] "8 Quantum Computing Applications & Examples." *Built In*, 18 Nov. 2019, builtin.com/hardware/quantum-computing-applications. Accessed 15 June 2020.
- [2] "Novel Approach Can Determine the Sources of the Gut's Microbiome." *GEN - Genetic Engineering and Biotechnology News*, 13 June 2019, www.genengnews.com/news/novel-approach-can-determine-the-sources-of-the-guts-microbiome/. Accessed 16 June 2020.
- [3] "Quantum Computing – Super Computers and Its Future – Witan World." *Witan World*, 22 Nov. 2019, witanworld.com/article/2019/11/22/quantum-computing/. Accessed 15 June 2020.
- [4] "Quantum Experiment Verifies"Spooky Action at a Distance". *Futurism*, 29 Mar. 2015, futurism.com/quantum-experiment-verifiesspooky-action-at-a-distance-2. Accessed 15 June 2020.
- [5] "Technology Predictions." *Quantumrun*, www.quantumrun.com/category/future-tech. Accessed 13 June 2020.
- [6] "The Future of Quantum Computing in the Cloud." *SearchCloudComputing*, searchcloudcomputing.techtarget.com/tip/The-future-of-quantum-computing-in-the-cloud. Accessed 13 June 2020.
- [7] "What is Quantum Computing and How is It Useful in Artificial Intelligence?" *DIMENSIONLESS TECHNOLOGIES PVT. LTD*, 18 June 2019, dimensionless.in/what-is-quantum-computing-and-how-is-it-useful-for-artificial-intelligence/. Accessed 20 June 2020.
- [8] "Will Quantum Computing Define The Future Of AI?" *Analytics India Magazine*, 27 Apr. 2020, analyticsindiamag.com/will-quantum-computing-define-the-future-of-ai/. Accessed 16 June 2020.
- [9] Katwala, Amit. "Quantum Computers Will Change the World (if They Work)." *WIRED UK - Future Science, Culture & Technology News and Reviews*, 4 Mar. 2020, www.wired.co.uk/article/quantum-computing-explained. Accessed 16 June 2020

Contd. on pg. 25

⁵ "Quantum Experiment Verifies"Spooky Action at a Distance". *Futurism*, 29 Mar. 2015, futurism.com/quantum-experiment-verifiesspooky-action-at-a-distance-2. Accessed 15 June 2020.



Special Interest Group



All stages of evaluation shall be through virtual mode

Computer Society of India

CSI SIG eGovernance Awards 2019-2020

In the 18th year of recognizing successful eGovernance initiatives

Nominations are invited from Government entities - Ministries, Department, Autonomous Institutions, PSUs, Local Bodies etc. belonging to Government of India, States and Union Territories.

Submission of Nominations: Sept. 7 - Oct. 6, 2020

For details about awards categories, condition for participation, nomination process, short-listing stages, please visit-

<https://www.csi-sigegov.org/awards/>

Awards ceremony will take place during CSI Annual Convention scheduled to be organized at Lucknow from Feb. 11-14, 2021.

Prof. G. P. Sahu
Chairman
CSI-SIG-eGov
Mob.: 93055 08002

Prof. D. K. Dwivedi
Convenor
CSeGA 2019-20
Mob.: 94152 15755

Participate and share your eGovernance journey

Contd. from pg. 24

About the Authors



Mrs. R. Sathy M.Tech., (Ph.D.) currently working as Assistant Professor (Senior Grade) at SRM Institute of Science and Technology, Ramapuram Campus, Chennai. She has 18 years of working experience both as an Academician and an industry expert. She has around 30 publications in national and international Journals. She also deployed many real-time projects for the Industries. She has organized a variety of Faculty Development Programmes, workshops, walkathons, conferences and short term programs. She is an IBM Certified Database Associate, completed various NPTEL and Coursera certification courses. She has been a CSI life member since 2000.



Mrs. V. Surya M.E (Ph.D) currently working as an Assistant Professor at SRM Institute of Science and Technology, Ramapuram Campus, Chennai. She received her B.E and M.Tech in Computer Science and Engineering from Anna University. She has five years of teaching experience and attended various FDP and workshops, also conducted technical workshops and social events.



Ms. Ghanta Hari Chandana is a third-year student pursuing B.Tech at SRM Institute of Science and Technology, Ramapuram Campus, Chennai. She has done many online courses and volunteered for many events in and around the campus.



Future of work “Phygital”

► Sushree Patnaik

Deputy Manager, Human Resources, Robert Bosch Engineering and Business Solutions Pvt. Ltd.

It is said that the present defines the future and the future builds on the foundation of the past.

What better situation than now to embrace this thought? I say this as I have just delivered a webinar and pondering over my thoughts to pen down this article. I am sure Webster's is going to include 'zoom fatigue' as the word of 2020! And as I finish this article, I will be joining another session online – a musical concert. Who would have thought! Well, the times have changed, and how.

I am sure none of us would have anticipated that a pandemic of this nature would have the capacity of putting the world at a standstill, and yet here we are still in the thick of it. But given human race's resilience and the power to cope with setbacks, we have been moving along hoping for the best.

At a macro perspective, every realm of Political, Economic, Social and Technological space has been hit, and in few cases hard. Looking through the lens of our Indian ecosystem of Political or Government lens, there have been labor laws that were amended specifically given the crisis. Laws related to industrial disputes, health and working conditions of workers and migrants will be defunct for a stipulated period of time. International politics has also witnessed a massive dent in few countries owing to lack of care for citizens and critical healthcare facilities being available. Who knows how the future government reforms will get impacted due to this crisis. The Economic slump has and will affect workforce adversely. CRISIL has predicted that there would be ~4% permanent loss of GDP. Fiscal 2022 will likely see a V-shaped recovery at over 7% growth. However, the sustenance will not be able to lift GDP volume to its trend path even by 2024. Sectors such as manufacturing, construction and hospitality will bear the maximum shocks. It is said that one must never let a good crisis go to waste, and with this sentiment the National Education Policy (NEP) has also been launched. With

majority of the US universities operating virtually in the near future and the long term deeply uncertain for an in person mode, the NEP could not have come at a better time. The NEP proposes restructuring institutions into multidisciplinary academic platforms with thousands of students being enrolled via different programs. So, a Princeton Mumbai or a Harvard Hyderabad may not be a very distant future! Societal norms and workplace cultures have also seen a radical shift. Needless to say, Work From Home (WFH) is the new cool owing to the situation, but Work From Anywhere (WFA) will be the trend going forward. The concept of 'People going to work' is no longer relevant but 'Work coming to people' is what will be. With WFH and WFA there also come new leadership and managerial styles that call for a change in behavior – collaboration, flexibility, autonomy and accountability have taken on a whole different meaning. How does one really imbibe these aspects when the teams do not meet daily? I am sure all of us have realized who the real leaders in such situations are! Technology (apart from the virus) has been the universal leveler in this situation. OTT movies that got released via these platforms had the same viewership irrespective of them being a 100 crore film or a 15 crore film. For the students of 2020, Zoom has become the new classroom, Google Hangout the playground and Microsoft Teams the blackboard. 469 crore is the Indian government's budget for digital learning for 2020-21. \$1.96 billion will be the market for online education in India in 2021. The numbers speak for themselves.

The practices and new ways of work defined in this pandemic will most definitely pave way for the Future of Work.

As with everything else revolutionized, the famous Maslow's hierarchy has also seen a twist given the recent events. No longer are the Physiological, Safety,

Esteem and Self-actualization needs holding good but future workplace tenets of **Technological, Emotional and Purposeful** work are taking over. The Physical aspect of a workplace has gone into oblivion – where earlier there was a scramble of real estate for corporate offices, has now seen a slump and for the good. With WFA the new adage, talent has also gone boundaryless. I can now hire a fully functioning virtual team from Bay Area while my start up runs in Bangalore. Not that it was unheard of earlier, but with technology pervading into the work sphere all the more, this is the way forward. Another facet that throws open a challenge is how I engage my employees and enhance Employee Experience in this digital era. As HR, interaction with employees is high touchpoint and a virtual experience may not be the answer for every conversation. Technology has also democratized talent to a high level. Open source platforms like GitHub, Kaggle and Analytics Vidhya call on coding specialists to showcase their skill and have them ranked amongst the best. Futuristic roles and organizations no longer look at resumes but asses candidatures via GitHub or Kaggle personas. With the Digital Population in India surging ahead, active internet users as on Jan 2020 is 687.6 million and over a 3 year horizon till 2023 is at 876.25 million. (Statista.com) India is only second to China with digital consumption. With new strands of Emotional and Purposeful tenets sewn into Future of Work, new age talent is no longer looking for a lifetime of employment. Work life is going to be a series of sprints than a marathon. As I interact with the new generation at work, I realize that their emphasis is on personalization and valuing experiences than tangibles. The way we recruit has also shifted. I recall when we were trying to scout for a senior Facilities Manager profile, the expectation was no longer someone who has the traditional

mindset of architecture and buildings, but someone who is in terms with change – can they think of newer more digital ways of work in our campus? How will infrastructure planning change according to that? One would definitely want someone who has had different stints in organizations, that too of different flavors that will add diversity and dimension to their profile. The biggest question one faces as a leader to engage with the young workforce is towards giving them a purposeful work environment. Simply put, where and how does my work connect to the larger scheme of the organization's strategy? A research document 'What Percentage of Your Life Will You Spend at Work?' by Revise Sociology (2016) showed that the average person works 1,842 hours a year, or 92,100 hours over a 50-year career! While new leadership traits have been born out of this pandemic, the digital nomad generation or better still the 'phygital nomads' need to do their own thing at work. No more archaic managerial styles will work. How do we work today? Mobile. Tomorrow? In an even more mobile way! A laptop, good broadband and themselves. That's all that matters. Digital Collaboration tools have carved a new space for themselves. Organizations with strong online social networks are 7% more productive than those without. ("How Social Networks Network Best". Harvard Business Review. Feb 2009) and a median 20% increase in employee satisfaction ("How companies are benefitting from Web 2.0: McKinsey Global Survey Results". McKinsey Quarterly. September, 2009)

While talent has seen an upheaval in every sense, our physical workspaces would also undergo a radical shift in planning and building. While we all know how the concept of a Digital Twin works in manufacturing by managing the performance, effectiveness and quality of a manufacturer's assets, the foray into corporate workspaces is still new, but given this era, who knows if this might be the next revolution. Last year when the Notre Dame Cathedral was razed down in flames, the world held its breath to see if we can ever recreate this piece of art. Until recently, the restoration would have involved going through dusty blueprints to guide the repair. But with the advantage of Digital Twin at their disposal, engineers and architects were able to recreate the French cathedral as much as possible. Not only were they able to recreate it, but also add innovations in design

and materials. The Digital Twin market is estimated to grow at a staggering \$26.07 Billion by 2025. Imagine what a Digital Twin of a workspace can do and how it can benefit building owners, property developers and most important, employees and Employee Experience managers. This totally changes the perspective of strategizing space and asset management. It allows the space manager to look at planning and coordination via digital collaboration; no more clunky diagrams and charts but real time inputs can be recorded. Gen Z wants their office environment to be connected and be as smart as their home and cars, with the ability to create a personalized experience. How often have you sat in a boardroom with an uncomfortable AC setting? Instead of calling housekeeping (where ACs are centralized) or even changing the setting on your own, how would you like it if the room was already set as per your liking before the meeting? Digital Twins have a far bigger impact than just personalized experience. Intelligent Building Management is about knowing how effectively you can utilize energy resources and also save them, are lights on when employees are around? Are there entire floors vacant when teams are WFH? All this and more with Digital Twinning!

So, what really is the Future of Work conjuring up to be? From the manner of working to technology platforms to driving a more purposeful work, the new work paradigm holds exciting opportunities, and challenges at the same time. Talking about the manner of working, the new generation does not believe in archaic hierarchies and coveted designations, but believes in wierarchies (coined by Jon Husband) – the organizing principle for an era of interconnected knowledge, trust and credibility. Traditional hierarchies will not go away but a blend of both is what will work best – a more versatile and fluid model. Our jobs are what define us. Do they? In the future, it will be imperative to look at jobs as a combination of different tasks that we do. No wonder machines and robots are taking away our tasks! (not jobs ☺) Tasks are repetitive, let RPA take care of that. Jobs are what demands our creativity, intelligence and ideas. No machine is ever going to take that away. How does this change the future you may ask? When you evaluate your career as pieces of tasks, it is easier to move from one career to another. And that is how the

future will deconstruct candidatures. Your Personal Assistant is no longer going to be a PA. Welcome RPA, again. That is what Siri, Alexa and our very own GPS systems have already been doing.

Tools of the future will elevate our working to the next level. While technology has been ubiquitous in every sphere of work, how has it translated Employee Experience in an organization? Artificial Intelligence is enabling passive candidate sourcing by identifying likely candidates from verified data sources. Using recruiter-defined parameters (e.g. location, skill set or industry), AI can return lists of potential candidates, predict their readiness for a move, develop and send communications, and map responses. Learning & Development Companies on the cutting edge of AI implementation are using AI to create or adapt training programs that fit company and employee needs. Training platforms powered by Machine Learning can analyze an employee's background, their current role, and career aspirations to recommend relevant training programs through services such as Lynda or Udemy. Analytics has been a recent entrant but taken the workplace by storm. Who does not love numbers and especially when they are linked to your bottom line! With Analytics into the foray, even qualitative departments and functions in an organization work with metrics to quantify their findings. RPA assisting with transactional tasks is a well-known fact, but can it do more? Deep Learning based conversational AI is the next level. Another exciting immersive technology is around Mixed Reality comprising of Augmented Reality and Virtual Reality. VR is a classic example of how it can be used to simulate an environment for new joiners. It can simulate actual scenarios for employees and prepare them for how the actual organization looks like, easily acclimatizing them into the new world. VR technology can also be used to detect various behavioral habits and attributes that are required for evaluating the employees and their personalities. How does it enhance an HR professional's or manager's time spent? Leverage technology so one has the time freed up that can be utilized for tasks a machine cannot do.

How will this transition towards a more purposeful work and a genuine work environment? The future workforce is here to speak up and have an opinion. This generation is bold, fearless and has what it takes to

challenge status quo. On the occasion of the 74th Indian Independence Day, I am reminded of a video that a popular media network released on how today youngsters will shape tomorrow's world. It focuses on traits of independent thinking and being strong willed. After all, this is the voice that is going to be running future corporates. We have all lived with the Service Economy. What's next? The Experience Economy. Life and work is all about experiences, personalized. I order my food and shop online. The app understand my preferences and suggests what I might like next time. Adidas's tryst with 3D printing has it personalize a shoe to

your individual feet dimensions. No longer do you have to 'adjust' with mass shoe sizes. At work, I do not have to ask my manager on what courses to learn. The learning bot has my performance data, sees my skill gap and suggests what courses I can take up, which will also predict where I will be in the next 3 years of my career. This is what new age up skilling will all be about. A one career throughout your lifetime is no longer coveted. This is the age of experimentation, finding your calling and hopping jobs till you get the 'one'. Truly progressive organizations are respecting this about candidates. The education – employment – career – retire

cycle no longer holds good but probably education – drop out? – learn – job – experiment – repeat (no retire!) is what the future holds in store.

Alvin Toffler had famously quoted, *It is not the rate of change but our ability to absorb it that matters*. It is no longer about will I get affected by this or can I stay cocooned in my current state? But there is a streak of optimism to all this anxiety. If it leads to greater efforts of skilling, and reshaping the workforce then this is what is required. It could be that this uncertainty produces the preparedness! ■

About the Author



Sushree Patnaik B.E. (Electronics & Communication), MBA (HR), is currently working as Deputy Manager HR in Robert Bosch Engineering & Business Solutions, Bangalore. She has 10 years of work experience in HR. In her earlier stints, she has worked with Larsen & Toubro, TATA Consultancy Services and Thermax. Her experience has been in HR Business Partnering and Talent Management. In her current role at Bosch, she is the Executive Business Assistant to the Vice President HR and is involved in HR Digitalization and Analytics projects along with Employer Branding.

She is an NHRD life time member and has been involved in their programs on coaching and mentoring young MBA students. Sushree is certified in HR Analytics from IIM Rohtak.

Call for Paper for CSI Journal of Computing

(e-ISSN: 2277-7091)

Original Research Papers are invited for the **CSI Journal of Computing**, published on line quarterly (e-ISSN: 2277-7091) by the Computer Society of India (CSI). The Journal of Computing, offers good visibility of online research content on computer science theory, Languages & Systems, Databases, Internet Computing, Software Engineering and Applications. The journal also covers all aspects of Computational intelligence, Communications and Analytics in computer science and engineering. Journal of Computing intended for publication of truly original papers of interest to a wide audience in Computer Science, Information Technology and boundary areas between these and other fields.

The articles must be written using APA style in two columns format. The article should be typed, double-spaced on standard-sized (8.5" x 11") with 1" margins on all sides using 12 pt. Times New Roman font and 8-12 pages in length. The standard international policy regarding similarity with existing articles will be followed prior to publication of articles. The paper is to be sent to Dr. R. R. Deshmukh, Editor-in-Chief in the email id: rrdeshmukh.csit@bamu.ac.in with a copy to Prof. A. K. Nayak, Publisher, CSI Journal of Computing in the email id : aknayak@iibm.in

Prof. A K Nayak
Publisher



Role of Digital Twins in Smart City Development-A Technology for Sustainable Cities

► Archana Sasi

Assistant Professor, School of Engineering, Department of Computer Science and Engineering, Presidency University, Bengaluru, Karnataka
archanasasi@presidencyuniversity.in

► Sathish Kumar Ravichandran

Assistant Professor, School of Engineering and Technology, Department of Computer Science and Engineering, Christ University, Bengaluru, Karnataka. Email sathishkumar.r@christuniversity.in

Digital Twins – An Introduction

A digital twin can be defined as a virtual model of an operation, physical products or services. This is a high precision depiction of the actual-world that appears, performs, and also linked to the physical world, to enhance knowledge for decision taking. Dr Michael Grieves first coined the term digital twin in 2002. The Digital Twin idea reflects the integration between the physical and the virtual world in which each manufacturing product gets an effective digital representation. It provides the possibility of connecting the configuration of the distributed product aspect with the technical and conservational data in the field, and remotely tracking and controlling the instance of the product. During the life cycle of product creation, companies should have a full digital footprint of their resources right from the design stage to the delivery process. Digital Twin uses Virtual Reality and augmented reality combined with graphic modelling and 3D data to construct a virtual image of a object, service, device, process. This digital twin is a precise version of the physical world while preserving the status of the original copy on a real-time basis by regular updates. Digital twin technology can be described as a technology that applies to diverse areas including, but not confined to, product monitoring when in use and during its life cycle.

The figure 1 shows the schematic of building the digital-twins virtual machine platform combined with sensory data and information fusion output.

Digital Twins Operation

In Digital Twins technology, the digital equivalents of the physical resources are generated using sensors as digitized replicas of physical locations or machines / appliances. This technology links the

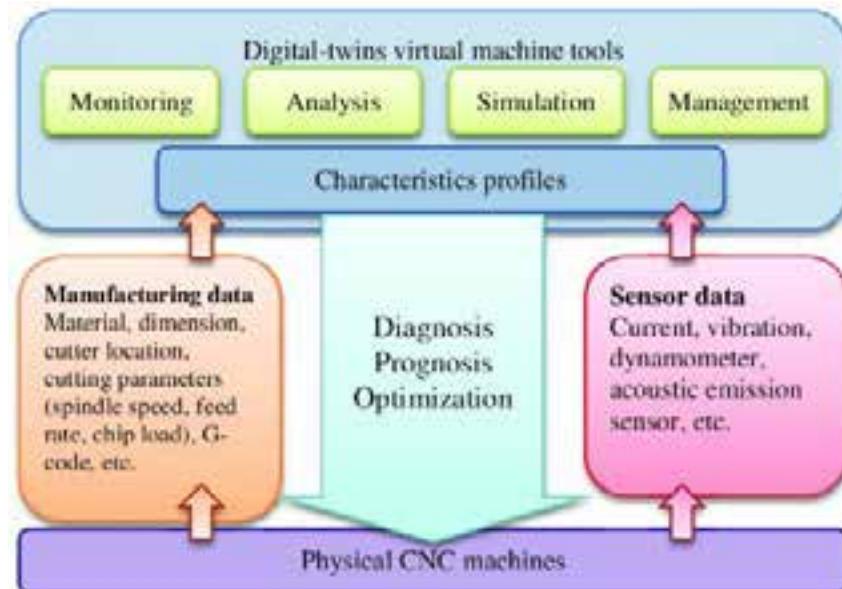


Fig 1 : Schematic of Building Digital Twins Virtual Machine Platform

physical and the virtual world by gathering data from the mounted sensors in real time. The data obtained are either decentralized locally, or stored centrally in a cloud. The data is then analyzed and simulated in a virtual replica of the assets. After the simulation has received the details, the requirements are applied to actual assets. The incorporation of the data into physical and virtual representations helps to optimize real asset efficiency. All this knowledge is incorporated into a physics-based virtual model together with AI algorithms and we obtain the requisite details about the physical asset by applying analytics to those prototypes. The continuous transmission of data aids to achieve the accurate suitable interpretation and details about the asset that tries to optimize the outcome of the industry. This

technology thus serve as a living model of the real components. Ultimately, this lets companies better assess and forecast issues in advance, avert downtime or show early alerts, create novel business openings and also design better goods at reduced prices by using simulations Figure 2 shows the integration of ideas and assets in Digital Twin.

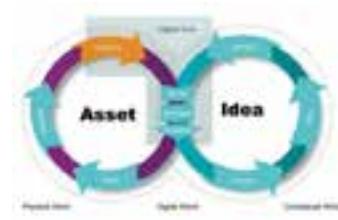


Fig 2 : Integration of Ideas and Assets in Digital Twins Technology

Digital Twins – Real Time Applications

Digital Twins would be the next major thing for the production of new technologies and processes in Fourth Industrial Revolution which aims to reliably forecast the present incarnation and future of real resources through the examination of digital equivalents. Through introducing Digital Twins, companies can gain deeper information on quality of product, enhance service for the customers and to make stronger strategic and tactical decisions depending on those observations.

Digital twins can be used in many industries manufacturing, agriculture, aerospace, electricity, construction, drilling platform, utilities, and automotive, healthcare, smart cities and so on.

Manufacturing: Digital twin has had a considerable influence on product design and manufacture. Upon getting the data it alters the old process where we manufacture the product directly. It makes production more effective and streamlined while at the same time minimizes the throughput time.

Agriculture: A digital twin is able to integrate information about the farm and thus plays a crucial role in the agricultural sector. Digital platform incorporation helps to store and link information concerning financial analytics and stakeholders. Automating analytics through Digital Twin technology and certain other system controlled mechanisms will enable us to gather more information from sensors and other resources without involvement of human.

Healthcare: Digital Twins together with IoT technology can play a crucial part in the healthcare industry, from reduction in cost to patient tracking, preventive maintenance and customized healthcare delivery.

Automobile: Digital Twins can be used to construct the digital prototype of a connected vehicle in the automotive industry. This collects the vehicle's operational and functional data, and aids in evaluating the overall performance of the vehicle and also the features related.

Aerospace: Real-time data provided by the Digital Twins technology are pioneering how the aircraft industry addresses fleet management and sustainability. This not only helps to boost airline workers' maintenance abilities, but it also helps to minimize prices and contribute to providing the customers with a better service.

Smart City: Smart city development and management with Digital Twins aids improve economic growth, resource productivity, elimination of ecological footprint and enhance the overall standard of a citizen's life. In this article we will discuss the role of Digital Twin in the smart city development. Fig 3 shows the various application sectors of Digital Twins.



Fig 3 : Various Application Sectors of Digital Twins.

Digital Twins Benefits

Digital twin systems deliver a broad spectrum of advantages. With regard to autonomous manufacturing and industry 4.0 development technology is certainly one of the most important application fields for digital twins. There is also a broad variety of uses available, from smart transport applications to power generation, healthcare, communications systems and logistics.



Fig 4 : Several Technology areas and Benefits of Digital Twins

Digital object mirroring in the area allows

the numerous forms of examination that can contribute to detailed diagnostic and optimization techniques. In this way, digital twins are also a modern educational tool: the digital copy can be used instead of having to learn and practice with the real object. The Figure 4 shows the several technology areas and the benefits of Digital Twin Technology

Digital Twins in the Industry 4.0

Digital twins that integrate Artificial Intelligence, Machine Learning, Internet of Things, and Big Data are important in Industry 4.0 that are primarily used in the commercial space of development and construction and also in the Industrial IoT. The broad Internet of Things scope and use have rendered the Digital Twins highly profitable and open to the commercial world. The emerging digital twin will incorporate data as well as interfaces. This will be a multifaceted digital alternative to the real asset, rooted in the ecosystem of Industry 4.0. This will serve as an entry point to potential Industry 4.0 networks and the real world for a new generation of technologies and algorithms. Figure 5 shows the Industry 4.0.



Fig 5 : Industry 4.0

The Digital Twin, in effect provides the ideal environment for analytics and simulation to gather data from any part of the manufacturing process. Once data is collected correctly and a Digital Twin is developed, it can be used by system integrators, project managers, and other stakeholders to guide business decisions and enhance decision taking processes. The advantages Industry 4.0 and builders stand to achieve from Digital Twins comprise improved plant efficiency, Focused Predictive Maintenance, Sophisticated regulation of complex systems or procedures, smooth training and practicing processes. Small and large scale companies will now use Digital Twin approaches for addressing complex issues.

Development of "smart city" focused on Industry 4.0

Advent of the internet of Things, interconnected networks and their global networking of cyber-physical structures

creates new possibilities for developing a "smart city" focused on Industry 4.0 and transition to a "smart economy". Industry 4.0 technology can address certain resource and energy management issues, industrial production, and demographic shifts in megacities. Industry 4.0 technologies not only offer vertical integration that connects processes within an enterprise from design and development to logistics and operation through production. The creation of "smart cities" as an urban, industrial and commercial goal, environmental policy encourages new industrialization and modern economic digitization. Smart technologies and approaches go beyond manufacturing facilities, transforming logistics, sales and other project management components at all levels of transport, energy sources and other infrastructure components creating a modern urban landscape-integrated, interconnected and equipped with Industry 4.0 resources. Industry 4.0 establishes industrial and technical foundations for developing "smart cities" whose growth and incorporation is an integral part of economy digitalization.

Role of Digital Twins in Smart Cities Development

When technologies such as the IoT, virtual reality and augmented reality evolve, urban planners may create virtual replicas of city infrastructure to adapt better to changes in local resources and the environmental variations. Digital Twin technology provides a digital representation of a city, a simulation of the real world, within the context of smart cities. Putting the virtual and real environments combined will help inform decision taking better, reduce uncertainties and even serve as a tool for connecting citizens. With layered data sources of structures, urban networks, services, industries and transportation, they are increasingly becoming invaluable resources to simulate the city's pulse in real time. Prior implementation, if we could check it in a virtual environment, it would reduce costs and the risks of failure in the real world. Validation and prototyping can significantly boost a city's resilience. Planners could assign resources, schedule activities and manage traffic by providing real-time data about any emergency, which would enhance many other urban systems by itself. Digital twins can aid cities organize transport networks, prepare for floods and inform

pedestrians about highly polluted areas.

A Smart City Digital Twin model allows improved visibility of city-wide interactions of human infrastructure in which community spatiotemporal variations are incorporated at a real-time collision of virtual reality in the analytics framework. By sharing and exchanging spatio-temporal data with the city, allowed through the link offered by IoT technology and virtualization, this city's Digital Twin becomes more intelligent over time, willing to provide analytical insights into the potential progress and growth of the city.

Relevance of Digital Twin simulation for smart cities

The advent of Virtual Twins provides an attempt to build smart adaptive systems by creating a dual virtual instance of the device in conjunction with the representation. Each part of the infrastructure is regarded as an independent entity to which the performance data of the human infrastructure are connected based on its position and proximity in space-time. The framework contains an analytics plugin which is used to interpret data between the application and the server system. This plugin comprises of several layers such as data collection and data compression units, combined with the city database, which are connected to a spatiotemporal modeling and simulation server. The analytics server framework is designed to conduct analysis of city networks in both infrastructure and human / social media platforms to track

the nature and efficiency of city networks such as service, resource distribution, and consumption. Through this way, accumulated spatiotemporal data gained helps the server system to eventually learn and produce richer analytical insights that are loaded into a working digital simulation computer system to analyze a range of potential future scenarios, thus facilitating decision taking.

Analysts can navigate and the city via a Head-Mounted Display (HMD) and through Motion Controller module that moves between various viewpoints, as well as alter their size. The ability to communicate with the digital twin city strengthens spacial awareness and can result in improved data-driven findings. The Smart City Virtual Twin forms a basis in creating a network of reality-virtuality at the intersection of such communications in real time.

Fig. 6 shows an illustration of how the consumer navigates the city in spatiotemporal terms, recognizes entities and routes, and explores the variations in space and time by adjusting their virtual scale, recorded by the HMD's sensors their positional monitoring device in relation to the city.

This tracking and navigation system provides tremendous flexibility in the access to location-specific knowledge. Nevertheless, it is important to always maintain a two-way channel of communication between the digital twin and the actual city. To this point, an Augmented Reality crowd-sourcing framework operates parallel with the



Fig 6 : the consumer navigates the city in spatiotemporal terms using HMD Sensors

network. Facilitated by a mobile application, this module is a two-way tagging framework, in which both analysts and people can tag the infrastructure at different times and locations with their input. In addition to the already managed data, all tags, whether in text, image, or video format, are filtered, verified, and incorporated in the analytics server system. The crowd sourced labeling data is then displayed in the digital twin as well as the mobile app.

Conclusion

Cities will keep exploring how digital twin technology can be used to bring their cities smarter, safer and more effective. Investing in technological enablers, particularly smart infrastructure and many other smart city technology, will expand the availability of the

data required for cities to gain the benefits of digital twin technology. Future research can explore this paradigm in ways that allow complex interlinked visual and numerical analytics to enable cities to capitalize on the smart dimensions of interactions between human infrastructure technology to achieve objectives of urban sustainability and flexibility. That can be done through predictive analytics, as well as through strategies that enable infrastructures and people to take measures that improve and enhance public health, vitality and security of the cities.

References

- [1] <https://www.researchgate.net/figure/Schematic-of-constructing-the-digital-twins-virtual-machine-tool-integrated>
- [2] <https://www.beca.com/ignite-your-thinking/ignite-your-thinking/november-2019/digital-twins-what-why-and-how>
- [3] https://www.researchgate.net/figure/Different-application-fields-of-digital-twin_fig4_336870688

- [4] <https://www.contact-software.com/en/wissen/cross-cutting-functions/digital-twin/>
- [5] <https://www.simio.com/blog/2019/09/19/industry-4-0-revolution-understanding-the-digital-twin-and-its-benefits/>
- [6] <file:///E:/PhD/CSI%20MAGAZINE/September%202020/Smart%20City%20Digital%20Twins.pdf>

About the Authors



Archana Sasi received her B.Tech and M.Tech in Computer Science and Engineering and Computer and Information Science from the College of Engineering Cherthala in 2012 and 2014. She is currently working as Assistant Professor and doing her Ph.D. under the Department of Computer Science Engineering in School of Engineering at Presidency University, Bangalore, Karnataka, India. She has published many articles in CSI India Magazine. Her research area includes Supply Chain Management, Internet of things and Big Data Analytics.



Sathish Kumar Ravichandran received his B.Tech, M.E, and Ph.D. in Information Technology, Computer Science Engineering and Information and Communication Engineering from Anna University Coimbatore and Anna University Chennai, Anna University Chennai in 2011, 2013, and 2019 respectively. He is currently working as Assistant Professor in Computer Science and Engineering department at Christ University Bangalore in Karnataka. He received the best paper award in IEEE sponsored International Conference on Advanced Computing & Communication System, India. He serves as an Editorial review member for many UGC journals. He published many research papers in SCI, Scopus indexed Journals. His research area includes Supply Chain Management, Big Data Analytics, IoT, and Bio-Inspired Optimization algorithms.



Computer Society of India™

Call for Contributions in CSI Adhyayan

(A National Publication dedicated to IT Education, Research and Student Community)

CSI Adhyayan is being positioned as a national publication dedicated for IT education, research and student community. This quarterly electronic publication performs the functions of a newsletter, a magazine and journal.

We take this opportunity to invite the contributions in this venture. Your invaluable contributions, suggestions and wholehearted support will be highly appreciated. We appeal to all our Chapters, Student Branches and member academic institutions for encouraging and motivating the students in terms of contributing innovative ideas, exploring new vistas of knowledge and new findings through CSI Adhyayan.

We especially invite news and updates from our member institutions and student branches.

Please send your article to the Chief Editor **Dr. Vipin Tyagi** via email csci.adhyayan@gmail.com with a copy to the publisher Prof. A. K. Nayak in the email : aknayak@iiitm.in

On behalf of CSI Publication Committee

Prof. A. K. Nayak
Publisher



The Prognostics of Digital Twin Technology for Industry 4.0

► **S. Balakrishnan**

Professor and Head, Dept. of Computer Science and Business Systems,
Sri Krishna College of Engg. and Technology, Coimbatore, Tamilnadu, India.

► **J. Janet**

Principal, Sri Krishna College of Engineering And Technology, Coimbatore

Digital Twin is at the cutting edge of the Industry 4.0 revolution encouraged through cutting edge data analytics and the Internet of Things (IoT) availability. IoT has expanded the volume of information usable from assembling, social insurance, and savvy city situations. The IoT's rich condition, combined with information investigation, gives a basic asset to prescient support and issue recognition to name however two and furthermore the future soundness of assembling procedures and savvy city improvements. Ventures are getting progressively computerized. Despite the fact that this procedure holds extraordinary guarantee for conveying esteem, numerous organizations and associations battle to understand this potential at operational and key level.

1. Introduction

A digital twin is a virtual model and detailed representation of a system (e.g., product design) or entity (e.g., factory) that can be used to understand performance, improve processes and create revenue opportunities from services. A digital twin can be characterized, on a very basic level, as an advancing" computerized profile of the recorded and current conduct of a physical item or procedure that streamlines business execution". The digital twin depends on enormous, aggregate, ongoing, certifiable information estimations over a variety of measurements. These estimations can make an advancing profile of the item or procedure in the computerized world that may give significant bits of knowledge on framework execution, prompting activities in the physical world, for example, an adjustment in item plan or assembling process.

The digital twin idea offers extraordinary likely incentive for associations in the manufactured condition. The broad utilization of advanced twins holds the guarantee to increment operational proficiency, take into consideration asset streamlining, improve resource the board, convey cost reserve funds, and improve profitability and security. The digitization of the manufactured condition, empowered by an expansion in figuring power, less expensive sensors, Internet of Things (IoT), progressed investigation and more noteworthy

advancement of 3D representation and vivid situations, consequently can possibly effectively contribute towards accomplishing the UN Sustainable Development Goals (SDGs).

2. Digital twin conceptual architecture

The conceptual architecture of digital twin consists of six steps, as follows: (1) Create (2) Communicate (3) Aggregate (4) Analyze (5) Act and (6) Insight.



Fig.1:Conceptual Architecture of Digital Twin

Step 1: (Create)

The create step "encompasses outfitting the physical process with myriad sensors that measure critical inputs from the physical process and its surroundings". The measurements by the sensors can be extensively ordered into two classifications: (1) "operational measurements pertaining to the physical performance criteria of the

productive asset (including multiple works in progress), such as tensile strength, displacement, torque, and color uniformity; (2) environmental or external data affecting the operations of a physical asset, such as ambient temperature, barometric pressure, and moisture level".

Stage 2: (Communicate)

This step helps the consistent, continuous, bidirectional joining/network between the physical procedure and the computerized stage. System correspondence is one of the extreme changes that have empowered the digital twin; it includes three essential parts:

- "Edge Processing - The edge interface associates sensors and procedure history specialists, forms signs and information from them close to the source, and passes information along to the stage".
- "Edge Security - New sensor and correspondence abilities have made new security issues, which are as yet creating".
- Communication Interfaces - It help move data from the sensor capacity to the combination work.

Stage 3: (Aggregate)

This step can bolster information ingestion into an information storehouse, handled and arranged for examination. The information accumulation and preparing

might be done either on the premises or in the cloud.

Stage 4: (Analyze)

In this step, information is investigated and pictured. Information researchers and experts can use progressed examination stages and innovations to create iterative models that produce bits of knowledge and suggestions and guide dynamic.

Stage 5: (Insight)

In this step, bits of knowledge from the examination are introduced through dashboards with perceptions, featuring unsatisfactory contrasts in the presentation of the advanced "twin model and the physical world" simple in at least one measurements, showing regions that possibly need examination and change.

Stage 6: (Act)

The "act step is the place noteworthy bits of knowledge from the past advances can be taken care of back to the physical resource and computerized procedure to accomplish the effect of the computerized twin".

3. Digital Twin Driving Business Values

With the development of progressively positive "storage and computing costs, the quantity of use cases and conceivable outcomes to empower an advanced twin has incredibly extended, thusly driving business esteem".

Category of business value	Description
Quality	- Improve overall quality - Predict and detect quality control issues - Control quality releases products able to determine over quality standards
Warranty cost and services	- Calculate current configuration of equipment in the field to reduce service inefficiencies - Improve performance of manufacturing equipment - Reduce downtime and increase reliability
Operational costs	- Improve efficiency of production engineering resources - Improve performance of manufacturing equipment - Reduce downtime and increase reliability
Reduced rework and participation	- Create a bigger network of connected parts and raw materials to better manage testing and inventory items and more efficient communication between them
New product introduction, cost and lead time	- Shorten the time to market of new products - Reduce the cost of new products per unit produced
Revenue growth opportunities	- Identify potential new leads that are ready for corporate expansion or financial portfolio investment

Fig. 2: Business Values of Digital Twin

4. Digital Twin Enabling Technologies

Emerging technologies such as "Internet of Things, Artificial Intelligence and advanced modeling techniques are enabling an intelligent, connected and digitally empowered mesh of people, things and services which outline a definitive concept, Digital Twin , for today's business".

Digital Twin depends on the accompanying three principle columns, empowered by innovation:

(i) Connectivity

- (a) Sensors: sensors dispersed all through the procedures and tasks make flags that empower Digital Twin to catch operational and natural information relating to the physical procedure in reality.
- (b) Big data: "real-world operational and ecological information from the sensors are accumulated and joined with information from the endeavor, for example, the bill of materials (BOM), venture frameworks, and structure determinations".
- (c) IoT: "sensors impart the information to the advanced world through joining innovation (which incorporates edge, correspondence interfaces, and security) between the physical world and the computerized world, and the other way around".

(ii) Digitalization

- (a) Simulation modeling: the "advanced" side of Digital Twin itself is an application that consolidates the segments above into a close ongoing computerized model of the physical world and procedures.
- (b) Data-driven modeling: like recreation models, information driven models (DDMs) give the "computerized" side of the Digital Twin.

As opposed to Simulation models which think about unequivocal information regarding the physical twin, DDMs obtain advance scientific and factual strategies to examine the information that describe a framework to discover connections among data sources and yields.

(iii) Intelligence

- (a) Artificial Intelligence (AI): AI causes "it feasible for machines to gain as a matter of fact, change in accordance with new information sources and perform human-like undertakings".
- (b) Analytics: Analytics procedures are utilized to break down the information through algorithmic and perception schedules applied on the gathered data by sensors in time.
- (c) "Actuators: should an activity be justified in reality, the AI behind the

Digital Twin delivers the activity by utilizing actuators, subject to human mediation, which triggers the physical procedure".

5. Digital Twin Challenges

This area draws fundamentally on the difficulties related with Digital Twins. In any case, as the exploration advances, it is obvious to see the difficulties found in information investigation, IoT and IIoT are like those found in the difficulties for Digital Twins with some talked about underneath:

(1) IT Infrastructure

So also to both examination and IoT the test is with the current IT framework. The Digital Twin needs framework that considers the accomplishment of IoT and information examination; these will encourage the compelling running of a Digital Twin.

(2) Useful Data

The following test is around the information required for a Digital Twin. It should be quality information that is without commotion with a steady, continuous information stream. On the off chance that the information is poor and conflicting, it risks the Digital Twin failing to meet expectations as it's following up on poor and missing information.

(3) Privacy and Security

Inside an industry setting, plainly the protection and security related with Digital Twins are a test. Right off the bat due to the huge measure of information they use and besides the hazard this stances to delicate framework information. To conquer this test, the key empowering advancements for Digital Twins - information examination and IoT - must follow the current practices and updates in security and protection guidelines. Security and protection thought for Digital Twins information add to handling trust issues with Digital Twins.

(4) Trust

The difficulties related with trust are both from an association perspective and that of the client.

(5) Expectations

In spite of Digital Twin appropriation being quickened by industry pioneers Siemens and GE, alert is expected to feature the difficulties that exist for the desires for Digital Twins and the requirement for additionally understanding.

6. Conclusion

Digital twins are today transitioning. Powered by the juncture of progress in

the web of things, enormous information, distributed computing, open APIs, computerized reasoning, and augmented reality, once-static advanced models and reproductions can now genuinely wake up progressively to help anticipate future circumstances, the condition of physical things, and even our general surroundings.

At last, Digital twins give us a chance to improve the earth where we as a whole live and work. Their structure and configurations are yet to be completely grown, yet it's now conceivable to value the advantages that could be figured it out.

References

- [1] S.Balakrishnan, "An Overview of Agent Based Intelligent Systems and Its Tools", CSI Communications magazine, Volume No. 42, Issue No. 10, January 2019, pp. 15-17.
- [2] S.Balakrishnan, J.P.Ananth, L. Ramanathan, S. P. Premnath, (2018). "An Adaptive Energy Efficient Data Gathering In Wireless Sensor Networks", International Journal of Pure and Applied Mathematics, Volume 118 No. 21, 2018, pp. 2501-2510.
- [3] V. Anandkumar, Kalaiarasaran T R, S.Balakrishnan, "IoT Based Soil Analysis and Irrigation System", International Journal of Pure and Applied Mathematics, Volume 119, No. 12, 2018, pp.1127-1134.
- [4] Ranjeethapriya K, Susila N, Grantly Regina Elwin, Balakrishnan S, "Raspberry Pi Based Intrusion Detection System", International Journal of Pure and Applied Mathematics, Volume 119, No. 12, 2018, pp.1197-1205.
- [5] S. Balakrishnan and Rahul R. "Big Data in Business Intelligence", CSI Communications magazine, Volume No. 42, Issue No. 8, November 2018, pp. 21-23.
- [6] S. Balakrishnan, R. Yogeshwaran "Heritage Computing and its Impact", CSI Communications magazine, Volume No. 42, Issue No. 10, December 2018, pp. 6-7.
- [7] J. Janet, S. Balakrishnan and E. Murali, "Improved data transfer scheduling and optimization as a service in cloud," 2016 International Conference on Information Communication and Embedded Systems (ICICES), Chennai, 2016, pp. 1-3. doi: 10.1109/ICICES.2016.7518895.
- [8] Balakrishnan S., Janet J., Spandana S. "Extensibility of File Set Over Encoded Cloud Data Through Empowered Fine Grained Multi Keyword Search". In: Deiva Sundari P, Dash S., Das S., Panigrahi B. (eds) Proceedings of 2nd International Conference on Intelligent Computing and Applications. Advances in Intelligent Systems and Computing, vol 467. 2017. Springer, Singapore.
- [9] J. Janet, S. Balakrishnan and K. Somasekhara, "Fountain code based cloud storage mechanism for optimal file retrieval delay," 2016 International Conference on Information Communication and Embedded Systems (ICICES), Chennai, 2016, pp. 1-4. doi: 10.1109/ICICES.2016.7518901.
- [10] S.Balakrishnan, S.Sheeba Rani, K.C.Ramya, "Design and Development of IoT Based Smart Aquaculture System in a Cloud Environment", International Journal of Oceans and Oceanography, ISSN 0973-2667, Volume 13, Number 1 (2019), pp. 121-127.
- [11] J. Janet, S. Balakrishnan, S. Sheeba Rani, "IOT Based Fishery Management System", International Journal of Oceans and Oceanography, ISSN 0973-2667, Volume 13, Number 1 (2019), pp. 147-152.
- [12] J.Janet, S.Balakrishnan, S.Sheeba Rani, "IoT based lake and reservoir management system", International Journal of Lakes and Rivers (IJLR), Vol. 12, Issue 1, (2019), pp. 21-25.

About the Authors



Dr. S. Balakrishnan (CSI Membership No. 2060000034) is a Professor and Head, Department of Computer Science and Business System at Sri Krishna College of Engineering and Technology, Coimbatore, Tamilnadu, India. He has 18 years of experience in teaching, research and administration. He has published over 15 books, 6 Book Chapters, 24 Technical articles in CSI Communications Magazine, 24 technical Blogs, 1 article in Electronics for You (EFY) magazine, 6 articles in Open Source for You Magazine and over 100+ publications in highly cited Journals and Conferences. Some of his professional awards include: Faculty with Maximum Publishing in CSI Communications 2017-2019, International Data Science Writer of the Year 2019, MTC Global Outstanding Researcher Award, Contributors Competition Winner July 2019 to December 2019 by DataScience Foundation, UK, Inspiring Authors of India, Deloitte Innovation Award Deloittee for Smart India Hackathon 2018, Patent Published Award, Impactful Author of the Year 2017-18. His research interests are Artificial Intelligence, Cloud Computing and IoT. He has delivered several guest lectures, seminars and chaired a session for various Conferences. He is serving as a Reviewer and Editorial Board Member of many reputed Journals and acted as Session chair and Technical Program Committee member of National conferences and International Conferences at Vietnam, China, America and Bangkok. He has published more than 21 Patents on IoT Applications and 1 granted copyright.



Dr. J. Janet is the Principal of Sri Krishna College of Engineering and Technology, Coimbatore, a top 100 NIRF ranked autonomous Institution affiliated to Anna University. Being a distinguished academician with 25 years of experience and versatile research outcomes in Computer Science Engineering, she has guided more than 13 doctoral candidates to completion in Anna University, JNTUH and MS University. With research thrust on Knowledge based systems, she has over 120 SCI and Scopus Indexed Journal publications to her credit with research imprint of 300+ citations. She has procured colossal Research funding grants to the tune of 6.87 Crores in diverse schemes of DST-YSS, TIDE, CHORD,CSRI, TITE, SEED, WOS, AICTE-RPS & UGC-MRP and her strong research modeling skills to act as technical mentor for multitude of projects. The key research findings have been converted to more than 17 IPR patent publications and 1 International patent. She has served as Convener and Program Chair for more than 50 International conferences and workshop program committees. She has authored an assortment of books and book chapters with leading publishers on emerging technologies. She is the recipient of Top Influential Women Educator Award by uLektz, Excellence in Education Award and Lifetime Achievement, Young Principal - Coimbatore Zone award 2018 and several Institutional awards for establishment of COEs and vibrant Academic-Industry Interfaces.



Digital Twins – A Paradigm approach in Industrial Automation

► Vishakha Yadav

Assistant Professor, Department of CSE, BMS Institute of Technology and Management, Bengaluru. Email: vishakhay@bmsit.in

► Banuprakash R.

Assistant Professor, Department of ETE, BMS Institute of Technology and Management, Bengaluru. Email: r.bhanuprakash@bmsit.in

Imagine an environment which helps in "mimicking potential ideas for a product building in its initial conception stage, exploring the related services and studying the future scope of process enhancement"? Could a technology assist in achieving all this before it's put into real time operation.

The answer is "Digital Twins". It's a promising technology which many trades and productions can take advantage of. It Featured as one of the Top 10 Strategic Technology Trends for 2017 by Gartner's.[1]

So, What is a Digital Twin Terminology?

In the year 2002, Michael Grieves at the University of Michigan proposed the jargon. Since then many researchers have been toying around with the idea. The advent of IOT has really given a boost to further nurture this technology. The feasibility of real time data gathering through the networked components of IOT for further conceptualization, processing and visualization using the machines has fuelled the scope of this technology in industrial environment and applications. The digital data collated in a physically connected world through various sensors have practically made Digital Twin technology reachable, thinkable beyond the analytical capabilities of a human being.

This is a boon for the various complex industrial applications where human capabilities fall short and marred by enumerable constraints. Digital Twin ably supports in gaining

insights of challenging jobs/tasks to improvise on them further. This would facilitate in enhancing the nature of the processes, procedures and productivity along with learning of possible flaws if any afore to its deployment.

Subsequently the gathered observations and learning through the digital

twins alleviate the system performance with marginal risk and improved return on investment. [1]

Role of Digital Twins in a digitized era

It is a computer-generated model of a process, product or service. The transformation of the gathered data from the physically wired connected realm to the model driven domain permeates the perpetual data analytics. Moreover, it is conducive in monitoring the industrial systems to forestall problems before it actually occurs, avert failures, manoeuvre the mean time to failure and explore new prospects by foreplanning using simulations. [2]

Digital Twin is generally perceived as a value addition to the manufacturing and production industry of varied complexity. It is a software depiction of a system of physically connected machines/components or processes. The data gathered in the real time production manufacturing environment may be greatly helpful in performing various fault and performance analysis per se. Digital twin is conducive to identify, avoid, envisage, and enhance the value of the business. GE Digital, is focused on how digital twins can help their customers across three core areas: Asset, Network, and Process. [3]

Scope of the technology in industrial scenario

Genesis of the technology ascended at NASA to emulate the life-sized prototypes of space capsules. It was perceived to understand the potential problems in the orbit. It paved way to full-fledged digital simulations. Although the concept was initially known by different names, John Vickers of NASA termed it as the "digital twin" as quoted in a 2010 Roadmap Report [4]. Further, digital twins have broadened its horizon to various numerous application such as structures, plants, and cities. and

► Thippeswamy G.

Professor & Dean Academics, Department of CSE, BMS Institute of Technology and Management, Bengaluru. Email: dean_academics@bmsit.in

► Siddiq Iqbal

Assistant Professor, Department of ETE, BMS Institute of Technology and Management, Bengaluru. Email: siddiq@bmsit.in

processes can have digital twins. This enables the stakeholders to simulate the input-output processes of these systems to associate the behaviour of the systems parts to different circumstances. [5]

Functional perspective of Digital twins

In a digital twin set up the connected components engage themselves in constant learning. Concurrently, the system engages itself in gathering the variable details and statistics like the operational conditions, constraints and status pertaining to various sources.

This self-learning is facilitated using the sensors deployed in the manufacturing environment to gather the data which expresses the numerous aspects of its operating condition. The integral components of such system are engineering experts who expertise themselves with acquired domain and functional knowledge accrued over the years, machineries and the working environment associated with it, pattern of historical data usage to reason into its digital model. There are 3 functional components required for a Digital Twin model:

1. Physical product/machine,
2. Virtual / Digital product,
3. Network between the above two products.

Data assimilation is carried out using the physical product/ Machine, which is the crux of the technology, further it is passed on as an information to the digital/virtual product for consequent study and analysis. The various categories of Digital twins are:

- Digital Twin Prototype (DTP)
- Digital Twin Instance (DTI)
- Digital Twin Aggregate (DTA)
- The DTP exists before there is a physical product. Digital Twin Prototype consists of the plans, strategies, analysis, and processes to comprehend a physical product/machine.

As soon as the product is manufactured, it has DTI as the digital twin of each individual illustration/case of the product. Accretion of DTIs is Digital Twin Aggregate, whose data and information can be used for examination about the physical product/machine, prognostics, and learning. Use Cases are build for Information representation. Robotic Process Automation (RPA) is synonymous to a digital twin in the manufacturing and production environment.

The Scope of digital twin technology

Connectivity

Growth of IoT has fostered the development of digital twin technology. Nature of IoT supplements the requisite and fundamental infrastructure needed for Digital twins. Hence it is more capable of building connectivity between organizations, products, and customers. Supply chain management and Enterprise Resource Planning can get benefited more from it. All the partners and members connected with this link can achieve better performance over integrated digital platform rather than investing time on different modes of communication.

Homogenization

Heterogeneous data collected from different physical machines flows across digital platform to achieve uniformity in data analytics. The information is retrieved in

cognizance for further processing. It would examine, foresee, and resolve complications, malfunctions and glitches if any using the virtual representations. This approach is wiser rather than validating it on corporal models and waiting for prevailing reflexes on these products. It would facilitate convergence of varied user experience irrespective of the demographics set up.

Reprogrammable and smart

Using artificial intelligence technologies and predictive analytics, emergent behaviour and functional modification of system features may be achieved. The sensors placed on the physical product enables reengineering in a reflexive manner.

Digital smidgeons

Digital footprints can be used by industry recourse personnel to keep an eye on downtime, failure, fault analysis and achieving up keeping of assembly during crisis and challenging. This would assist manufacturers to alleviate future design and performance of the machines.

Modularity

In manufacturing industry, product design encompasses grainer, modular components assembled collectively to brand a product. Customization of products and production modules are viable to achieve better performance. Digital twin technology empowers industrialists to trail

the behaviour of machines for possible areas of improvement. [6]

In conclusion the authors are of opinion that evolution of Digital Twins Technology along with Artificial Intelligence and Data Analytics would further strengthen the Industrial Automation to its fullest capacity in achieving value-added productivity with time.

References:

- [1] <https://bernardmarr.com/default.asp?contentID=1870>
- [2] <https://www.forbes.com/sites/bernardmarr/2017/03/06/what-is-digital-twin-technology-and-why-is-it-so-important/#4ce59bec2e2a>
- [3] <https://www.ge.com/digital-applications/digital-twin>
- [4] Piascik, R., et al., Technology Area 12: Materials, Structures, Mechanical Systems, and Manufacturing Road Map. 2010, NASA Office of Chief Technologist.
- [5] <https://www.networkworld.com/article/3280225/what-is-digital-twin-technology-and-why-it-matters.html#:~:text=Digital%20twins%20are%20virtual%20replicas,AI%20and%20analytics%20are%20optimized.>
- [6] https://en.wikipedia.org/wiki/Digital_twin

About the Authors



Vishakha Yadav (LMI1503848) is currently working as Assistant Professor at BMS Institute of Technology and Management, Bengaluru. Her research interests include Computer Vision, Software Engineering, Data Analytics etc. She has Industrial Experience of 4 years and teaching experience of 15 years. She has published 7 papers in International Journals and Conferences.



Banuprakash R is currently working as an Assistant Professor in Electronics and Telecommunication Engineering department, BMS Institute of Technology and Management, Bengaluru. He is BE, M.Tech, and pursuing PhD in the field of RF communication. He has overall 13 years Teaching and 4 years of Industry experience. He published around 15 research papers on antennas in international journals and conferences. He got Best Paper award for four research paper IEEE conferences. He has completed four consultancy projects on antennas.



Dr. Thippeswamy G is currently working as Dean Academics and Professor at BMS Institute of Technology and Management, Bengaluru. He has obtained his doctorate (Ph.D) in Image Processing and pattern recognition. His research area includes Computer Vision, Image Processing and Pattern Recognition, Data Analytics etc. He has an overall teaching experience of 27 years and has more than 40 papers to his credit in reputed international journals and conferences. He has participated in investigation of various Research Projects.



Siddiq Iqbal is currently working as an Assistant Professor in the department of Electronics and Telecommunication Engineering, BMS Institute of Technology and Management, Bengaluru. He is pursuing Ph.D in the field of Wireless Sensor Networks. He has 16 years of teaching experience. He has published 8 papers in various International Journals and Conferences.



Call For Paper

Digital Transformation eReadiness for Self Reliance

Digital Transformation: eReadiness for Self-Reliance

Dates: 11th, 12th, 13th & 14th February, 2021 at Lucknow

The Annual Convention of Computer Society of India (CSI) is proposed to be held on 11, 12, 13 and 14 February 2021 at Lucknow, the capital city of the largest state of India - Uttar Pradesh. The Convention with the theme Digital Transformation: eReadiness for Self-Reliance, includes several activities like the International Conference, Pre-convention Tutorials, Student-level Poster/Paper Presentation Sessions and Competitions apart from Statutory Meetings of CSI and Award Ceremonies etc.

Tracks of the Convention: There will be following significant tracks of the conference-

Track 1: Self Reliance through ICT & IT: Services and Infrastructure

Track 2: Changing ways in Governance for Self Reliance: Policies and Frameworks

Track 3: Use of ICT in Making Agriculture and Defence Self Reliant

Track 4: Use of ICT in Making Education and Research Self Reliant

Track 5: Interdisciplinary approaches and applications for Self Reliant

Track 6: Entrepreneurship Challenges: From Jobseeker to Job provider

Call for Papers:

Searching for opportunities, between the battle of saving human lives and stagnating economies in this challenging time of the pandemic, the emphasis of the Government of India is to regain the lost status of the Nation known as 'Sone ki Chiriyा'. To spur economic growth in India and to overcome the current crisis, the Government has announced "Atmanirbhar Bharat Abhiyan" (Self-Reliant India Scheme) with a quote "Economy, Infrastructure, Technology-driven System, Vibrant Demography and Demand will be the five pillars on which India's self-reliance will be based". A technology-driven "Atmanirbhar Bharat" relies heavily on digitising India,

with an emphasis on health, education, governance, agriculture, defence, engineering/technology and other sectors. The aim is to create and sustain the ability to produce quality products in a cost-competitive manner in order to compete with any country in the world and to priorities cottage and home industries, small and medium enterprises (SMEs) and other ancillary industries. The effects of this reorientation towards domestic manufacturing are already visible in India's International Trade Policy, where it seems determined to protect its domestic policy space. It not only deals with manufacturing the products and services but also ensures that the deliverables reach even to the citizen standing at the last step of the economy. The theme of the Convention Digital Transformation: eReadiness for Self-Reliance, is inclined towards having a broader look and to explore the possibilities for futuristic India.

We wish to bring together innovative academia and industrial experts to a common forum to deliberate on this issue. We seek active participation from End users, Academicians, Researchers and other faculty members from various esteemed institutions/research organizations. It will be a matter of delight to have a personal presence at the Convention and hear what the technology experts and researchers have to share about the technology advancements and their impact on our daily lives and the steps to be taken towards making India self-reliant.

Paper Invite: End-users, technocrats and academicians, researchers including research scholars and students are invited to this Annual Convention to deliberate and discuss the issues and showcase their original research work related to the theme of the convention, which pertains to the need of the hour i.e. development in the infrastructure, bringing the existing

human resources at par with the needs of any organization, the utilization of Information Communication Technologies and Information Technology infrastructure for making India self-reliant, which has been made in reference to the following themes (but not limited to these themes) :

Paper Themes:

Digital Transformation and Innovation

- Internet of Things & Applications
- Block Chain Technologies
- Digital Infrastructure for Every Citizen
- Governance & Services on Demand
- ICT in Health Care
- Social Media Networks
- ICT in Human, Social and Ecological Compatibility
- E-Learning & MOOCs
- Data Visualization

Artificial Intelligence & Virtual World

Artificial Intelligence

- Computational Intelligence
- Knowledge Acquisition
- Automated Software Generation
- Swarm Intelligence
- Computer Simulation
- Human Computer Interaction
- Genetic Algorithms

Machine Learning

- Artificial Neural Networks (ANN)
- Reinforcement Learning
- Deep Learning
- Adversarial Machine Learning
- Edge computing applications
- Transfer Learning

E-learning

- Word Embedding
- Digital Repositories
- Photo Sharing
- Social Networking
- Subscribed Content Delivery
- Assessment and Survey Tools
- Podcasts and Streaming

Expert Systems

- Expert Systems for Industry
- Expert Systems for Medicine and Health
- Expert Systems for Agriculture

Natural Language Processing

- Signal and Speech Processing
- Geo Informatics & Remote Sensing
- Game playing
- Speech and Text Recognition

Machine Vision

- Computer Vision
- Brain-Machine Interface
- Medical Diagnosis
- Robotics and automation
- Biomedical Engineering
- Image Processing
- Video Analysis
- Segmentation Techniques
- Bioinformatics and Scientific Computing

Virtual World

- Virtual Reality
- Virtual Entertainment
- Virtual Society
- Digital Library
- Augmented Reality
- Computer Animation
- Social Media

Data Analytics and Big Data

- Data Science
- Data Mining
- Data Engineering
- Data Warehousing

- Data Analytics
- Secured Computing
- Pattern Recognition
- Performance Evaluation
- Big Data Analytics
- Predictive Analytics
- Human Computer Interaction
- Intelligent Database Systems

E-Governance and Business Intelligence

E-Governance

- Digital Democracy
- ICT for Sustainable Economic Development
- ICT for Pandemic & Disaster Management
- ICT Challenges for Self Reliant India
- Digital Empowerment of Citizen
- Digital and Green Economy
- ICT for Social Development
- ICT in Creation of Wealth
- ICT in Job creation & Poverty Alleviation
- Digital Infrastructure as a Utility to Every Citizen
- Governance & Services on Demand

E- Commerce

- ICT in On-line Marketing & purchasing
- ICT in Retail Chain Management
- ICT in On-line Auction Systems
- ICT in On-line Booking (ticket, Seat Etc.)
- ICT in Online publishing & advertisements
- ICT in Financial Management
- ICT in M-Commerce

Business Intelligence

- Dashboards
- Reporting
- Visualisation
- ETL & OLAP

Data Communication, Computing & Innovation

Computing

- Algorithms
- Evolutionary Algorithms
- High Performance Computing
- Cognitive Computing
- Cloud Computing
- Embedded Computing
- Human-Centred Computing
- Digital Twins
- Quantum Computing
- Distributed And Parallel Systems
- Grid Computing
- Scalable Computing
- Mobile Computing

Internet and Web Applications

- Networking
- Open Spectrum Solutions
- Cognitive Radio
- Wireless/ Mobile Communication
- Mobile Ad-Hoc Networks
- Networks With Memory
- 5g Wireless Technologies
- Next-Generation Wireless Communication
- Signal Processing
- Communication Protocols
- Satellite Communication Systems
- 4g/5g Network Evolutions
- Software Defined Networking
- Wireless Sensor Networks

Network Security and Data Protection Security

- Cyber Security
- Computing Ethics
- Data Compression
- Ethical Hacking
- Digital Forensics
- Facial Expression and Emotion Detection
- Security & Cryptography
- Data Encryption
- Data Fusion and Security

Important dates:

Regular Track Paper Submission Last date : 10th December 2020

Author Notification

15th January 2021

Registration Deadline

20th January 2021

Conference Dates

11th, 12th, 13th & 14th February, 2021

Convention Website:

Please visit the conference website for more details: <http://csi-india2021.org/>



Computer Society of India™

National Student Coordinator for the year 2020-21



Name & Affiliations

Dr. P. Kumar

Director - Alumni Affairs
Rajalakshmi Engineering College (Autonomous)
Thandalam, Chennai – 602 105
(M) 98405 73702 | (E) pkumar_5@yahoo.com

Regional Student Coordinators for the year 2020-21

REGION-I



Dr. Sunil Pratap Singh

Assistant Professor
Bharati Vidyapeeth's Institute of Computer Applications and Management (BVICAM)
New Delhi - 110063
(M) 97586 63304
(E) sunil_pratap@rediffmail.com

REGION-II



Dr. Somnath Mukhopadhyay

Assistant Professor
Department of Computer Science & Engineering,
Assam University, (A Central University), Silchar
(M) 94754 13463
(E) somnath.mukhopadhyay@aus.ac.in
som.cse@live.com

REGION-III



Dr. Mamta C. Padole

Associate Professor
Dept of Computer Science and Engg
Faculty of Technology and Engineering,
The Maharaja Sayajirao University of Baroda, Vadodara
(M) 99987 92087
(E) mamta.padole@gmail.com / mamta.padole-cse@msubaroda.ac.in

REGION-IV



Dr. Brojo Kishore Mishra

Department of Computer Sc. & Engg, School of Engineering & Technology
GIET University
Gunupur-765022, Odisha
(M) 94378 75808 / 79782 16728
(E) brojomishra@gmail.com

REGION-V



Dr. Salman Abdul Moiz

Professor, School of Computer & Information Sciences,
University of Hyderabad,
Gachibowli, Hyderabad-500046
(M) 98850 49992
(E) salman@uohyd.ac.in, samsco.uoh@nic.in

REGION-VI



Dr. Samiksha Shukla

Associate Professor & HOD,
Department of Data Science, Christ (Deemed to be University),
Lavasa Campus, Pune 412112
(M) 98804 62311
(E) samiksha.shukla@christuniversity.in
samiksha.shukla@gmail.com

REGION-VII



Dr. S. Hemalatha

Panimalar Institute of Technology
#391, Bangalore Trunk Road, Varadharajapuram,
Nazarethpet, Poonamallee, Chennai - 600123
(M) 98403 37793
(E) pithemalatha@gmail.com
slaechemalatha@gmail.com

State Student Coordinators for the year 2020-21

REGION-I

UTTAR PRADESH



Dr. Puneet Misra

Assistant Professor
Department of Computer Science
University of Lucknow
Lucknow-226007
(M) 94151 59146
(E) puneetmisra@gmail.com
puneetmisra.csu@gmail.com



UTTARAKHAND

Prof. Ramesh Sing Rawat

Asst. Professor
Graphic Era Deemed to be University,
Clement Town, Dehradun - 248002
Uttarakhand
(M) 94123 79001
(E) rsrawat@geu.ac.in
rsrawat06@gmail.com



PUNJAB

Prof. Jaswinder Singh

Asst. Professor,
Department of Computer Applications
Chitkara University
Tehsil Rajpura - 140401
(M) 99888 82501
(E) jaswinder.singh@chitkara.edu.in

REGION-I

DELHI



Prof. Rhythm Choudhary

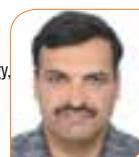
Assistant Professor
Department of Computer Science
Maharaja Surajmal Institute
GGS Indira Prastha University, Delhi
(M) 96431 04346
(E) rhythmchoudhary@msi-ggsip.org



HIMACHAL PRADESH

Dr. Pradeep Kumar Gupta

Department of CSE & IT,
Jaypee University of Information Technology,
Waknaghat, Solan - 173234, HP
(M) 98051 93854
(E) pkgupta@ieee.org
pradeepkumar.gupta@juit.ac.in



HARYANA

Dr. Vikas Kumar

Professor
Chaudhary Bansi Lal University
(State Govt University)
Bhiwani - 127021, Haryana
(M) 98998 44584
(E) prof.vikaskumar@gmail.com

State Student Coordinators for the year 2020-21

REGION-I

JAMMU AND KASHMIR



Prof. Parveen Singh
H.O.D - Dept of Computer Sciences
Govt. Higher Education Department
Govt of Jammu and Kashmir
Jammu, J&K 180006.
(M) 94192 00844
(E) imparveen@yahoo.com



LADAKH

Dr. Mahboob Ali
Assistant Professor
School of Computer Science, University of
Ladakh, UT Ladakh
(M) 94694 66640
(E) mehbobaali@gmail.com

REGION-II

WEST BENGAL



Dr. Debasis Giri
Asso Prof & Former Head, Dept of IT
Maulana Abul Kalam Azad University of
Technology, Haringhata
Nadia - 741249, West Bengal
(M) 99328 86799 / 94341 46565
(E) debasisgiri@hotmail.com
giridebasis@gmail.com



BIHAR

Prof. Gopal Krishna
Netaji Subhas Institute of Technology
Amhara, Bihta, Patna - 801118
Bihar
(M) 82713 09236 / 87096 05462
(E) gopalkrishna91@gmail.com
gopal.cse@nsiterp.in



ASSAM

Dr. Sunita Sarkar
Associate Professor and Head
Department of Computer Science and
Engineering, Assam University, Silchar
Silchar - 788011, Assam
(M) 94351 73557
(E) sarkarsunita2601@gmail.com
sunitasarkar@rediffmail.com

REGION-III

MADHYA PRADESH



Dr. Neha Gupta
Symbiosis University of Applied Sciences
Bada Bangadda, Indore - 453112
Madhya Pradesh
(M) 89826 13633
(E) nehaguptaneema@gmail.com



RAJASTHAN

Dr. Ashish Chandra Swami
S. S. Jain Subodh PG College
Jaipur, Rajasthan
(M) 98292 51110
(E) ashishchandraswami@gmail.com



GUJARAT

Prof. Priyalba Vaghela
Asst. Professor cum Research Fellow
Dept. of Computer Science & Engg.
Devang Patel Institute of Advance Technology
and Research, Charusat, Changa
(M) 79843 93319
(E) priyalvaghela.dcs@charusat.ac.in
priyalvaghela1024@gmail.com

REGION-IV

ODISHA



Dr. Sourav Kumar Bhoi
Assistant Professor
Dept. of Computer Science and Engg
Parala Maharaja Engineering College,
Berhampur 761003
(M) 94380 67694 / 79780 18390
(E) souravbhoi@gmail.com



JHARKHAND

Prof. Bhagwan Singh
Professor of Management
Dept. of Business Administration
School of Management Sciences
Central University of Jharkhand (CUJ)
Chery Manatu, Ranchi
(M) 98164 81037
(E) bhagwan.singh@cuj.ac.in



CHHATISHGARH

Dr. Monica Shrivastava
Associate Professor
Faculty of Management Studies
Shri Shankaracharya Technical Campus
Bhilai, Chhattisgarh
(M) 98930 81129 / 78840 88809
(E) monica.s@ssgi.edu.in
monicasv_1@yahoo.com

REGION-V

TELANGANA



Prof. Chavali Sita Kameswari
Keshav Memorial Institute of Technology
3-5-1026, Narayanguda
Hyderabad - 500029
(M) 99668 00037 / 94411 40218
(E) sitakameswari@kmit.in
sita.rao@yahoo.co.in



ANDHRA PRADESH-1

Dr. S. Maruthuperumal
Professor & HOD-CSE
NBKR Inst. of Science and Technology
Vidyanagar, S.P.S.R. Nellore - 524413
(M) 90255 55206
(E) maruthumail@gmail.com
csehod@nbkrist.org



KARNATAKA

Smt. Anitha Venkatesh
Chairperson & Managing Director
AIMIT (Adithya Institute of Mgmt. &
Information Technology)
Vidyaranyapura, Mysore
(M) 94480 11009
(E) adithyacomputers@gmail.com

REGION-VI

MAHARASHTRA



Dr. M U Kharat
Professor and Head, Comp. Engg. Dept.
MET's Institute of Engineering
Bhujal Knowledge City, Adgaon, Nashik
(M) 93257 13417
(E) mukharat@rediffmail.com



GOA

Ms. Shailaja Sardessai
Principal
Dempo Higher Secondary School of Science,
Miramar, Goa
(M) 98223 85346
(E) shailasardessai@gmail.com

REGION-VII

TAMIL NADU & PUDUCHERRY



Prof. V. Santhana Marichamy
Assistant Professor
Department of Computer Applications
Valliammai Engineering College
S.R.M Nagar, Kattankulathur 603 203
(M) 94442 18282
(E) sandalswamy72@gmail.com



TAMIL NADU

Dr. I Jasmine Selvakumari Jeya
Hindusthan College of Engg. and Tech.
Othakkalmandapam Post
Coimbatore - 641032
(M) 94433 81609
(E) wjasminejeya@hindusthan.net
wjasminejeya@gmail.com



KERALA

Dr. M V Rajesh
Associate Professor
Dept. of Electronics Engineering
Govt. Model Engineering College,
Thrikkakara, Kochi 682021 Kerala
(M) 94474 64687 / 94460 35370
(E) mvrajeshihrd@gmail.com



Online Technical Hackathon (OTH)

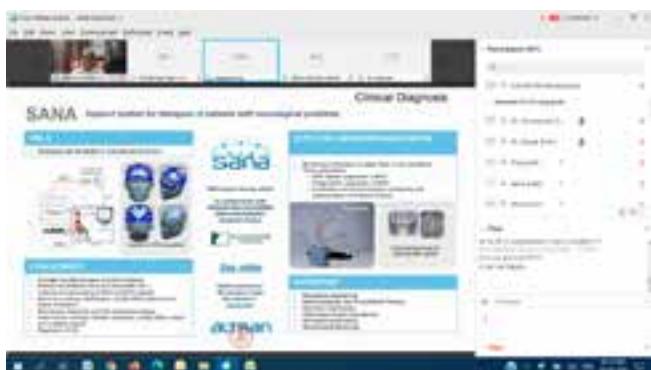
Reported by Diwakar Tripathi , President at CSI BBDITM student council, Lucknow



CSI BBDITM Student Council of Dept. of Computer Science Engineering and Dept. of Information Technology organized Online Technical Hackathon 2.0 on 23rd August 2020. Under the guidance of our Director Dr. Bhavesh Kumar Chauhan; our Patron, Dr. Manuj Darbari; Branch Co-ordinator, Dr. Diwakar Yagyasen and Branch Counsellors, Prof. Zulfikar Ali Ansari & Prof. Shadab Siddiqui, the council launched the hackathon to bring about creativity among students and encourage practical learning. Participants from all over the country are allowed to participate as a team of 2 to 5 or as an individual. Students are challenged to propose ideas and solutions to problem statements chosen by the council that impacts different technical domains of our country. The event posters were launched a week prior to the submission date, there were no registrations this time to give the participants flexibility in teaming and working. On 23rd August, the PPT submission portal created by the council was opened for entries to be submitted from 10am to 6pm. The Submissions were all checked by the council members based on an evaluation scheme devised in such a way that it takes in consideration Creativity, Usefulness, Implementation, Quality and Content. The Results were announced the very next day on 24th August by notifying each participant using email and a Winners Poster is published on Social Media. The Top 3 positions were awarded the Certificate of Achievement while each and every participant was given a Certificate of Participation. The feedback of the event was overwhelmingly positive and the students turn out was more than expected as both teams and individuals participated.

Webinar on “Data Science and AI”

Organised by Bharati Vidyapeeth's Institute of Computer Applications and Management (BVICAM), New Delhi



AICTE's Industry Institute Partnership Cell (IIPC) of Bharati Vidyapeeth's Institute of Computer Applications and Management (BVICAM), New Delhi, in collaboration with Computer Society of India (CSI), IEEE Delhi Section, IEEE Computer Society, Consultants Network Affinity Group, Inter Society Relations, Institution of Electronics and Telecommunication Engineers (IETE), Delhi Centre and Indian Society for Technical Education (ISTE), Delhi Section organized an online webinar on "Data Science and AI" was conducted on 08th August, 2020.

The Webinar was held in the benign presence of Prof. Subrata Mukhopadhyay, Chairperson, CNA Group and Former Chairperson, IEEE Delhi Section, Dr. Ajay Thakare, Chairman, Technical Program and Publicity Committee, IETE and Prof. A. K. Saini, Vice President-cum-President Elect, CSI. The webinar began with the welcome address by Prof. Subrata Mukhopadhyay welcoming all the guests and participants, followed by the welcome address of Prof. A. K. Saini outlining the multidimensional perspective of Data Science and AI. Prof. M. N. Hoda, Director, Bharati Vidyapeeth's Institute of Computer Applications and Management (BVICAM), New Delhi also addressed the session and discussed the background note of conducting such Webinars through virtual platforms. He emphasized that these webinars act as networking tools to connect people from across the world and help them to adapt to a New Normal life, a new ecosystem caused by COVID-19. He also discussed the five phases of COVID-19 i.e. Denial, Anger, Bargain, Depression and Acceptance and motivated the participants to directly move to Acceptance phase from Bargain phase without going into Depression phase, which is also one of the objectives of these weekly webinar series. He also motivated participants to keep learning continuously regardless of all disruptions.



Webinars organised by Bharati Vidyapeeth's Institute of Computer Applications and Management (BVICAM), New Delhi



Webinar on "Citations and Reference Management using Mendeley"

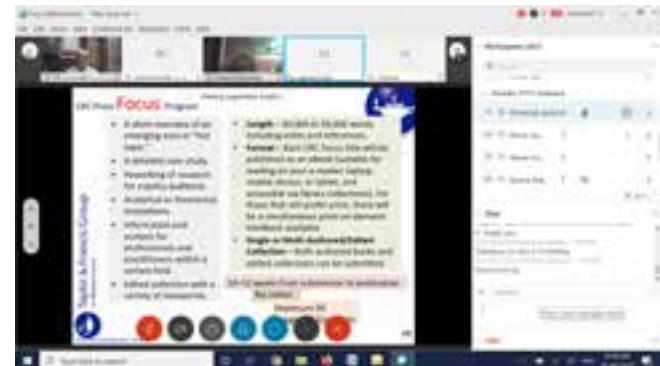
AICTE's Industry Institute Partnership Cell (IIPC) of Bharati Vidyapeeth's Institute of Computer Applications and Management (BVICAM), New Delhi, in collaboration with Computer Society of India (CSI), IEEE Delhi Section, IEEE Computer Society, Consultants Network Affinity Group, Inter Society Relations, Institution of Electronics and Telecommunication Engineers (IETE), Delhi Centre and Indian Society for Technical Education (ISTE), Delhi Section organized an online webinar on "Citations and Reference Management using Mendeley" was conducted on 14th August, 2020.

The Webinar began in the benign presence of Prof. Subrata Mukhopadhyay, Chairperson, CNA Group and Former Chairperson, IEEE Delhi Section, Dr. Ajay Thakare, Chairman, Technical Program and Publicity Committee, IETE and Prof. A. K. Saini, Vice President-cum-President Elect, CSI. The webinar began with the welcome address by Prof. Subrata Mukhopadhyay welcoming all the guests and participants, followed by the welcome address of Prof. A. K. Saini outlining the multidimensional perspective of Citations and References. Prof. M. N. Hoda, Director, Bharati Vidyapeeth's Institute of Computer Applications and Management (BVICAM), New Delhi also addressed the session and discussed the background note of conducting such Webinars through virtual platforms. He emphasized that these webinars act as networking tools to connect people from across the world and help them to adapt to a New Normal life, a new ecosystem caused by COVID-19. He also discussed the five phases of COVID-19 i.e. Denial, Anger, Bargain, Depression and Acceptance and motivated the participants to directly move to Acceptance phase from Bargain phase without going into Depression phase, which is also one of the objectives of these weekly webinar series. He also motivated participants to keep learning continuously regardless of all disruptions.

Webinar on "How to Write Technical Books?"

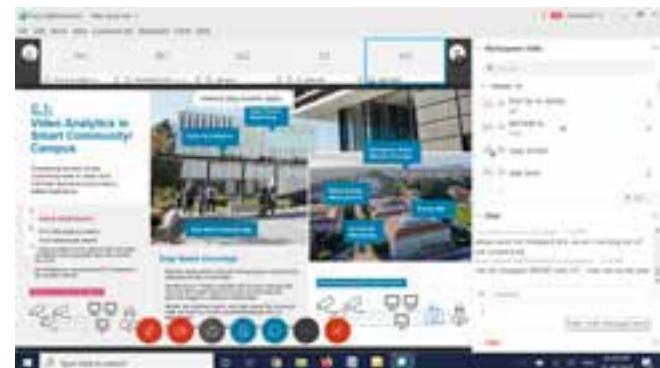
AICTE's Industry Institute Partnership Cell (IIPC) of Bharati Vidyapeeth's Institute of Computer Applications and Management (BVICAM), New Delhi, in collaboration with Computer Society of India (CSI), IEEE Delhi Section, IEEE Computer Society, Consultants Network

Affinity Group, Inter Society Relations, Institution of Electronics and Telecommunication Engineers (IETE), Delhi Centre and Indian Society for Technical Education (ISTE), Delhi Section organized an online webinar on "How to Write Technical Books" was conducted on 28th August, 2020.



The Webinar was held on 28th August, 2020 in the benign presence of the dignitaries including Prof. Subrata Mukhopadhyay, Chairperson, CNA Group and Former Chairperson, IEEE Delhi Section. Prof. R. K. Vyas, National President, CSI welcomed all the invited guests and participants. Prof. M. N. Hoda, Director, Bharati Vidyapeeth's Institute of Computer Applications and Management (BVICAM), New Delhi also addressed the session and discussed the background note of conducting such Webinars through virtual platforms.

Webinar on "Is Edge Computing the Saviour of IoT?"



AICTE's Industry Institute Partnership Cell (IIPC) of Bharati Vidyapeeth's Institute of Computer Applications and Management (BVICAM), New Delhi, in collaboration with Computer Society of India (CSI), IEEE Delhi Section, IEEE Computer Society, Consultants Network Affinity Group, Inter Society Relations, Institution of Electronics and Telecommunication Engineers (IETE), Delhi Centre and Indian Society for Technical Education (ISTE), Delhi Section organized an online webinar on "Is Edge Computing, the savior of IoT?" was conducted on 22nd August, 2020.



National FDP on “Research Directions in Security and Computational Intelligence”

Report by: **Mr. Pradeep Rathi**, RVP-VI

Vivekanand Education Society's Institute of Technology
National Level FDP
Research Directions in Security and Computational Intelligence

Keynote Speaker:
Mr. PRADEEP RATHI,
Founder & Director In-Chief, S. Zone
Regional Vice-President, Region-6 (Maharashtra, E. Sard, CS)
• 30+ years experience in R&D, Product Engineering,
Manufacturing, CMM & Research Project based in
Academia.
• Has handled various complex Project Management
Operations.
• Published more than 100 Technical Papers &
Technical Reports.
• Registered 10 Patents in R&D & 10
of National & International Conferences.

Monday 3 August 2020, 3:00 p.m.

Vivekanand Education Society's Institute of Technology
National Level FDP
Research Directions in Security and Computational Intelligence

*** Analysis of Various Objects using Hyperspectral Remote Sensing & Its Applications ***

Dr. RATNADEEP DESHMUKH
Professor & Head, Dept. of CS & IT,
Dr. Babasaheb Ambedkar Marathwada
University, Aurangabad

Monday 3 August 2020, 3:30 p.m.

Mr. Pradeep Rathi, RVP-6 was Chief Guest and Key Note Speaker to inaugurate the FDP on Research Directions in Security and Computational Intelligence organized by Vivekanand Education Society's Institute of Technology.

Every year the Student chapter of CSI from V.E.S. Institute of Technology, an amalgamation of various talented and dedicated people work to create and host events which are enthralling as well as beneficial to the students of our college. This includes a plethora of technical events and educational workshops for a complete holistic development, of its members.

As the world faces unseen challenges and increasing uncertainties due to this global pandemic, Vivekanand Institute of Technology in association with CSI-VESIT, VESIT-Internal Quality Assurance Cell(IQAC) and VESIT-Institution's Innovation Council(IIC), conducted a National level six-day Faculty Development Program on "Research Directions in Security and Computational Intelligence". This program was organized with the aim of educating/ informing faculty on conduction of research in multiple fields of computational intelligence also how to stay safe and secure in the online daily interactions and thus furthermore help its students.

Eminent speakers from all over India were invited to conduct the program:

3rd August:

- Keynote Speaker: Mr. Pradeep Rathi - Regional Vice President Zone-6 MH & Goa, CSI.
- Dr. Ratnadeep R. Deshmukh - Analysis of Various Object using Hyper spectral

Remote Sensing & Its Applications.

- Mr. Arup Vithal - AI in Healthcare and Lifesciences

4th August:

- Mr. Ravindra Muddinagiri - Recent advances in passwordless authentication using Biometric methods

- Dr. Mani Kumar - Financial Technology

5th August:

- Dr. Shashidhar R. - Research trends in Blockchain
- Prof. Dr. Seyed M. Buhari - Optimal Classroom Scheduling/ Course - Curriculum Mapping.

6th August:

- Mr. Vikash Kumar - Chief Marketing Officer, Blocklogy Edutech Pvt. Ltd.

7th August:

- Mr. Mahesh Pavaskar - Cyber security space & SIEM
- Dr. Sharvaree C. Tamahne - AI, NN and its Applications.
- Dr. Sangita K & Dr. Shubhangi Sapkal - ANN its Matlab Programming

8th August:

- Mr. Sushil Bedre - CSI Blockchain.
- Mr. Sandip Chavan - CSI Blockchain.
- Dr. Ramesh R Manza - Open Source Tools for E-Content Development, Teaching,Learning & Evaluation.



**Vivekanand Education Society's
Institute of Technology**



CSI IT Excellence Awards-2020

Date: 17th January 2020 at Bhubaneswar

Report by: Apoorva Agha, National Convener



CSI IT Excellence Awards-2020 were organized at Bhubaneswar on 17 January 2020 alongwith the 53 Annual Convention from 9.30 am in Conference Hall No.II of KiiT Bhubaneswar. A total or thirteen valid nominations were received and five were shortlisted for the awards. A panel of four eminent Judges comprising of Dr. Gulshan Rai, Former National Security Coordinator & Ex. Officio Secretary Government of India, in the Chair, Shri Satish Khosla, FCSI, Consultant, Shri R.N.Lahiri, FCSI, TCS and Shri A.K.Saini, FCSI judged the presentations.

The five presentations which received the CSI IT Excellence Awards-2020 were,

1. Mr. Tuhin Bose, Chief Technology Officer and Vice President, Videonetics Technology Pvt. Ltd., Kolkata presented Artificial Intelligence & Deep Learning Powered DeeperLook(TM).
2. Dr. Vivek Chandra, GM & Head(IT), MP Poorv Kshetra Vidyut Vitaran Co. Ltd., Jabalpur presented Load Forecast for MP Discoms using Artificial Intelligence.
3. Mr. Rajan Trivedi, DGM (IT) NHPC Limited, Faridabad, Haryana

presented Employee Health Scheme (EHS) Portal & Vendor Payment Portal.

4. Mr. Swaroop Kumar Panigrahi, GM I/c Business Excellence HOD[BE & IED], Rourkela Steel Plant presented Leveraging IT:Integration of Level-II & Level-IV Automation.
5. Mr. Santosh Biradar, Associate Consultant Enterprise Training Services, Amstar Technologies Pvt . Ltd., Bangalore presented Innovative Application of Block Chain for driving Business Transformation.

The Awards in the form of Trophies and Certificates were given away during the evening function by Shri Gulahan Rai, Chief Guest and Shri R.K.Vyas, Vice President & President Elect with the assistance of National Convener, Shri Apoorva Agha who conducted the National Contest and the Awards programme.

The Awards programme was attended by a galaxy of eminent dignitaries, ExecCom Members, members of CSI, Convention Delegates and large number of Students.



CSI STPI YITP Awards-2020

Date: 17th January 2020 at Bhubaneswar

Report by: Apoorva Agha, National Convener



CSI STPI YITP Awards-2020 were organized at Bhubaneswar on 17 January 2020 alongwith the 53 Annual Convention from 10.30 am in Conference Hall No.I of KiiT Bhubaneswar. A total of seven valid nominations were invited for their presentations for the National Awards-2020 who were winners from the seven Regional Rounds viz., Region-I held at Ghaziabad on 4.1.2020, Region-II held at Kolkata on 4.1.2020, Region-III held at Surat on 6.1.2020, Region-IV held at Bhubaneswar on 11.1.2020, Region-V held at Bangalore on 7.1.2020, Region-VI held at Aurangabad on 11.1.2020 and Region-VII held at Tiruchirapalli on 7.1.2020.

The panel of four eminent Judges comprised of Shri Anil Ji Garg, Past Chair Ghaziabad Chapter, in the Chair, Dr. Ratnadeep Deshmukh, Chair Div.III and Dr. Subhash Chandra Yadav, Chair Div.V judged the presentations.

The three presentations which received the National CSI STPI YITP Awards-2020 were,

1. **Winner** – Mr. Yogesh Bhosale, Faculty, CSMSS College of Engineering, Aurangabad presented DiGi-BUILD-INFRA.
2. **Runner** - Ms. M. Sneha Deepika, Guest Faculty, Dept. of Geo Engineering, Andhra University Visakhapatnam presented Development of an Automated IOT Based Polyhouse Monitoring and Controlling System.
3. **Special Mention** – Mr. Ruddra Dev Roychoudhury, Mr. Hrishav Bakul Barua and Mr. Ashis Sau of TATA Consultancy Services Ltd. (R & I), Kolkata presented Saathi: A Telepresence Robotic Avatar for a Convenient, Safe and a High-Tech Society in Future. At the Regional Rounds, Winners, Runners and Special Mention

awardees were given Trophies, Certificates and Cash prizes of ₹ 5,000/-, ₹ 3,000/- and ₹ 2,000/- respectively. At the National Rounds, Winners, Runners and Special Mention awardees were given Trophies, Certificates and Cash prizes of ₹ 25,000/-, ₹ 15,000/- and ₹ 10,000/- respectively.

The Awards in the form of Trophies and Certificates were given away during the evening function by Shri Gulahan Rai, Chief Guest and Shri R.K.Vyas, Vice President & President Elect with the assistance of Shri Anand Rao, Senior Member CSI and Shri Apoorva Agha, National Convener who conducted the National Contest and the Awards programme.

The Awards programme was attended by a galaxy of eminent dignitaries, ExecCom Members, members of CSI, Convention Delegates and large number of Students.





Welcome to new CSI members during Lockdown

Membership No.	Name	Membership No.	Name
I1505700	Prof. Pratik Bhattacharjee	I1505714	Dr. K K Kailaiselvi
I1505706	Prof. Ahona Ghosh	I1505717	Mr. Saravanan S S
I1505715	Mr. Anand Panduranga	I1505718	Miss Nikhat Fatma Mumtaz Husain Shaikh
I1505716	Mr. Sanjay Devkishan Taneja	I1505719	Prof. Apurva Ashokbhai Mehta
I1505723	Mr. Sandeep Choudhary	I1505720	Prof. Niyati Jatin Buch
I1505726	Miss Amrinbanu Mujamil Shaikh	I1505721	Dr. S Ramakrishna
I1505728	Mr. Sanket Anadani	I1505722	Mr. Bibhu Kalyan Mishra
I1505736	Prof. Renetha J B	I1505724	Mr. Karthikeyan Sankaran
I1505740	Dr. Deepthi P S	I1505725	Mr. Mujeeb Shaik Mohammed
I1505741	Prof. Sreejith S	I1505727	Mr. Balgeetsingh Bahadursingh Sucharia
I1505742	Mr. Kaushal Girishkumar Gor	I1505729	Dr. Bose Sudan
I1505745	Miss R Thara Krishnan	I1505730	Mr. Ashok Sangwan
I1505746	Miss Remya Shaji	I1505731	Mrs. Prabha B
I1505747	Miss Labeeba Vahid	I1505732	Dr. R Parameswari
I1505748	Mr. Sunu Sundar	I1505733	Dr. Soumyadev Maity
I1505749	Miss Divya Hari	I1505734	Mr. Narayana Murthy
I1505750	Miss Nishiya Vijayan	I1505735	Dr. Anuradha Purohit
I1505751	Mr. Sumith S	I1505738	Dr. Anbu M
I1505752	Miss Sneha S	I1505739	Dr. Lilly Raamesh
I1505753	Miss Anjana Thampy S	I1505743	Mrs. Anitha S
I1505754	Mr. Jomon Thomas Lobo	I1505744	Mrs. Thresa Jeniffer J
I1505755	Miss Kavitha A P	I1505762	Mr. Imran Sharif
I1505756	Mrs. Anju Kurian A	I1505763	Dr. Vikas Baburao Thakare
I1505757	Mrs. Mithra P B	I1505764	Mr. Amit Chaurasia
I1505758	Mr. Shamin S	I1505766	Mr. Saharasnaman N R
I1505759	Mrs. Lekshmi Nair G	I1505767	Dr. Natarajan Venkatachalam
I1505760	Mr. Sanju S	I1505771	Dr. Sunil Kumar Srivastava
I1505761	Mr. Rajith S S	I1505772	Dr. Parneeta Dhaliwal
I1505765	Mr. Pavan Kumar Ande	I1505773	Dr. Umamaheswari Ramalingam
I1505768	Dr. Resmi Sekhar	I1505774	Miss. Vaishnavi Ravindran
I1505769	Mr. Arundev V	I1505775	Dr. Bhaskar Mondal
I1505770	Prof. Priya Sekhar S	I1505778	Dr. Narayana Rao Appini
I1505776	Dr. Jarikre Oghenegweke Amos	I1505779	Dr. Tuhin Utsab Paul
I1505777	Dr. John Kani Amoaka	I1505781	Dr. Gogineni Rajesh Chandra
I1505780	Mr. Anand Kumar Sinha	I1505782	Mr. Sandeep S
I1505786	Dr. Suresh D	I1505783	Mr. Anumanchi Durga Sivarama Kumar
I1505790	Mr. Rahul Pramodkumar Samant	I1505784	Mr. Rama Subbiah Boya
I1505797	Mr. Ankit Dhansukhbhai Prajapati	I1505785	Mr. Kota Amarendranath
I1505798	Miss. Bhagyasri Girishbhai Patel	I1505787	Mr. Piyush Raja
I1505799	Miss. Bhavini Rajendrakumar Bhatt	I1505788	Dr. Debasis Giri
I1505800	Mrs. Henita Hemang Shah	I1505789	Mr. Devarshi Chatterjee
I1505801	Dr. Madhavi Bharatbhai Desai	I1505791	Dr. Abhinav Tomar
I1505802	Mr. Narandra Vijaykanti Jagtap	I1505792	Dr. Prakash P
I1505803	Mr. Nikunj Yogeshbhai Kansara	I1505793	Mr. Chethan Venkatesh
I1505707	Dr. Vijayakumar K	I1505794	Mr. Adit Chopra
I1505708	Dr. J. Dafni Rose	I1505499	Mr. Shrihan Pasikanti
I1505709	Ms. Sruthi Krishnamoorthy	I1505795	Dr. Dhanya Kannanganatti Madhavan Pillai
I1505710	Ms. Charumrutha Prakash	I1505605	Mr. Kiran Kinnera
I1505711	Mr. Achintya Kumar Das	I1505796	Dr. Senthil Mahesh P C
I1505712	Mrs. Sakshi Taresh Khanna		



CSI Service Awards 2019-2020



Call for Applications

There are various awards which are to be given to the Chapters and Individuals to acknowledge and encourage for their extraordinary contribution towards growth of the society and IT Industry. Applications are invited from Chapters and Individuals for their significant contributions to the society during the year 2019-2020 (July 2019 to June 2020) The Awards will be presented during CSI Annual Convention which is scheduled to be held from 11th February 2021 to 14th February 2021 at Lucknow.

The CSI Awards constituted for encouraging the chapters / individuals are indicated below:

- 1 Best National Chapter Award*
- 2 Best Regional Chapter Award (Category A)
- 3 Best Regional Chapter Award (Category B)
- 4 Best Regional Chapter Award (Category C)
- 5 Best Chapter News-Letter Award
- 6 Chapter Patron Award

7 Significant Contribution Award

8 Active Participation Award (Youth - under 28 years)

9 Active Participation Award (Woman)

Chapters and Individuals interested in participating for these awards, may mail their nominations in a prescribed format. Application forms can be had from admn.officer@csi-india.org.

The nomination should be routed through respective Regional Vice Presidents, so that the scrutiny can be done by CSI-ED at Chennai and forwarded to "**Awards Committee**".

The completed applications as soft copies should reach via email to admn.officer@csi-india.org with CC to aknayak@iibm.in and ipp@csi-india.org as specified in the form, latest by 20th October 2020. Incomplete application will not be considered for scrutiny.

*The best national chapter award will be given on the basis of nomination for best regional chapter award, so, a separate nomination for this award is not required.

Prof. A. K. Nayak

Chairman (Awards Committee)

Mr. Arvind Sharma
Member

Dr. Subhash Chandra yadav
Member

Dr. Suresh Chand Tyagi
Member



Welcome to new CSI Academic Institutional Members during Lockdown

IM No.	Name	City
M10760	Seth Jai Parkash Mukand Lal Institute of Engineering & Technology	Yamuna Nagar
M10756	Bharati Vidyapeeth's Institute of Computer Applications & Management	New Delhi
M10755	S. R. Institute of Management & Technology	Lucknow
M10751	Presidency College	Bangalore
M10752	Amruta Institute of Engineering and Management Sciences	Bidadi
M10758	Sapthagiri College of Engineering	Bangalore
M10757	Capital Degree College	Hyderabad
M10753	D.Y. Patil College of Engineering & Technology	Kolhapur
M10754	L.B.S. Institute of Technology for Women	Thiruvananthapuram
M10759	SRM TRP Engineering College	Tiruchirapalli



Computer Society of India™

Call for Proposals from CSI Student Branches to organize

National / Regional / State Level CSI Student Conventions

during the year 2020-2021

Computer Society of India (CSI) organizes National, Regional, and State Level Student Conventions annually, to enhance the awareness on technological developments and applications, and foster creative professional orientations among the academic community. The Conventions, held at Student Branches, offer excellent opportunities to the students to manifest their technical proficiency and prowess through paper presentations, discussions and extensive interactions with peers and pioneers.

CSI invites Proposals from Student Branches to conduct the National/ Regional / State Level Student Conventions to be held during the month of October to December 2020.

Criteria:

The proposing Student Branch should be very active, with a track record of several CSI activities, and be in good standing through the years 2019-20 and 2020-21.

The proposals for convention will be evaluated, broadly based on the parameters given below:

- a) Number of years of continuous valid Student Branch at the college (without break)
- b) Average student strength over the past three years
- c) Number, quality and level of activities at the student branch
- d) Prompt submission of activity reports and financial accounts
- e) Ability to attract good speakers from Industry
- f) Availability of infrastructure and other resources
- g) Financial strength and potential
- h) Accessibility and other general conditions

All the National, Regional & State Student Conventions are to be completed according to the above schedule.

The CSI Student Convention Manual describes the guidelines and norms to conduct the student conventions.

The Proposal:

Interested Student Branches are requested to send electronic

proposals in the prescribed format with all necessary data, including the information stated below.

- a) **Type of convention proposed:** National / Regional / State level
- b) Proposed dates (at least one day for State level and two days for Regional and National level – please indicate two sets of dates)
- c) A statement of case why the SB should be considered favourably for the proposed event
- d) Signed undertaking by the Head of the Institution to provide all the required support (Document with scanned signature)
- e) Name & contact details of SBC and the coordinator-designate for the proposed convention

How to send:

The Student Branches may send the proposals in the prescribed format on or before 20th October 2020 through the respective Regional Vice President, to the Hon Secretary (csi.hon.secy@gmail.com) and Vice President (aksaini1960@gmail.com), with a copy to Education Directorate (admn.officer@csi-india.org) and National Student Coordinator (pkumar_5@yahoo.com)

Selection:

A Committee constituted by CSI, including the Chairman, Academic Committee, Chairman Conference Committee, Honorary Secretary and National Student Coordinator will assess the proposals to select the host institutions in consultation with RVPs, RSCs and SSCs as per the requirement.

CSI Support:

CSI extends token financial grants for the technical events, in accordance with the availability of budgetary resources, subject to the approval of the Executive Committee. CSI also supports the publicity efforts for the Conventions.

Convention Helpline:

CSI-Education Directorate shall be pleased to offer any information or help on the convention. Please do contact Mr. Gnanasekaran (email: admn.officer@csi-india.org Mobile: 98403 41902) for any assistance.

Dr Anil Kumar Saini
Vice President

Dr. P Kumar
National Student Coordinator

Prof Vipin Tyagi
Hon Secretary



Viewing the Covid-19 and Lockdown situation in the country,
the ExecCom of CSI has decided to give **15% DISCOUNT** in new
enrollment of Life Membership of CSI till 31st December, 2020.

Dr. Vipin Tyagi
Hon. Secretary, C



Computer Society of India™

Academic Awards 2019-2020

Call for Applications



Computer Society of India has been honouring academic excellence through Academic Awards every year. The awards will be presented during the CSI Annual Convention which is scheduled to be held from **11th February 2021 to 14th February 2021** at Lucknow. Applications are invited for the following awards for the period from July 2019 to June 2020 from the CSI accredited student branches who meet the criteria and are currently in good standing.

Sl. No.	Name of the Award	Criteria	To be submitted by
1	Best Accredited Student Branch Award	Good standing – during the award year and currently, large student strength & large number of activities as defined in the specified form	Student Branch Counsellor (SBC) with necessary recommendation from Regional Student's Coordinator (RSC) and approval from Regional Vice President (RVP)
2	Largest Student Branch Award	Continuous good standing for the past 3 years with highest 3 years averaged strength	Decided by Awards Committee
3	Best CSI International Students Event Host Award	Institutional member hosted maximum student's competition participated by minimum 10 foreign students	SBC with necessary recommendation from RSC and approval from RVP
4	Highest Sponsorship of CSI Events Award	Institutional member extending maximum support for CSI events during the award year	SBC with necessary recommendation from RSC and approval from RVP
5	Longest Continuous SBC Award	Longest continuous tenure as SBC over the last 3 years	SBC with necessary recommendation from RSC and approval from RVP
6	Faculty with maximum publishing in CSI Publications	Publishing maximum articles in CSI publications / digital library during the award year	Self with necessary recommendation from RSC and approval from RVP
7	Paper Presenter at International Conference for Faculty	Presentation of paper at prestigious International Conferences during the award year	Self with necessary recommendation from RSC and approval from RVP
8	Students with maximum publishing – CSI publications	Publishing maximum articles in CSI publications / digital library during the award year	SBC with necessary recommendation from RSC and approval from RVP
9	Highest Committed Student Branch Activist Award	Most active CSI Volunteer from the Student Branch during the award year	SBC with necessary recommendation from RSC and approval from RVP
10	Best Ph D Thesis Award	CSI member, who submitted a high-quality thesis (Thesis quality to be evaluated by a panel of eminent research scientists) leading to acceptance for Ph D degree by a recognized University	Research Scholar (who got the Ph D during the award year) / the Research Supervisor / Current Employer

The application for the academic awards are invited only from the CSI members or from CSI Accredited Student Branches in good standing during the year 2019-2020 to till date.

Application forms can be had from admin.officer@csi-india.org

The completed applications as soft copies should reach via email to admin.officer@csi-india.org with CC to aknayak@iibm.in and ipp@csi-india.org as specified in the form, latest by **20th October 2020**. Incomplete application will not be considered for scrutiny.

Prof. A. K. Nayak
Chairman (Awards Committee)

Mr. Arvind Sharma
Member

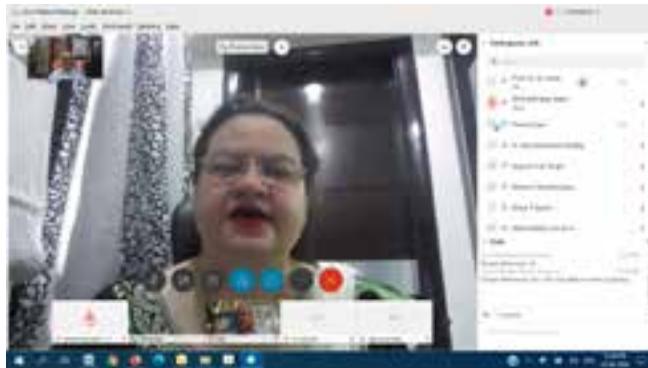
Dr. Subhash Chandra yadav
Member

Dr. Suresh Chand Tyagi
Member



One Month Faculty Induction / Orientation Programme (FIP)

Organised by : Bharati Vidyapeeth's Institute of Computer Applications and Management (BVICAM), New Delhi



AICTE's Industry Institute Partnership Cell (IIPC) of Bharati Vidyapeeth's Institute of Computer Applications and Management (BVICAM), New Delhi, in collaboration with Computer Society of India (CSI), IEEE Delhi Section, IEEE Computer Society, Consultants Network Affinity Group, Inter Society Relations, Institution of Electronics and Telecommunication Engineers (IETE), Delhi Centre and Indian Society for Technical Education (ISTE), Delhi Section organized a month long Faculty Induction/Orientation Programme from 01st August, 2020 to 31st August, 2020.

The programme commenced with registration of participants on 01st August, 2020 followed by Technical Demo of the CISCO WebEx Digital Learning Platform on 02nd August, 2020 and Inaugural Session on 03rd August, 2020. During the inaugural session, Prof. M. N. Hoda, Director, Bharati Vidyapeeth's Institute of Computer Applications and Management (BVICAM), New Delhi, welcomed all the guests & attendees, and discussed the background note of conducting this Induction programme. He highlighted the significance of Education 4.0 to meet the emerging demands of Industry and emphasized on continuous learning which must go on regardless of all disruptions. Prof. Preerna Gaur, Chairperson, IEEE Delhi Section, addressed the audience and highlighted the activities of the IEEE Delhi Section. She also talked about various student chapters introduced under IEEE DS to promote the relationship between Academia and Industry.

Chief Guest of the inaugural session, Prof. A. K. Singh, Vice Chancellor, Sri Sri University, Cuttack, highlighted the significance of "Digital Transformation in Higher Education and Education 4.0. Guest of Honours of the inaugural session, Prof. A. K. Nayak, Immediate Past President, Computer Society of India discussed the benefits of the online education and Dr. Nitin Malik, Registrar, Ambedkar University, New Delhi emphasized the importance of Induction programme in the academic career. He motivated all the participants to enthusiastically participate in this programme and derive quality outcomes from it. Various interesting and knowledge imparting online sessions were covered in the programme.

The objective of this Faculty Induction Programme was to sensitize and motivate the faculty to adopt learner centric approach

with required degree of in-built flexibilities having ICT integration, and emerging pedagogical approaches to teaching learning processes and assessment in Higher education. The programme observed active participation of research scholars and faculties from different states of the nation; like from Pillai Institute of Information Technology, Panvel, Annamalai University, Tamilnadu, Tripura Institute of Technology, Narsingarh, Baba Ghulam Shah Badshah University, J&K, St. Xavier's University, Kolkata, Goa University, Goa - to name a few. Last day of the programme also witnessed a Valedictory Session of the One Month Faculty Induction Programme. Dr. Vishal Jain, Associate Professor, BVICAM, presented a brief report on all the sessions covered during one month of the programme. Prof. M. N. Hoda welcomed all the guests and thanked all the speakers & participants to make this programme a successful event with positive outcomes. He discussed that it is important to ensure the quality of education in technical programs and develop a confidence among students, Industry and stakeholders. Guest of Honour, Prof. A. K. Nayak, Immediate Past President, Computer Society of India, congratulated the organizing team for successfully conducting One Month Faculty Induction Programme. Chief Guest of the event, Prof. K. K. Aggarwal, Chairman, National Board of Accreditation (NBA), New Delhi Former Founder Vice Chancellor, Guru Gobind Singh Indraprastha University, New Delhi, congratulated and thanked all the participants for attending this programme. He motivated all the attendees to develop a passion and make self-commitments to achieve the mission of their Institutes and follow the outcome based curriculum to promote OBE.

At the end, few participants shared their experiences on attending this programme and gave their valuable feedback. The entire programme was coordinated by Dr. Vishal Jain, Associate Professor, Mr. Manish Kumar, Assistant Professor, Mr. Uttam Singh, Assistant Professor, BVICAM and Dr. Ritika Wason, Associate Professor, BVICAM. All the participants were awarded with certificates of participation electronically. Dr. Vishal Jain expressed his vote of thanks to all the attendees for their active participation and professional bodies for their collaboration in this online programme.



Webinar on Transforming Relationship Between Human and Robots Amid COVID-19

Report by: Dr. Pankaj Goswami & Sri Vinay Kumar Johri, Chairman, CSI Lucknow Chapter



Computer Society of India, Lucknow Chapter organized a Webinar on Transforming Relationship Between Human and Robots Amid COVID-19 which was held on 08th August 2020 (Saturday) from 11.00 AM onwards. Prof. R.K. Vyas, President Computer Society of India, presided over the event. Sri Vinay Kumar Johri, Hon. Secretary on behalf of CSI Lucknow Chapter welcomed Mr. Milind Raj who was the Invited Speaker, Prof. R.K. Vyas, Prof. A.K. Nayak, Sri Arvind Sharma and all the participants from various walks of Life present in the Webinar.

The programme started with the welcome address by Dr. Pankaj Goswami, Chairman CSI Lucknow Chapter who welcomed all and delivered his welcome address. Dr. Goswami stated that in near future we will not be able to distinguish Humans as well as Robots. At present Human and Robot are easily distinguishable. I would personally feel that we are the advanced genomic biologically created Robots. We will be discussing the scenario that how the Citizenship to the Robot be awarded. Sofia is the First Humanoid to become the Citizen of United Arab Emirates.

Prof. A.K. Nayak thanked all the Participants and advised that under the dynamic & vibrant leadership of Dr. Goswami, Lucknow Chapter is doing well, and he praised the activities of Computer Society of India Lucknow Chapter. He also advised that the forthcoming Annual Convention is going to be held in Lucknow in the month of coming February 2021. He stated that Robots are coming to great help in social networking, Malls, handing over the things/items etc. The power of Robots in Artificial Intelligence started sometimes in 1956 by USA Medical Expert Systems. Robots are also used in business intelligence. Now Emotional Intelligence is also being used. Artificial Intelligence is the source and other developments are Objects. Post Covid-19, Education System 4.0 where Robots will be used in Virtual Laboratories, Lab experiments. There is imagination to go to Education 5.0. The 5 areas where manpower will be required:

- Security Analysis
- API Programming
- Robotics 7 Smart Industry
- Application of durable Technology viz. Smart watch etc.
- Data Analytics & Business Intelligence Professionals.

He stressed upon that integration of Technology will also be possible where under Emotional Intelligence, Computer Intelligence etc. emotions can also be fed into the minds of Robots.

Prof. R.K. Vyas praised Mr. Milind Raj, our invited expert speaker who is connected to impart knowledge to children also. Mr. Vyas remembered his meeting with His Excellency Dr. Kalam through a Video Conference to a remote village of Maharashtra. He stated that we play a very important role in Covid-19 pandemic where Robots are being used to deliver medicines to Covid-19 patients in the Hospitals. Artificial Intelligence and Expert Systems are extensively being used in Machine Intelligence, IOT come together, Automobile Industry, Pharmaceuticals etc. Earlier Robots were not being used but now Covid-19 since last 3-4 months connecting through Online Mode, Video Meetings, Computer Science/Electronics, conducting Seminars etc. an opportunity to connect with resource people. He also remembered an experience at Avadh University Faizabad wherein on the occasion of Annual function of IET, one of the Robots offered Garland, Flowers, Bouquet etc. He also welcomed the Children attending the Webinar Master Shiv, Master Panshu Goswami & Master Nishit Soni. Mr. Vyas also talked about the coming Annual Convention in February 2021 and expressed his confidence in the Regional Vice President Region-1 Sri Arvind Sharma and other Organizing Members for the event.

Sri Vinay Kumar Johri, Hon. Secretary CSI Lucknow Chapter introduced Mr. Milind Raj, the invited Speaker to the participants & other dignitaries sharing some facts about Mr. Raj. Milind Raj is a young passionate Creator of World class Robots and made extremely significant contribution to the walks of Life in India and abroad. Milind is a technology master mind of Automated Robotics, Artificial Intelligence, Flying Robots, Humanoids, Defence Robots, Agriculture Robots, Underwater Robots. Milind created Anti-Corona Drone to fight this pandemic while making India as second Nation in the World to come up with this unique Technology. On 23 December 2014, Milind's world class flying robotics innovation was launched, appreciated and awarded by 11th President of India, His Excellency Dr. A.P.J. Abdul Kalam. The Missile Man of India granted Mr. Milind the Title of "Drone Man of India". He is a popular mentor to Children. Children from all walks of Life come to gain knowledge about Science and Technology in Milind's innovative state-of-the-art Robotics Club. Education to underprivileged Children is 100% free of cost. He invited Mr. Milind for his expert address to all the present in the Webinar.

Mr. Milind Raj from his Robotics Tech Club, one of the premier Clubs, which is 100% disinfected using ultraviolet radiations, started his speech by explaining how things have really changed after

Contd. on pg. 61

Webinars of CSI Patna Chapter



Report by Prof. Nilesh Narayan, Chairman, CSI Patna Chapter

Webinar on Smart Computing & IoT

COMPUTER SOCIETY OF INDIA, PATNA CHAPTER ORGANIZES ONE DAY INTERNATIONAL WEBINAR ON "SMART COMPUTING & IOT"

HOSTED BY INDIAN INSTITUTE OF BUSINESS MANAGEMENT, PATNA

WEBINAR CHAIR: Prof. A. K. Nayak, Ex-Asst. Prof. President and Chairman of Academic & Research Committee, CSI.

INAUGURATION: Prof. J. S. P. Rai, Vice Chancellor, Indian Institute of Management Raipur.

PRESIDENTIAL ADDRESS: Mr. R. K. Vyas, PRESIDENT, Computer Society of India.

GUEST OF HONOR: Prof. A. K. Saini, Vice-President, Computer Society of India.

KEY NOTE SPEAKER: Prof. Dharm Singh Jat, Professor of Computer Science, Professor Dept. of Comp. Engg. & Tech., Nambia University of Science & Tech.

INVITED SPEAKER: Dr. J. K. Mandal, Professor Dept. of Comp. Engg. & Tech., Kalyani Govt. Coll., WB.

MEMBER OF INDUSTRY EXPERT: Mr. Rohit Singh, Advisor Project Manager, DPL Technologies, Bangalore.

R.V.P.: Prof. Shams Raza, Regional Vice President, Region-II, CSI.

REGISTRATION LINK: <https://tinyurl.com/25bfywebinar>

ORGANIZERS: Prof. Ganesh Panday, Dr. Rohit Kumar, Prof. Nilesh Narayan Patna, Chairman, CSI, Patna Chapter.

DATE & TIME: 08 August 2020 12:00 noon.

Platform: Zoom, YouTube, Facebook.

An International Webinar on Smart Computing & IoT was organised by Indian Institute of Business Management, Patna in collaboration of Computer Society of India on 8th august 2020. The webinar was inaugurated by Prof. J.S.P. Rai, Vice Chancellor of

Jaypee University, Guna, Madhya Pradesh. Prof Rai in his inaugural address discussed about the importance of various aspects of smart computing & its applications in industry, business & other related sectors.

In his opening address Prof. A. K. Nayak, Chairman of the Webinar and Immd. Past President of Computer Society of India introduced the theme of the Webinar and highlighted the growing impact of Smart Computing and Internet of Things in different sectors in general and industry and business in particular. The development of this technology has led to industry 4.0 which is transforming the industries and business to smart industry and smart business.

Prof. Dharm Singh Jat, Professor of Nambia University of Science & Technology and Dr. J. K. Mandal, Professor Dept. of Computer Science and Technology, Kalyani University delivered the keynote address where as Prof. A. K. Saini, Vice President, CSI was Guest of Honor. The function was presided Mr. R. K. Vyas, President of Computer Society of India and Prof. Shams Raza, Regional Vice President, Region-II, CSI delivered the concluding remarks and vote of thanks. The convenor of the Webinar Prof. Ganesh Panday, Dy. Director, IIBM has coordinated the event where as Prof. Rohit Kumar, Asst. Professor, IIBM, Patna has hosted the webinar.

Webinar on Opportunity and Challenges in Digital Payments

INDIAN INSTITUTE OF BUSINESS MANAGEMENT, PATNA ORGANIZES ONE DAY INTERNATIONAL WEBINAR ON "Opportunities & Challenges in Digital Payments"

WITH JOINT COLLABORATION OF COMPUTER SOCIETY OF INDIA, PATNA CHAPTER

WEBINAR CHAIR: Prof. A. K. Nayak, Ex-Asst. Prof. President and Chairman of Academic & Research Committee, CSI.

CHIEF GUEST: Prof. Bharat Bhaskar, Director, Indian Institute of Management Raipur.

PRESIDING OVER: Prof. M. N. Hoda, Director, Bharti Vidyapeeth Inst. of Comp. Applications & Mgmt., New Delhi.

GUEST OF HONOR: Dr. G. S. Rathore, Head & Former Dean, Dept. of Economics & Finance, Amritsar College, Amritsar.

KEY NOTE ADDRESS: Prof. Subrat Sarangi, Professor, Mudra Institute of Communication MCA, Ahmedabad.

INVITED ADDRESS: Prof. Bhagwan Singh, Professor Dept. of Mgmt Studies & Finance Officer (I/C), Central Inst. of English & Foreign Languages, Hyderabad.

INVITED ADDRESS: Dr. Suman Pandey, Post Doctoral Fellow, Pohang Univ. of Sci. & Tech., Korea National Univ. Korea.

R.V.P.: Prof. Shams Raza, Regional Vice President, Region-II, CSI.

REGISTRATION LINK: <https://tinyurl.com/16auqewb>

ORGANIZERS: Prof. Ganesh Panday, Dr. Rohit Kumar, Prof. Nilesh Narayan Patna, Chairman, CSI, Patna Chapter.

DATE & TIME: 16 August 2020 12:15 PM.

One International Webinar on Opportunity and Challenges in Digital Payments was organised by Indian Institute of Business Management, Patna in collaboration of Computer Society of India on 16th august 2020. The webinar was inaugurated by the Chief Guest, Prof. Bharat Bhaskar, Director, Indian Institute of Management (IIM) Raipur and Dr. G. S. Rathore, Head & Former Dean, Dept. of

Commerce, UP, Autonomous College, Varanasi participated as the Guest of the Honor. In his inaugural address Dr. Bhaskar has pointed out the exponential growth of online payments has brought many opportunities for enhancing the productivity and efficiencies of the organisation in spite of several number of Global Challanges due to the security, privacy and authenticities. In his opening remark, the chairman of the Webinar, Prof. A. K. Nayak explained about the optimal utilisation of Online and Digital transactions to overcome many of the crises, caused due to COVID-19.

Prof. Subrat Sarangi, Professor, Mudra Institute of Communication MCA, Ahmedabad has delivered the keynote address whereas Prof. Bhagwan Singh, Professor, Dept. of Mgmt Studies & Finance Officer (I/C) and Dr. Suman Pandey, Post Doctoral Fellow, Pohang Univ. of Science & Technology, Kanwon National Univ. Korea participated as invited speaker.

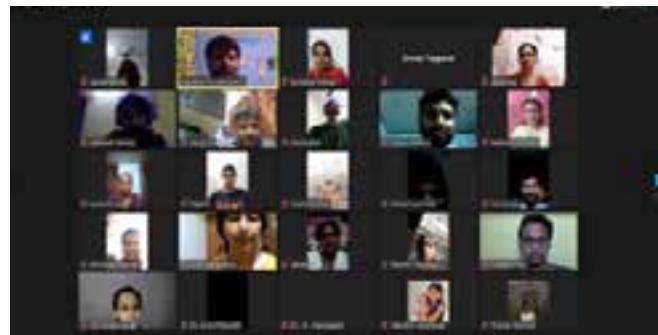
The Webinar was presided by Prof. M. N. Hoda, Director Bharti Vidyapeeth Inst. of Comp. Applications & Mgmt., New Delhi and the concluding remark along with vote of thanks was presented by Prof. Shams Raza, Regional Vice President, Region-II, CSI. The convenor of the Webinar Prof. Ganesh Panday, Dy. Director, IIBM has coordinated the event where as Prof. Rohit Kumar, Asst. Professor, IIBM, Patna and Gopal Krishna, Bihar State Student Coordinator, CSI has hosted the webinar.



Online Workshop on

“Data Analysis & Visualization Using Pandas, Seaborn and Plotly in Python”

Report by: **Mr. Jitendra Singh Kushwah**, Assistant Professor, ITM Group of Institutions Gwalior



ONLINE WORKSHOP ON
**DATA ANALYSIS & VISUALIZATION USING PANDAS,
PLOTLY & SEABORN IN PYTHON**
16-18 July, 2020 | 7-9 PM

TOPICS TO BE COVERED IN THE WORKSHOP

- Basics of Python
- Concept of Data Frame & its applications
- Data Analysis using Pandas
- Data Visualization using Matplotlib, Seaborn, Plotly

REGISTRATION FEE
Rs. 1000 per participant (including Study materials)

WORKS OF PAST WORKSHOPS
Mr. Jayant Bhide, Regional VP, CSI Gwalior Chapter
Mr. Rakesh Khetan, Member, IE Gwalior Chapter

LAST DATE OF REGISTRATION: 15th JULY, 2020

CONTACTS: 9895... JAYANT BHIDE, REGIONAL VP, CSI GWALIOR CHAPTER
+91-9429143131, WORKSHOP@CSI-GWALIOR.GMAIL.COM

www.csigwalior.org

Three days workshop was conducted on “Data Analysis & Visualization Using Pandas, Seaborn and Plotly in Python” on 16th – 18th July, 2020 in association with ITM Group of Institutions Gwalior, The Institute of Engineers (India) organized by CSI Gwalior Chapter, Gwalior(MP).

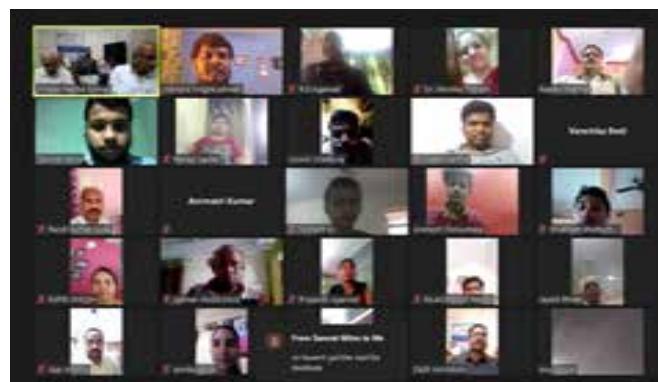
In Inaugural function, Mr. Jitendra Singh Kushwah, Assistant Professor, ITM Group of Institutions Gwalior, Mr. Jayant Bhide, Regional VP, Region-3 CSI, Mr. Dilip Hayaran, Chairman, CSI Gwalior Chapter, Mr. Rakesh Khetan, Member, IE Gwalior Chapter, Dr. Rajendra Singh, Reformer & Socialist and Dr. Rishi Soni, HOD, Deptt of CSE, ITM-GOI Gwalior and Expert Mr. Jitendra Singh Kuswha were present. Vote of thanks given by Mr. Dilip Hayaran. He thanked the dignitaries, Academicians, Industry Professionals, Students and the members of CSI Gwalior Chapter for the support to make the entire workshop a grand success. At the end of the valedictory function, Mr. Jitendra share his view about three days workshop. He said that participants response was really over whelming in spite of being a COVID-19 and they were participated in all the activity very interestingly. In this session, participants also share their view about the workshop and expert.

Notebook. Third day, Mr. Jitendra elaborate Data Visualization & Its usability in data analysis using Matplotlib, Seaborn and Plotly libraries. In these days, Mr. Jitendra taught analysis of dataset, visualizes the data after analysis using Python editor Jupyter. all the sessions were hands-on. Students were enjoy all the sessions and ask many questions. Mr. Jitendra covered theoretical and practical sessions of all the topics successfully online using ZOOM app.

Feedback:

At the end of the day, Online Feedback form fill by the participants. According to feedback form, students strongly appreciated to Mr. Jitendra Singh Kushwah. His presentation skill, knowledge, problem solving method etc. was excellent. Participants also interested to conduct this type of workshop again by Mr. Jitendra.

In valedictory function, Mr. Jayant Bhide Regional VP, Region-3 CSI, Mr. Dilip Hayaran Chairman, CSI Gwalior Chapter, Dr. Rajendra Singh, Reformer & Socialist and Dr. Rishi Soni, HOD, Deptt of CSE, ITM-GOI Gwalior and Expert Mr. Jitendra Singh Kuswha were present. Vote of thanks given by Mr. Dilip Hayaran. He thanked the dignitaries, Academicians, Industry Professionals, Students and the members of CSI Gwalior Chapter for the support to make the entire workshop a grand success. At the end of the valedictory function, Mr. Jitendra share his view about three days workshop. He said that participants response was really over whelming in spite of being a COVID-19 and they were participated in all the activity very interestingly. In this session, participants also share their view about the workshop and expert.





Allahabad Chapter Webinar Series

Report by: Prof. Ratnesh Mishra, Chairman, CSI, Pragraj Chapter, U.P., India

Webinar Series-18

CSI Allahabad Chapter organised a Webinar Series 18, hosted by Prof. Ratnesh Mishra (Chairman, CSI Allahabad Chapter) and Prof. Narendra Gupta (Secretary, CSI Allahabad Chapter), welcome to all participants and speaker by Prof. Ratnesh Mishra (Chairman, CSI Allahabad Chapter). The topic of this program was "Digitalisation-Information Technology Opportunity Unleashed" by Mr. Malay Majumdar, President, Obeetee, Delhi. He has discussed about the Digitalisation - Information Technology Opportunity Unleashed many a time loose parlance creates confusion. Let us try to look back – Why: Because we're talking about different things but calling them the same. Some have begun labelling digitalization as digital transformation. In this discussion, let us clarify the terminology. Digitization refers to creating a digital representation of physical objects or attributes. Below are few examples; scanning a photograph to create a digital file, Converting a paper report to a digital file, such as a PDF recording a presentation or phone call, turning physical sound into a digital file. Digitalization is "the use of digital technologies to change a business model and provide new revenue and value-producing opportunities; it is the process of moving to a digital business. Digital transformation is the integration of digital technology into all areas of a business, fundamentally changing how you operate and deliver value to customers. Below few examples of digital transformation in Business by Big Companies/Brands; Reliance Jio, Walmart, Target, Domino's. Digitalisation can facilitate: Health Service – PM Announces National Digital Health Mission, E- governance, Educational, Online Shop, E-Ticket. Digital India: Technology to transform a connected nation; Indian consumer have strongly embraced digital technologies. Now India's company must follow suit. With more than half a billion internet subscribers, India is one of the largest and fastest – growing market for digital consumers. However adoption is uneven among business. Rapid spread of digital technologies and their potential value to the Indian economy by 2025, if Government and private sector work together to create new digital ecosystem. Building digital ecosystems that connect, automate, and analyze. Digital agriculture, Digital. Start the question session, this session hosted by Mr. Vijay Pandey and participated by Mr. Suraj and Dr. R.S Pandey. Conclude the program and votes of thanks by Mr. D. K. Dwivedi Programme attended by Prof. Ratnesh Dixit, Prof. K. K. Bhutani, Dr. Dushyant Singh, Mr. Rajkumar, Prof. Sheel Shalini, Mr. Vishal, , Dr. Sashank Srivastava, Dr. Tarun Sharma, Mr. Padamnabh Tripathi, Mr. Sanjay, Mr. K. K. Pandey, Mr. Sanjeev Ranjan, Ms. Akansha, Ms. Nancy. Ms. Shipara, Mr. Rajesh Kumar Nirla.



Webinar Series-17

CSI Allahabad Chapter organised a Webinar Series 17, hosted by Prof. Ratnesh Mishra (Chairman, CSI Allahabad Chapter) and Prof. Narendra Gupta (Secretary, CSI Allahabad Chapter), Welcome to all

participants and speaker by Prof. Ratnesh Mishra (Chairman, CSI Allahabad Chapter). The topic of this program was "Advancement in Computer Vision" By Dr. Rajitha B Assistant Professor, CSED, MNNIT Allahabad. She has discussed about the Advancement in Computer Vision the digital image is a presentation of a two dimensional images as a finite a set of digital values called picture elements or pixels. Pixels values typically represent gray levels, colours, Heights. Digitalization implies that a digital image is an approximation of a real scene. A digital image is composed of a finite number of elements called pixels, each of which has a particular location and value. In 8-bit representation Pixel intensity values change between 0 (Black) and 255 (White). Pixel Resolution: is often considered equivalent to pixel count in digital imaging. In pixel resolution, the term resolution refers to the total number of count of pixels in a digital image. For example. If an image has M rows and N columns, then its resolution can be defined as M X N. we have an image of dimension: 2500 X 3192. Its pixel resolution = $2500 * 3192 = 7982350$ bytes. Dividing it by 1 million = $7.9 = 8$ mega pixel (approximately). Aspect ratio is the ratio between width of an image and the height of an image. Vision is the process of discovering what is present in the world and where it is by looking. Computer Vision is the study of analysis of pictures and videos in order to achieve results similar to those as by people. In 1966, Marvin Minsky at MIT asked his undergraduate student Gerald Jay Sussman to "spend the summer linking a camera to a computer and getting the computer to describe what it saw". We now know that the problem is slightly more difficult than that. (Szeliski 2009, Computer Vision). Current Research Applications-Optical character recognition (OCR), Face detection, Smile detection, Object recognition (in supermarkets), Vision-based biometrics, Login without a password, Object recognition (in mobile phones), Special effects: shape capture, Special effects: motion capture, Smart cars, Google cars, Vision-based interaction, Interactive Games: Kinect, Vision in space, Industrial robots. Then start the question session, in this session participated by Mr. Vijay Pandey, Mr. Suraj and Dr. R. S. Pandey. Conclude the program and votes of thanks by Dr. G. P. Sahu (Past Chairman, CSI Allahabad Chapter). Mr. D. K. Dwivedi Programme attended by Prof. Ratnesh Dixit, Prof. K. K. Bhutani, Dr. Vijay Agarwal, Mr. Rajkumar, Prof. Sheel Shalini, Mr. Vishal, Dr. S. Kanungo.

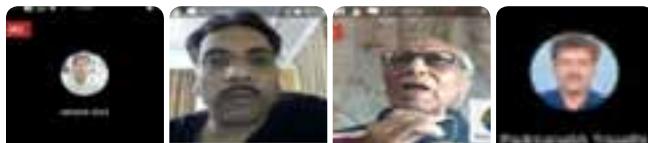


Webinar Series-16

Prof. A. K. Nayak (Immd. Past President, CSI) has given good wishes and said CSI Allahabad Chapter is energetic chapter for this webinar series. In this webinar series, topic was "Wisdom Machine" which was given by Prof. K. K. Bhutani Director UPTEC, he told about the machine and also how the machine and Wisdom are related to each other. First he told about the machine in detail, when and how the machine was invented, then about data information and Wisdom,



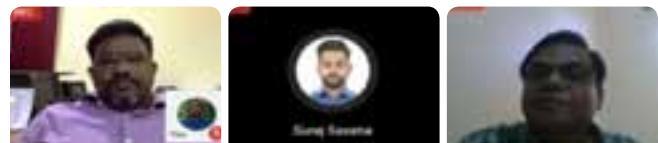
Professor Bhutani specifically discussed how data processing takes place in a computer and He told about the relation between knowledge, intelligent and wisdom, in this context, he should also tell a short story about one of his students who settled in America and had a problem there and to solve that problem. So he called his Baba in India and the problem which the big scholars of America which could not be solved for several weeks, the same problem was solved by the old Baba sitting in the village in 3 days. He told that for Wisdom, it is very important to have information, intelligent, as well as experience. Wisdom does not come in a day Wisdom needs time. He further said that with the help of the True Wisdom Machine, we can imagine a Happy Society, then the question session was started. In this session Vijay Pandey, Shilpi Khare, Shivam Bhardwaj, Vijay Dwivedi, Anjani Awasthi participated. PTEC Center Manager Ratnesh Dixit, Ravi Prakash ji , AK Prasad, Shishur Verma, Prof. Shail Shalini, Mr. Vishal, Mr. K. K. Pandey, Mr. Suraj, Mr. Manishji Mr. Akanksha etc.



Webinar Series-15

CSI Allahabad Chapter organised a Webinar Series 15, hosted by Prof. Ratnesh Mishra (Chairman, CSI Allahabad Chapter) and Prof. Narendra Gupta (Secretary, CSI Allahabad Chapter). Welcome to all participant and speaker by Prof. Ratnesh Mishra (Past Chairman, CSI Allahabad Chapter). The topic of this program was "Research Issues and Technologies for Internet of Things (IoT)" By Dr. Vijay Kumar

Chaurasiya, Associate Professor, IIIT Allahabad. He has discussed about the Internet of Things (IoT) that is the network of physical devices, vehicles, home appliances and other items embedded with electronics, software, sensors, actuators, and connectivity which enables these objects to connect and exchange data. The objects are able to interoperate within the existing Internet infrastructure through its embedded computing and communication system. Internet of Things (Current Status of Deployments) - Less than 1% of things around us are connected. For example Refrigerator, car, washing machine, heater, a/c, garage door, should all be connected but are not. It is expected that the demand will increase from 10 Billion devices today to 50 Billion devices by 2020 which will include processes, data, things, and people. it is expected that funds to a tune of \$14 Trillion will flow towards IoT Deployments over next 10 years. IoT is also referred as Internet of Everything by Cisco and Smarter Planet by IBM. Mutual authentication and node identification: Each application has a different set of users which require various degrees of access privileges. Thus, to prevent any illegal access effective authentication schemes should be applied. Data Management: Due huge data collections, the system complexity increases which require a lot of resources and complex algorithms to manage data and may also result in data loss. Big data and cloud applications provide various tools for processing and managing the data collected by IoT sensors.



| REPORT |

National Webinar on Therapeutic Goals of COVID-19

Report by: **Dr. Aniruddha Nag**, Chairman, CSI Kolkata Chapter, TREASURER, IETE, Sr. Member CSI, IETE, ISOC, ISC, FOSET, Fellow IARA

National Webinar on Therapeutic Goals of COVID-19 was held on August 31, 2020. The program was jointly organized by Computer Society of India, Kolkata chapter and The Institute of Electronics and Telecommunication Engineers, Kolkata Center. It lasted for more than 2 hours. More than 80 participants were attended the Webinar including CSI members, IETE members, some doctors, social workers and local people .

This webinar inaugurated by jointly Prof. Ramkrishna Vyas, President of CSI, and Prof. (Dr.) J W Bakal, PRESIDENT, IETE and many dignitaries including Prof. (Dr.) A P Thakare, Chairman (TPPC)&Co-Chairman (AC), IETE, Mr. Ajay Kumar, Zonal Mentor and GC Member, IETE, HQ addressed the august gatherings. Dr. Aniruddha Nag, Chairman of CSIKC, conducted the whole Webinar with Prof. (Dr.) J. K. Mondal, Chairman of IETE, Kolkata.

Mr. Pulak Pal, social activist, Dr. Sayantan Chakraborty, eminent doctor, Mr. Bidyut Kumar Banerjee, renowned psychologist and Dr. Sekhar Ranjan Pal, eminent physician, shared their experience during COVID-19 time. Question and answer session was conducted jointly by Dr. Aniruddha Nag and Dr. J. K. Mondal.

Dr. J. W. Bakal, IETE President announced that 10% discount will be given to the new members if he or she is a life member of CSI.

At the end of the programme, vote of thanks was jointly given by Prof. J. K. Mondal, Prof. R. K. Vyas and Dr. Aniruddha Nag.

Dr. Aniruddha Nag also distributed e-certificates to Mr. Pulak Pal, social activist, Dr. Sayantan Chakraborty, eminent doctor, Mr. Bidyut Kumar Banerjee, renowned psychologist and Dr. Sekhar Ranjan Pal, an eminent physician.

CHAPTERS REPORT

BANGALORE CHAPTER

Reported by **Ms. Manjula G**, Hon. Secretary, CSI Bangalore Chapter



CSI Bangalore Chapter has organized a Two day Workshop on Fundamentals of Deep Learning with TensorFlow / Keras Framework on 24th and 25th July 2020. The speaker of the event was Dr. H Sarojadevi H, Professor, Dept of CS&E, Nitte Meenakshi Institute of Technology, Bangalore. Dr. Nalini N, Chairperson, CSI Bangalore Chapter welcomed the participants and gave a brief about CSI. Prof Prasad Babu, RVP-V, CSI has given Keynote address. The workshop focuses on the concepts of Deep learning, its components, characteristics, different architectures, applications with examples. The programming part of the deep learning will also be illustrated with TensorFlow / Keras framework. The workshop has provided useful information, knowledge and expertise for students, academicians and industry professionals. The participants were enabled to develop typical applications of deep learning.



CSI Bangalore Chapter has organized a Online workshop on Covid-19 Disrupted Classes-Undisrupted Learning. Total number of participants 80

Speakers at the Event:

- Prof. Iqbal Ahmed: Director Training and Collaborations, Acharya Institute, Bangalore & Past Chairman, CSI-BC (event Organiser)
- Mr. Manish Kumar, Director-Engineering Solutions, NXP Semiconductors.
- Mr. Venkata Simhadri: CEO & Managing Director, MosChip Semiconductor Technology Ltd., Member Executive Council and Chair Hyderabad Chapter at India Electronics & Semiconductor Association (IESA)

- Dr. Nalini N, Chairperson, CSI welcomed the participants and gave a brief about CSI. Mr. Venkata Simhadri gave a brief about the activities of India Electronics & Semiconductor Association (IESA)

Topics covered by the speakers (Insight provided on the following topics):

- Indian Higher Education – Challenges and Brand Building (this article by the speaker was published in EPSI, released by AICTE Chairman during 2019)
- Disruption of Education: Is Covid-19 disruption of Education, a boon or bane
- New Approaches to the construction of Knowledge Building: Digital Technology in Education. Challenges posed to students and Faculty in online education
- Automotive Industry
- Semi-Conductor industry
- Challenges posed by Services & Product Industry due to Covid-19. Skill set required by students for placement& Current Industry scenario.

CHENNAI CHAPTER

Reported by **Dr. A Prema Kirubakaran**, Hon. Secretary, CSI Chennai Chapter

The CSI Chennai Chapter organised the following webinar events jointly with ACM Chennai and IEEE CS Madras during 13th July – 4th August 2020.

- CDAC Mumbai, IEEE CS Madras, ACM Chennai & CSI Chennai conducted a 5 days Workshop on "eLearning Content Creation" from 13th July to 17th July from 4 p.m. to 6 p.m.

This workshop focussed on Content creation for online teaching and learning. This workshop provided an overview of different types of content such as presentations, audio video, screencasts, mindmaps/concept maps and interactive videos that can be created along with actual content using various open source software with hands-on demos and assignments.

Link to the workshop details at <https://bit.ly/2Z2CeYO>

- Webinar on "Demystifying AR, VR and MR" by Dr. PK Mishra, CTO, Adapro Consulting on 18th Jul from 6 p.m. to 7 p.m.

This webinar dealt in detail AR, VR and MR which are having significant impact on entertainment, education, and business with a few case studies.

Link to the presentation slides:

<https://bit.ly/3IguaOv>

Video link:<https://bit.ly/34sHgIC>

(Duration: 1 hour 28 minutes. File size: 259 MB)

- Webinar on "Robotic Process Automation" by Mr. S Krishna Raju, Manager, Business Development, Automation anywhere and Mr. Arjun S Meda, Sr. Developer, Evangelist, Automation Anywhere on 20th July from 11 a.m. to 12.30 p.m.

The webinar coverage included: Demystifying RPA and its Use cases, RPA for Digital Transformation, Leveraging RPA for faculty and students, Defining the RPA journey with Automation Anywhere and Opportunities in the world of Intelligent automation.

CHAPTERS REPORT

Video Link: <https://bit.ly/2OHwC1t>

(Duration: 1 hour 30 minutes. File size: 327 MB)

4. Webinar on "Using ML and Data Science to Combat Covid-19" by Dr. Vijayalakshmi Saravanan, ACM Distinguished Speaker, Adjunct Faculty, Dept. of Software Engineering, Rochester Institute of Technology, USA on 25th July from 6.30 p.m. to 7.30 p.m.

The webinar emphasized the importance of AI and Data Science techniques and highlighted how they help to fight the COVID-19 pandemic and also dealt with possible solutions.

Link to the presentation slides: <https://bit.ly/3f4SMoN>

Video Link: <https://bit.ly/30NR5qY>

(Duration 1 hour 13 minutes. File size: 379 MB)

5. Webinar on "Social Entrepreneurship in Rural Education Using Affordable Technology and Crowd sourcing Mode" by Mr. Prem Kumar Gokuladasan, Founder and Managing Trustee, BumbleB Trust (NGO) on 1st August from 6 p.m. to 7 p.m.

The webinar focussed on understanding the need for education in the government school students in the rural areas and designing a technology-based solution and adopting different methods of operation to achieve best results.

Link to the presentation slides: <https://bit.ly/3fo04me>

Video link: <https://bit.ly/33xzRRN>

(Duration 1 hour 29 minutes. File size: 379MB)

6. Webinar on "Graphic Design Using Canva" by Mr. M A Vignesh, Chairperson, IEEE SB Jeppiaar Engineering College & Student Ambassador, IEEE Xtreme 14.0 on 4th August from 6 p.m. to 7 p.m.

In this webinar, the speaker discussed the rules and guidelines that are being followed by graphic designers, various designing software along with its features and usage, how to download, install and start working. The speaker also demonstrated a freeware tool, Canva for designing various documents.

Video link: <https://bit.ly/30vmFe3>

(Duration 1 hour 22 minutes. File size: 287 MB)

While Mr. P V Subramanian, Chair, CSI Chennai Chapter welcomed the participants and introduced the speakers in the above events, Mr. H R Mohan, Past President, CSI and Chair, ACM Chennai moderated the Q&A and presented concluding remarks.

These webinars were well attended, and the participants felt the events were timely, interactive, and found the content relevant, interesting, useful.

COIMBATORE CHAPTER

Reported by Mr. N. Duraiswamy, Hon. Secretary, CSI Coimbatore Chapter

The CSI Students Webinar Series on "REST API – Why, What and How" organized by CSI Coimbatore Chapter on 24th June 2020. Dr. G. Radhamani, Chairperson, CSI Coimbatore Chapter welcomed all the participants. Dr. Somasundram, MC Member introduced the Student Speakers.

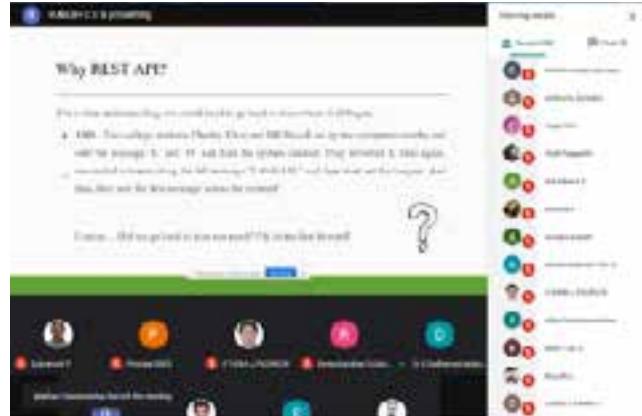
Mr. Rubesh described REST APIs by elaborating on three main

questions, WHY WHAT and HOW. Exploring these three questions in detail will result in a better understanding of the definition and functioning of REST APIs and will aid in starting a REST API development from scratch.



"WHY REST API" section shed light on the history of the commercial internet and how it became a mainstream medium and the transformations it faced which resulted in an architecture which we are using today. Thus, answering the question, WHY was REST API needed.

"WHAT is REST API" section defined and explained the concepts of REST and explained the REST as a style and not a standard for designing API and the advantages of the REST design. It explained how HTTP verbs are used to communicate. "HOW REST API" section demonstrated how to build a REST API from scratch using ASP.NET CORE framework. A classic to-do application was designed to get, post, update, delete a to-do. The endpoints were designed based on the entities. The API was then built and executed in the local server.



The webinar concluded by referring GraphQL, which is considered to be the next big technology that will dethrone REST APIs.

Artificial Intelligence and IBM Watson

Mr. B Jeevanandan addressed on Artificial Intelligence. It describes the basic functionality of AI, shows what are all the concepts, required to develop a good model. The good model is determined by its accuracy in output. The accuracy of the function can be increased by training model with better dataset under required algorithms.

The use of Auto-AI in Watson machine learning provides the high-performance algorithms for the given function so that the model can be deployed with higher accuracy rate. The usage of IBM Watson provides better learning experience to beginners and at the same time it is a powerful model. The usage of Artificial intelligence is increased day by day. Almost 80% of the industries are working with

CHAPTERS REPORT

AI and machine learning to improve their product. The scope of AI and Machine learning has been wider. This webinar shows how we can work with IBM Watson and deploy machine learning concepts. Some basic concepts like what is neural networks and how it predict data are also discussed. The session was an eye opener to the researchers and the students. Mr. N Duraiswamy, Hon Secretary, CSI Coimbatore Chapter proposed vote of thanks.

The webinar on "A practical model for Threat hunting and Threat investigation" by CSI Coimbatore Chapter was held on 16th of July 2020 with overwhelming registrations. The speaker was Mr. Shyam Sundar Ramaswami, Lead threat Researcher Asia Pacific, CISCO on the topic "A practical model for Threat hunting and Threat investigation.

The chairperson of CSI Coimbatore Chapter, Dr. G. Radhamani welcomed all the participants and introduced the Keynote Speaker. The purpose of the webinar is to bring together scholars from a variety of places across the globe to promote discussion on techniques to fight against threats, share threat investigation and attacks.

The speaker discussed on how to prevent threats from entering the organization's network components, such as antivirus, and firewalls. Today, many cyber-attacks cannot be detected solely with automated solutions, so more companies are using threat hunters to track and hunt APTs (Advanced Persistent Threats). Mr. Shyam also discussed about Ransom ware, spyware malware, bots and worms.



The discussion revealed the best way to check for spyware in the computer with anti-malware software. The anti-malware software deep scans the hard drive to detect and remove any threat lurking in the computer. He also discussed on threat hunting and investigations research in the developing world. The attendees raised the queries related to various threats. The session was an eye opener to the researchers and the students. Mr. N Duraiswamy, Hon Secretary, CSI Coimbatore Chapter proposed vote of thanks.

KANCHEEPURAM CHAPTER

Reported by Dr. M Senthil Kumar, Hon. Secretary, CSI Kancheepuram Chapter

The Five days Online Short Term Training Program on "Machine Learning" was organized by Computer Society of India, Kancheepuram Chapter in association with Department of Information Technology, St. Joseph's Institute of Technology from 27th to 31st July 2020. I would like to thank Dr. B Babu Manoharan, Chairman, Mrs. B Jessie Priya, Managing Director and Mr. B. Shashi Sekar, Director of St. Joseph's Group of Institutions and Dr. P. Ravichandran, Principal, St. Joseph's Institute of Technology for granting permission to conduct

this programme. The Chief Guest of the event was Dr. Rajeswari Mukesh, Chairman CSI Kancheepuram chapter.



The Welcome Address was given by Dr. L. Javid Ali, Associate Professor, Department of Information Technology, St. Joseph's Institute of Technology, welcomed all participants from various colleges. Dr. S. Kalarani, Professor and Head of Staff & Student Affairs, Department of Information Technology, St. Joseph's Institute of Technology shared her views on organizing this STTP. The Chief Guest welcome address was given by Ms S Anslam Sibi, Assistant Professor, Department of Information Technology, St. Joseph's Institute of Technology.

The first day session on 27th July 2020 was started by Dr. P. Ranjana, Professor, Department of Computer Science and Engineering, Hindustan Institute of Technology and Science gave the introductory talk on Machine Learning Algorithm for Computational Problem Solving. She shared her knowledge about machine learning concepts and insights about Reinforcement Learning.

The Second and Third day session on 28th & 29th July was handled by Dr. N. Priya, Associate Professor, PG Department of Computer Science, SDNB Vaishnav College for Women. In the Second session, she gave insight knowledge about Machine Learning and Deep Learning.

The Fourth and fifth day session was handled by Mr. Prakash Kumar Babu, Technology Analyst, Data and Analytics Unit Infosys Limited. The fourth day session was about relationship between Big data and Machine Learning. He shared how to develop Hadoop and map reduces in Google cloud platform. Fifth day session was about Machine learning algorithm implementation in Google Cloud Platform and how to select the algorithm for a given dataset and train the machine. The Vote of Thanks was given by Dr. S Nikkath Bushra, Associate Professor, department of Information Technology, St Joseph's Institute of Technology, thanked the management and all participants from various colleges. The event was organized under the guidance of Dr. Rajeswari Mukesh, Chairman, Kancheepuram chapter and coordinated by Dr. M Senthil Kumar, Hon. Secretary, CSI

CHAPTERS REPORT

Kancheepuram Chapter.



An International Webinar on Network Security organized by the Computer Society of India, Kancheepuram chapter on 14th August 2020. The theme of the webinar was to discuss the Network Security issues and recent techniques in cyber security. Dr. Rajeswari Mukesh, Chairman, CSI Kancheepuram Chapter welcomed the Guest speakers, Special invitees like Dr. B. Chidhambararajan, Chairperson Division-IV (Communication), CSI. Prof A. K. Nayak, Immediate Past President & Chairman Academics and Awards Committee, Dr. M. Sundaresan, Regional Vice President, Region-VII and the participants from various Institutions. Dr. B. Chidhambararajan felicitated the guest speakers, Special invitees and the participants. Prof. A. K. Nayak delivered the Inaugural address with his warm speech. The Guest of honor Dr. M. Sundaresan delivered his address and shares his about CSI Kancheepuram Chapter.

In Session one, Prof. Dharm singh Jat, Professor of Computer Science Namibia University of Science and Technology briefly explained the basics of Network security, attacks and algorithms. He primarily emphasized on various attacks of Networks and Cyber. In Session Two, Dr. Dilip Kumar Yadav, Professor and Head, department of Computer Applications, NIT, Jamshedpur clearly explained the email spoofing, Phishing attacks with real time examples.

In the Final session, Dr. Malaya Nayak, Executive Director, IT BUZZ Ltd, London clearly explained the automated packages for prevention

of cyber-attacks and explains how to prevent phishing attacks in the banking transactions. More than 350 participants were registered for this event. All the participants really enjoyed the session and clear their doubts regarding network and cyber security with the key speakers. Finally, Dr. M. Murugan, Vice Chairman, CSI Kancheepuram Chapter proposed the vote of thanks. The event was coordinated by Dr. M Senthil Kumar, Hon Secretary, CSI Kancheepuram Chapter.

TIRUCHIRAPPALLI CHAPTER

Reported by **Mr. D. Senthil Kumar**, Hon. Secretary, CSI Tiruchirappalli Chapter



CSI Tiruchirappalli Chapter organized the Webinar on Introduction to Industry 4.0 on 14th July 2020. Speaker for this event was Dr. P S Kumar, Managing Director, ETAsmart Private Ltd, Webinar commenced with the welcome address by Er R Kumar, Former GM BHEL.

Er. R Selvaraj, Chairman, CSI, Tiruchirappalli Chapter, introduced the speaker. Er D Senthil Kumar, Secretary CSI Tiruchirappalli Chapter proposed Vote of Thanks

VADODARA CHAPTER

Reported by **Mr. Mihir Mehta**, CSI Vadodara Chapter Chairman

CSI Vadodara Chapter organized an Expert Talk on How Business Intelligence can help transform a business on 8 August 2020. The expert Talk was delivered by a Baroda based expert Mr Ajay Joshi who heads ERP Consultants India and is on the Board of Advisors of BIBIRBAL – an organization specializing in offering BI related services.



It was an interesting session as it raised the questions that the business normally faces. Especially today, with the adverse impact of Covid-19, the options available are limited. In the context of the current situation and more so, from the point of view of SME Entrepreneurs, the typical scenarios they come across and how BI can help addressing them quite effectively was explained with the help of relevant scenarios and examples. Since the event was kept

CHAPTERS REPORT

interactive, with questions being raised by the speaker as well by the audience, the interest was maintained right through the session. Mr Joshi offered in-depth understanding of what is Business Intelligence, why and how it can be applied and what benefits we can expect out of BI

The major focus of the presentation was about:

- What are the Business Problems and how they can be solved by formulating business solutions?
- What are the typical problems and scenarios and what are the possible business solution in such scenarios?
- What is Business Intelligence Maturity Model and what are the pre-requisites
- How to go about setting up the right environment and build an effective model upon it
- What constitutes the right Business Intelligence Roadmap and what is the role of IT and Business Domain Experts as BI Champions
- Future of Business Intelligence

It was a fairly comprehensive insight coming from an expert who has worked on the topic at the ground level, provided a fruitful learning experience for those who invested their time to attend and it was certainly worth NOT missing it!

The Chapter organized the an expert talk on Why ERP Implementations

fail? on 22 August 2020. The speaker of the event was Mr. Vijay Venkatesh, MD & CEO Syscon Solutions (P) Ltd, Hyderabad.



Any software project is a non-reversible, capital intensive, long drawn effort aimed to realize specific objectives. More so, if the project involves implementation of an ERP Product. There are enterprise wide stakes involved, efforts from personnel from every corner of the enterprise who invest a lot of their time and efforts on the project. Still, it is not always that the objectives behind ERP implementation actually translate into accrual of anticipated benefits - even in the cases of so called 'successful' implementations.

It was an interesting session wherein Mr Vijay elaborated upon various aspects right from conceptualization of ERP in a company to determination of requirements, evaluation of ERP products and implementation. What are the desirable practices, what are the likely mistakes and what can be the precautionary measures, were detailed with a great depth? It alerted the audience on many pitfalls and how to guard against them. Mr. Vijay has a sound experience of directly supervising 100 plus implementations and the same was evident in the advice and suggestions put across by him. Thanks Mr. Vijay, for an interesting and fruitful session!

Contd. from pg.52

the Pandemic spread in India from the initial months of 2020. He stressed upon setting the right mindset to develop new technologies among Covid. He talked about the Technologies Amid Covid-19 viz How technological solutions are assuring us to go contactless, New developments in Technology, Robots & Humans, Challenges etc. and Post Covid-19, Relationship between Robots and Humans, Why Robotics Technology will be the need of hour, New Normal and Life of Humans with Robots, impact on jobs & career.

Mr. Milind Raj also talked about the Aarogya Setu App, Zero Touch Elevator Technology, Artificial Intelligence to uncover "covered" faces, Drone shipping technology – online orders to be delivered through Drones, Anti-Corona Drone, Humanoid Robots, Drones as an effective solution, Agriculture Robotics etc. He shared that people often ask him whether is Man versus Machines to which he replies that it is Man plus Machines. Robots are widely used in Natural disasters viz. Fire etc., Disinfection & Sanitization, Health Care assistance, Tele working, unmanned vehicles, Drones to help plant seeds, Spy Drone- Garun. He also discussed about the Dark Kitchen concept where robots are used for preparing and serving the food in restaurants.

Mr. Raj also discussed about the Challenges viz. Safety versus privacy, Health or Business first?, cost and time – Covid-19 is a highly contagious disease. We must act swiftly to contain it. Post Covid-19, New normal will be the new buzz word. Govt. To promote I.T. corridors,

remote working (working from home), distance learning etc. where Robotics and Drones are playing a vital role. How Covid-19 will change the Jobs & Career. More tasks & roles will become automated, employee experience will change, there will be boost of Artificial Intelligence & Robotics. We have to be digitally ready. The Covid-19 pandemic has accelerated key technology trends, including digital payments, tele health & robotics. These technologies can help reduce the spread of the Corona Virus while helping businesses stay open. Three New categories of work will evolve viz. Standard jobs, hybrid jobs where combination of technical & soft skills, super jobs involving more complex combination of technical & human skills. Mr. Milind Raj explained the relationship between robots and humans dealing together with Covid-19 in a very expressive way and all the questions put up by the participants were answered to full satisfaction of the participant.

Mr. G.P. Sing, immediate past chairman CSI Lucknow Chapter delivered Vote of thanks to Prof. Nayak, Prof. R.K. Vyas, Sri Arvind Sharma, Chairman, Vice-Chairman, Secretary and Management Committee for conducting regular Webinars through which all are benefitting. He also thanked all the participants from all over the Country. He specially thanked Mr. Milind Raj, the invite speaker for very informative & educative session in which the participants were inquisitively involved.

HIMALAYAN SCHOOL OF SCIENCE & TECHNOLOGY, DEHRADUN (REGION-I)

Reported by Prof. Arpit Goel, SBC, Himalayan School of Science & Technology



Himalayan School of Science & Technology, Dehradun has organized an online activity on Code-A-Thon on 10th August 2020. Committee welcomed the participants and briefed rules and regulations of competition in WhatsApp Group (specifically created for participants). Akash Rawat (B.Tech VII Sem) secured 1st Position, Hrithik Saxena (BCA V Sem) secured 2nd Position and Sudhanshu Singh Payal (BCA V Sem) & Aditya Chhetri (BCA III Sem) both secured 3rd Position. Special thanks to Dr R C Ramola (Dean, HSST) and Mr Bineet Kumar Joshi (COD, CIS Dept.). The work of volunteer Kanhaiya (Diploma CSE) was appreciable.

SUPREME KNOWLEDGE FOUNDATION GROUP OF INSTITUTIONS, HOOGHLY (REGION-II)

Reported by Prof. Aritra Bandyopadhyay, SBC, Supreme Knowledge Foundation Group of Institutions



The Department of Computer Science, SKFGI has successfully organized a webinar series on Surviving the Deep Learning Apocalypse on 31st Jul, 1st Aug, 7th Aug and 8th Aug 2020. The workshop was primarily focused on motivating students about Deep Learning concepts. The webinar series was conducted in Google Meet platform. Number of registered students was 150. The entire webinar

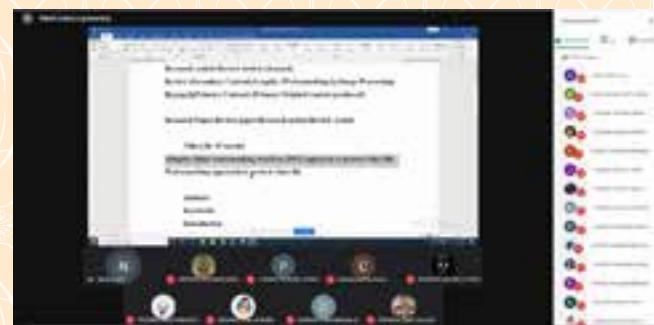
series was a very interactive. Prof Dr Rajib Bag, HOD-CSE welcomed all the participants and introduced the Keynote Speakers. The sessions for the first two days was conducted by Dr Abhijit Das, CVPR unit, ISI, Kolkata and the last two sessions were conducted by Mr Srijan Das, INRIA, STARS team, France.

DEVANG PATEL INST OF ADVANCE TECH AND RESEARCH, ANAND (REGION-III)

Reported by Prof. Priyalba Vaghela, SBC, Devang Patel Institute of Advance Technology and Research



Devang Patel Institute of Advance Technology and Research (DEPSTAR) hosted a webinar on Computer Vision on 1st August 2020. Main aim was to make students aware about computer vision and its applications. The Webinar was structured to cover all the topics and delivered through Zoom platform. There were total 80 participants present in the webinar. Mr Vishal Batvia has explained the concept. Mr Vishal Batvia has fulfilled the aim to provide an ideal opportunity to familiarize students with the concept of computer vision and its fields of application very well.



Devang Patel Institute of Advance Technology and Research (DEPSTAR) hosted a webinar on Guidance of Research Paper Writing in association with CSI Student Branch on 1st August 2020. The main goals were to make students to learn about Research Paper Writing from scratch. The workshop was structured to cover all the topics. The main aim was to make the students to aware about the importance of research paper and how to write a research paper. A total of 39 students have participated in this workshop. The webinar was delivered through Google Meet platforms and students from all semesters of IT, CE and CSE departments attended this webinar.

GYANMANJARI INSTITUTE OF TECHNOLOGY, BHAVNAGAR (REGION-III)

Reported by **Prof Umesh. Lakhtariya**, Gyanmanjari Institute of Technology



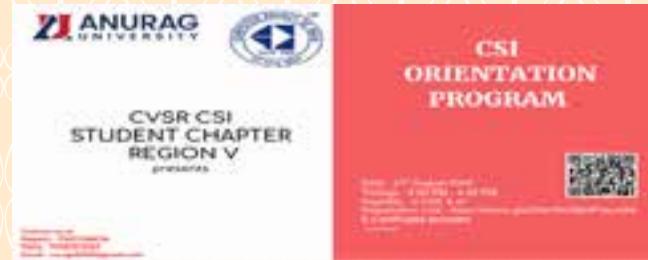
Gyanmanjari Institute of Technology, Bhavnagar has conducted the Workshop on Python on 22nd June 2020. The function was started with the motivational and informative audio-video and presentations on CSI awareness and Python introduction. Workshops were conducted by Mr Jayesh Popat (Senior Developer, iFlame Institute, Ahmedabad) under guidance of Prof Amit G Maru, HOD-Computer Engg. and Prof Chirag S Bhalodia, HOD IT. We are very much impressed with the enthusiasm shown by all participants and also the efforts taken by supporting staff. We are thankful to Dr H M Nimbark, Principal, Gyanmanjari Institute of Technology for the successful conduct of the event. CSI Student Coordinator and HOD of Prof Amit G Maru for taking care of all arrangements. We are thankful to Mr Jayesh Popat and his Supporting Team of iFlame Institute, Ahmedabad.



A One Day Workshop on Basics of Web Designing was organized by Computer Engineering and Information Technology departments of Gyanmanjari Institute of Technology on 5th July 2020. The primary goal of this one day Workshop is to enhance the technical knowledge of students about Web Designing & Photoshop. At the end of workshop, Prof Prashant Viradiya has given very positive and energetic words to all students and encourages them to participate in various kinds of workshops for gaining extra knowledge. He has also discussed about scope of Web Designing in near future.

ANURAG GROUP OF INSTITUTIONS, HYDERABAD (REGION-V)

Reported by **Prof. V Rama Krishna**, Anurag Group of Institutions



Department of CSE Anurag University conducted event on CSI Orientation Program on 21st August 2020. Students are participated from different colleges. The main objective of the event is a discuss about importance of CSI in student's life and explained the benefits of joining in computer society of India.

CHALAPATHI INSTITUTE OF ENGINEERING AND TECHNOLOGY, GUNTUR (REGION-V)

Reported by **Dr. K Kiran Kumar**, Chalapathi Institute of Engineering and Technology

CHALAPATHI INSTITUTE OF ENGINEERING & TECHNOLOGY
 Accredited by NAAC with 'A' Grade, NBA Accredited CSE, ECE, BE & BEE
 Approved by AICTE, Affiliated to APJAU, 2003-2018 Session
One Week National Level Workshop on AI & ML
 Organised by Department of Computer Science & Engineering
 Registration Fee : Free
 Registration Link : <https://forms.gle/P3yVTypGAvXNhPm6>
 Dates : 13-07-2020 to 18-07-2020
 Time : Daily 12 PM to 1:30 PM
 Contact : Dr.K.Kiran Kumar, HOD, CSE / S.Sashagi @ 9032777060

One week National workshop on AI & ML was organized by the department of CSE, Chalapathi Institute of Engineering and Technology, Guntur on 13th July 2020 to 18th July 2020 in Association with CIET CSI Student Branch and Keyway Research. The workshop was inaugurated by the CEO of the college Dr B Raveendra Babu and Principal Dr M Chandrasekhar. The host is Mr Arpit Yadav from Keyway research. Various topics relating AI & ML was discussed. The session was concluded with vote of thanks by Dr K Kiran Kumar Professor & HOD of CSE. About 3828 students & faculty members from more than 1200 colleges across the Nation have participated and acquired good amount of knowledge. Entire programme was coordinated by Dr K Kiran Kumar. We thank all the participants for making this event success.

FROM CSI STUDENT BRANCHES

DR. K V SUBBA REDDY INSTITUTE OF TECHNOLOGY, KURNOOL [REGION-V]

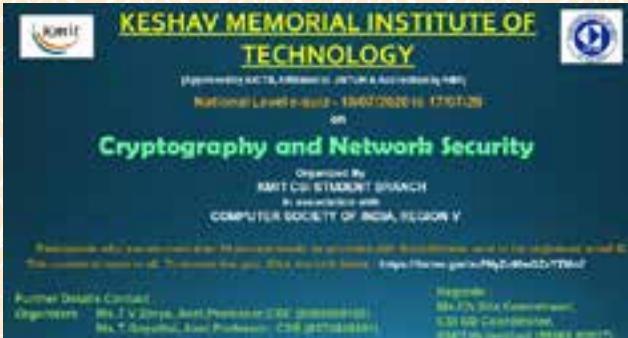
Reported by Prof. Bushra Tahseen, SBC, Dr K V Subba Reddy Institute of Technology



Dr K V Subba Reddy Institute of Technology, Kurnool has conducted a National Level Webinar on Amazon Web Services in Collaboration with Computer Society of India through YouTube platform on 23rd June 2020. Resource person for the Event is Mr B Harish Kumar Reddy, Kurnool. Total 40 students have been participated. During the Technical Talk, various topics covered. At the end of the Event, the students got the expected information and knowledge in various concepts which will eventually fulfil the gaps in the university curriculum.

KESHAV MEMORIAL INSTITUTE OF TECHNOLOGY, HYDERABAD [REGION-V]

Reported by Prof. Chavali Sita Kameswari, SBC, Keshav Memorial Institute of Technology



The National Level e-quiz on Cryptography and Network Security organized by the Keshav Memorial Institute of Technology, Hyderabad during 10th July 2020 to 17th July 2020 in association with Computer Society of India. This quiz is mainly conducted to provide an opportunity to gauge the participant's insights on the subject. Participants who secured more than 50 percent have been provided with E-Certificates. The organizers of the quiz are Ms T V Divya and Ms T Gayatri of CSE Department and the coordinator Ms Ch Sita Kameswari, SBC, KMIT. Around 816 participants have taken the quiz. 607 out of 816 participants got qualified.

B N M INSTITUTE OF TECHNOLOGY, BANGALORE [REGION-V]

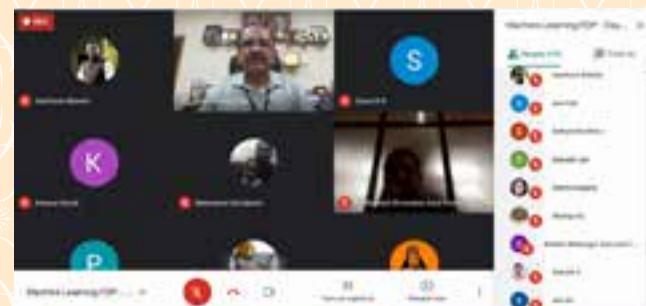
Reported by Dr. Niharika Kumar, SBC, B N M Institute of Technology, Bangalore



Dept of CSE, BNM Institute of Technology, Bengaluru had organized a two day webinar series on Industry Based Emerging Technologies in association with Metamor Technologies, Bengaluru under BNMIT CSI Student Branch on the 18th and 19th June 2020. 1092 students participated in this event. Mr Chandrakant SH, IT Director and Mr Mahesh R G, Program Director of Metamor Technologies were the key resource persons for this webinar. Various topics were covered during the days.

B M S INSTITUTE OF TECHNOLOGY & MANAGEMENT, BANGALORE [REGION-V]

Reported by Dr Aparna, SBC, B.M.S. Institute of Technology & Management



B M S Institute of Technology & Management, Bangalore has organized a five days online Faculty Development Program on Machine Learning from 27th July 2020 to 31st July 2020. This FDP has helped the participants to get an insight in to the Machine Learning aspects

SAI VIDYA INSTITUTE OF TECHNOLOGY, BANGALORE [REGION-V]

Reported by Dr. Sangeetha V., Sai Vidya Institute of Technology



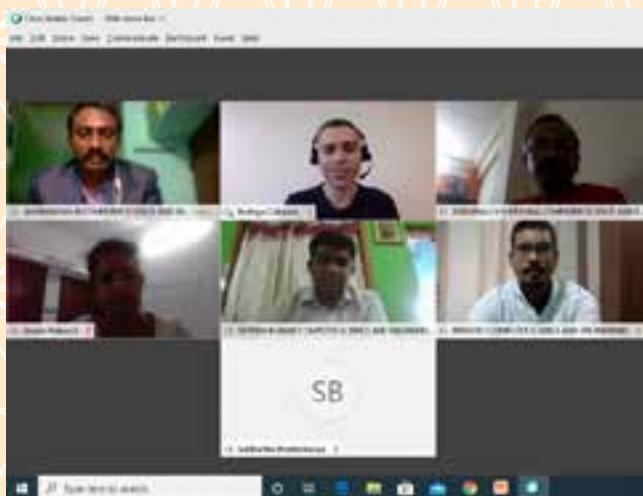
Sai Vidya Institute of Technology, Bengaluru has organized a Webinar on Augmented Reality - The Interface of Future on 22nd July 2020 for the students of ISE and CSE Departments.



Sai Vidya Institute of Technology, Bengaluru has organised a Webinar on An Insight into Web Application Development for all semester of ISE and CSE Department SVIT and outside other college students and Faculties.

CHRIST (DEEMED TO BE UNIVERSITY), BENGALURU (REGION-V)

Reported by Dr. N Jayapandian, SBC, CHRIST (Deemed to be University)



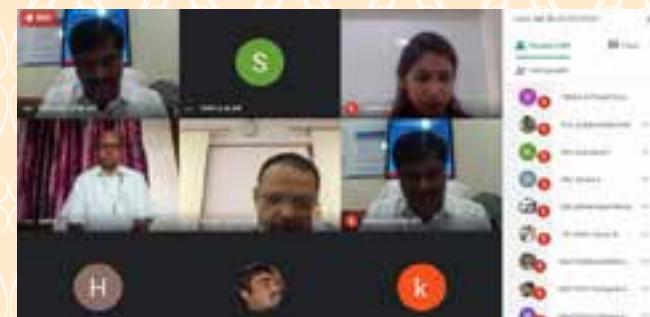
Research Symposium on Fog and Edge Computing: Challenges and Emerging Trends was organized by the Department of Computer Science and Engineering, Christ (Deemed to be University), Kengeri Campus on technical association with Computer Society of India on 18th August 2020. Dr Rodrigo Neves Calheiros, Associate Dean (Research), School of Computer, Data and Mathematical Sciences, Western Sydney University, Australia was the guest speaker for the event. Dr Ivan Jose is to provide presidential address of this event. Dr Balachandran K is providing introduction to speaker talk. Dr Jayapandian is Moderator of the event. Dr. Sathish Kumar and Dr. Gnana Prakasi O S are providing welcome address and vote of thanks of this event. The guest speaker is to share their thoughts and ideas on the topic of recent research opportunities in fog and edge computing.

DR. AMBEDKAR INSTITUTE OF TECHNOLOGY, BANGALORE (REGION-V)

Reported by Prof. Asha K N, Dr. Ambedkar Institute of Technology

The webinar on Let's talk Block Chain was organized by the Department

of Computer Science & Engineering, Dr Ambedkar Institute of Technology, Bangalore, under the Computer Society of India. The webinar was started by the Head of the Department, Dr Siddaraju, who introduced the Guest of Honor, Prof M Surendra Prasad Babu, RVP-V and the speakers Dr Prasad Honnavalli, Professor and Director at PESU & Prof. Sunitha R, Assistant Professor, Computer Science & Engineering, PESU. Prof M Surendra Prasad Babu, addressed the participants which included Dean of Academics and HoD CSE, Dr.Siddaraju, faculty coordinators Dr. K.R Shylaja, Mrs. Veena Potdar, Mrs. Asha K N, Mrs. Asha Rani K P, several other faculty and students from different colleges. There were close to 400 participants attending the webinar through Google Meet and YouTube livestreaming. The webinar ended with a pleasant vote of thanks given by Mrs. Asharanji K P following which a feedback form was collected and digital certificates were handed out to the participants by Mrs. Veena Potdar.



INSTITUTE OF MANAGEMENT RESEARCH & DEVELOPMENT, SHIRPUR (REGION-VI)

Reported by Prof. Vijaya Ahire, SBC, Institute of Management Research & Development



The CSI Student branch of R. C. Patel Institute of Management Research and Development, Shirpur organized a webinar on Parallel Computing for all MCA-2nd & IMCA-3rd year students on 8th August 2020. Total 60 students were present for this webinar. For this webinar cum expert talk we invited resource person Mr. Amit Joshi, Assistant Professor, Department of Computer Engineering & Information Technology, College of Engineering, Pune (COEP).

SIPNA COLLEGE OF ENGINEERING AND TECHNOLOGY, AMRAVATI (REGION-VI)

Reported by Prof. Sumaiyya Z Khan, Sipna College of Engineering and Technology

Sipna College of Engineering & Technology, Amravati.
Department of Information Technology

A Five Days ISTE Approved Short Term Training Program on,
“LaTeX The Document Processor”

Dr. A. M. Ansari, Chief Patron
Dr. S. M. Kherde, Patron
Dr. V. S. Gulhane, Convener
Prof. A. R. Bhuyar, Resource Person

Prof. L. K. Gautam, Coordinator
Prof. R. L. Pardhi, Technical Support

A Five Days ISTE Approved Short Term Training Program on LaTeX The Document Processor was organized by Department of Information Technology, Sipna College of Engineering & Technology, Amravati from 20th July 2020 to 24th July 2020. Huge number of participants from different Institutions participated in this STTP. The Short Term Training Program started on 20th July 2020 with its inaugural speech by Dr V S Gulhane, Convener of this STTP and Head of the IT Department. In this speech, he explained the aim and objectives of the training program. This was followed by the valuable speech of Dr S M Kherde, Patron of this STTP and Principal, Sipna COET, Amravati who addressed all the participants and wished them all the best for learning LaTeX which is a high quality type setting system. Prof. L. K. Gautam, Coordinator and Prof. A. R. Bhuyar, Resource Person of this STTP also shared their views regarding this STTP. On the last day of STTP, last session was taken by Prof. Dr. R. S. Mangrulkar, Associate Professor, Dept. of Computer Engineering, SVKM's Dwarkadas J. Sanghvi College of Engineering, Mumbai. In this session, he gave an introduction to Overleaf. This STTP got a huge response from participants. Hon'ble Shri. Jagdishji Gupta, President of Sipna Shikshan Prasarak Mandal, Dr. S. M. Kherde, Principal and Dr. V. S. Gulhane, Head of Department (I. T.) guided us for the successful accomplishment of this event. Prof. L. K. Gautam, Prof. A. R. Bhuyar and Prof. R. L Pardhi, faculties of Information Technology Department took efforts for the successful accomplishment of this program.

PROF. RAM MEGHE INSTITUTE OF TECHNOLOGY & RESEARCH, AMRAVATI (REGION-VI)

Reported by **Dr. S. R. Gupta**, SBC, Prof Ram Meghe Institute of Technology & Research



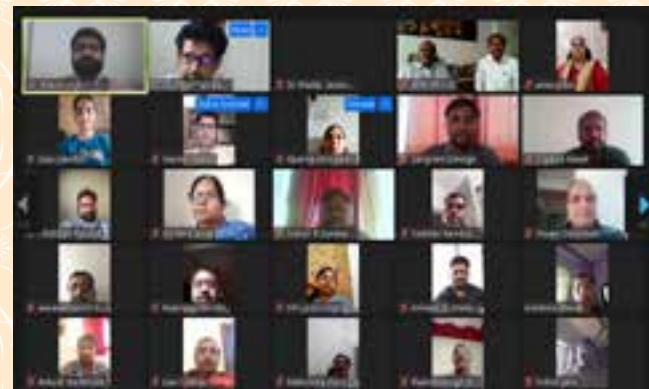
The CSI Student Branch of Prof Ram Meghe Institute of Technology & Research, Badnera-Amravati has organised a TWO WEEK (Ten Days) Online Training Program on C++ Language from 4th August 2020 to 14th August 2020. Total 130 Students registered and attended the

Two Week Online Training Program.

Training Program was Inaugurated by Dr P M Jawandhiya Chairman CSI Amravati Chapter accompanied by Dr G R Bamnote, Head-CSE & Past Chairman, CSI Amravati Chapter, Dr S R Gupta, SBC-CSI and Dr N N Khalsa, Dean Training & Placement, P.R.M.I.T & R, Badnera.

The Training Program was conducted by Prof. S. P. Akarte, Prof. N. M. Yawale, Prof. R. R. Karwa, Prof. N. V. Pardakar, Prof. R. A. Meshram and Prof. S. G. Taley. The Two Week Training Program was coordinated by Prof. Anand A. Chaudhari and Prof. Ms. Poonam B. Lohiya.

At the end of the workshop students expressed their views and gave feedback about the Training Program. Students also suggested organizing this type of Training Program in future also. As a whole the program was a great success. We are also thankful to our respected Principal, Dr. A. P. Bodkhe for his motivation, guidance and necessary support.



Prof Ram Meghe Institute of Technology and Research, Badnera-Amravati has organised the One Week Online AICTE-ISTE approved Short-Term Training Program on “Research and Publication Ethics” in association with CSI Amravati Chapter during 29th June 2020 to 03rd July 2020. Around 250 + participants successfully completed this Short-term program from all over India. Dr P M Jawandhiya, Chairman CSI Amravati Chapter inaugurated the STTP, Dr G R Bamnote the past Chairman of CSI Amravati Chapter was the Convenor and Dr. Sunil R. Gupta, the SBC, P.R.M.I.T & R, CSI Student's Branch and Prof. Sangram S. Dandge CSI members were the coordinators. The coordinator Dr. Sunil R. Gupta and Prof. Sangram S. Dandge thanked the management and the Principal Dr. A. P. Bodkhe for the constant support and encouragement for this STTP, the resource persons for sharing the knowledge, Head of Department Dr. G. R. Bamnote for necessary help, guidance and support, and congratulated the participants on the successful completion of the STTP. The organisers are grateful to CSI Amravati chapter for the support and guidance in making the event a success.

SRM VALLIAMMAI ENGINEERING COLLEGE, KATTANKULATHUR (REGION-VII)

Reported by **Dr. M Senthil Kumar**, SBC, SRM Valliammai Engineering College

The SRM Valliammai Engineering College Computer Society of India Student Branch organized a National Level Webinar on Hacking and

its Preventive Techniques (Hands - on Training) on 8th August 2020.



It was a good way to make use of the time in the quarantine period. More than 50 candidates have registered and got benefited. The speakers were Dr. M. Senthil Kumar, Associate Professor, SRM Valliammai Engineering College, Mr. R.Sankaranarayanan, Assistant Professor, SRM Valliammai Engineering College. Mr. G.Vivekanandan, Assistant Professor, SRM Valliammai Engineering College. The candidates got to know about how data are hacked. The candidates had basic hands on training on various tools and techniques used to prevent hacking. The students got the opportunity to clear the doubts based on Hacking and everyone enjoyed the session as it was interactive. The support of Dr. B. Chidhambararajan (Principal, SRMVEC), Dr. M. Murugan (Vice Principal, SRMVEC) and Dr. B. Vanathi(HOD, Department of CSE) gave the platform for the students. The guidance of CSI Staff Coordinators Dr. M. Senthil Kumar (Associate Professor, Department of CSE), Dr. S. Ravikumar (Assistant Professor, Department of IT) and Mr. V. Santhana Marichamy (Assistant Professor, Department of General Engineering) brought the webinar to the maximum success.

SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY, CHENNAI (REGION-VII)

Reported by **Dr. Jabez J**, SBC, Sathyabama Institute of Science and Technology

The Department of Computer Science, School of Computing, Sathyabama Institute of Science and Technology in association with Computer Society of India conducted 15 Days Executive Development Program on Leading Digital Transformation Innovative Applications of Emerging Technologies from 3rd August to 17th August 2020 with innovative titles like Digital Twin, Smart Factory Automation Digital Twin & Robotics, Digital Transformation Industry 4.0, Smart

Grid Digital Twin, Low Code Cloud Automation using Zoho Creator, Machine Vision & Intelligence, Digitalization in Customer Service, Story Telling with Data, Machine Learning with R, Machine Learning Strength Perspective and Opportunities, Agile Testing strategies for Digital Success, Generative Adversarial Networks, Role of Python in Digitization Era, Cloud, Big data Challenges in Higher Education During COVID19 and Future, Successful of Digital Enterprise. All these sessions were handled by experts from various leading industries as well as academicians from premier institutes. The objective of this skill development program is to focus on research methodology, research paradigm, research resources in Digital technology. More than five hundred participants actively participated and were benefited from it. The program was organized with the motivation of Dr. Sasikala, Dean, School of Computing, Head of the computer science Department Dr. L.Lakshmanan and Dr.S.Vigneshwari along with the coordination of the staff members of the CSE department.

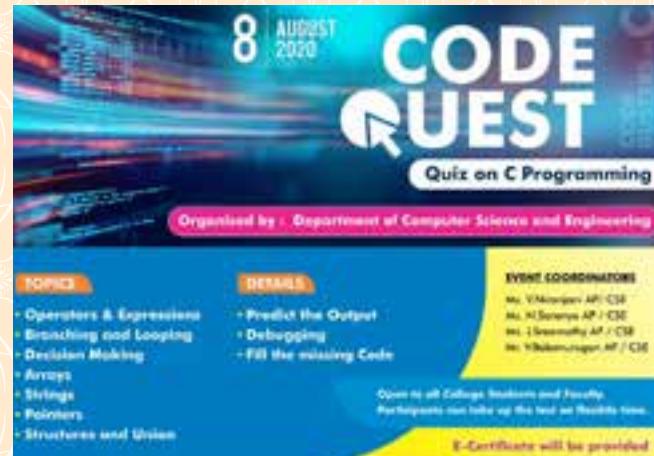


Also, the Department of Information Technology conducted a six days entrepreneurship program, "A Journey with Entrepreneur" which was held on 29th July 2020 to 03 August 2020, in which the entrepreneurs shared their journey of successful establishment. Where the talented young entrepreneurs to the most experienced professionals delivered their talk. This program lightened the participant's creativity to become an entrepreneur. This Programme was organized by the coordinators of the Department of Information Technology along with the Head of the Department Dr. R Subhashini.

SRI ESHWAR COLLEGE OF ENGINEERING, COIMBATORE (REGION-VII)

Reported by Prof. S Saradha, SBC, Sri Eshwar College of Engineering

Learning gives Creativity, Creativity leads to thinking, Thinking provides knowledge, Knowledge makes us Great. The reason behind conducting this event was to provide with an opportunity to explore on technical aspects. Quiz competitions are always interesting and informative, which provide excitement. Sri Eshwar college of engineering conducted a National level quiz competition on 8th August, 2020 in which total participants registered across India is 1178, and in which 887 attended the contest from 20 states. Flexible timing for attending the quiz (i.e. 24 hours) was given. The quiz was framed based on mixed category such that Predict the Output, Debugging and Filling missing code. Though some of the questions were tricky, the participants tried to answer them with confidence. The participants were provided with e-certificate.



| REPORT |

Webinar organised by CSI Patna Chapter

Report by Prof. Nilesh Narayan, Chairman, CSI Patna Chapter

Webinar on IT Security



An International Webinar on IT Security was organised by Indian

Institute of Business Management, Patna in collaboration of Region-II and Patna Chapter of Computer Society of India on 22nd August 2020. The webinar was inaugurated by the Chief Guest, Prof. J. S. Patil, Vice Chancellor, National Law University, Assam. Prof. A. K. Nayak, Immediate Past President and Chairman Academics and Awards committee of CSI has delivered the opening address, whereas the function was presided by Mr. R. K. Vyas, President, Computer Society of India.

The keynote speaker of the Webinar Dr. Shailesh Kr. Shrivastava, Scientist & Head Digital Government Research Center, NIC, Patna made his presentation on Network Security, whereas the invited speaker Dr. Malaya Nayak, Executive Director, IT Buzz Ltd. London spoke on Web Security and Prof. Prashant R. Nair, Chairman, IQAC, Amrita Vishwa Vidyapeetham, Amrita School of Engg., Coimbatore spoke on Cyber Security.

Prof. Shams Raza, Regional Vice President, Region-II, CSI delivered the concluding remarks and vote of thanks. The convenor of the Webinar Prof. Ganesh Panday, Dy. Director, IIBM has coordinated the event where as Prof. Rohit Kumar, Asst. Professor, IIBM, Patna has hosted the webinar.



Computer Society of India™

CSI YITP AWARDS 2021



**VIRTUAL / PHYSICAL /
HYBRID WORKSPACE**
The New Normal

NATIONAL ROUND

Saturday 13th February, 2021
during CSI 2021
54th Annual Convention
at LUCKNOW

REGIONAL PRESENTATION ROUNDS IN SEVEN REGIONS

Last date for nomination : Monday, 7th Dec. 2020

Presentation Rounds : Saturday, 9th Jan. 2021

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

Mr. Apoorva Agha
National Convenor

✉ apoorvaagha@gmail.com | ☎ 94153 16183



CSI 2021

54th ANNUAL CONVENTION

at Lucknow

CSI 2021
54th Annual Convention
@ LUCKNOW

CSI-IT Excellence Awards 2021

Technology Led Business Transformation

Recognition of the CIOs / Organizations who have done significant work in Technology Led Transformation using **ANY** technology

Saturday, 13th February 2021 during CSI 2021 54th Annual Convention at Lucknow

Criteria for the awards nominations is as follows:

Applications are invited from CIOs, Entrepreneurs and Organizations which have successfully implemented any of the following contemporary technologies for driving business transformation:

- ♦ Virtual / Physical / Hybrid Workspace – The New Normal
- ♦ IOT in Manufacturing Process
- ♦ Robotic Process Automation
- ♦ Innovative use of Bots/ Robotics
- ♦ Innovative application of cognitive application combined vision technology (including AR / VR)
- ♦ Advanced AI Applications
- ♦ Analytics and Machine Learning
- ♦ Block Chain
- ♦ Usage of Technology in Medicine/ Healthcare
- ♦ Usage of technology in Education
- The above list is only indicative, transformation programs in any of the emerging technologies are eligible.

Award categories will include Individual Nominees (CIOs/ Head of IT/ CEOs etc), Startups/ SMEs, Academic Institutes and large Organisations.

Nominations need to be submitted latest by 30th November 2020. Please write to below email ids for Nomination Form and Template.

Nominations to be submitted to csi.itea@gmail.com; with a copy to saurabh@gmail.com; apoorvaagha@gmail.com

Final Presentation and Award ceremony will be held on Saturday 13th February 2021 during 54th CSI 2021 Annual Convention at Lucknow.

For award sponsorships and any other query, write to: csi.itea@gmail.com

Mr. Saurabh Agrawal
Convener
 +91 92668 39339

Mr. Apoorva Agha
Co-Convener
 +91 94153 16183



Computer Society of India

CSI 2021

54th Annual Convention
@ LUCKNOW

Digital Transformation
eReadiness for Self Reliance

11th, 12th, 13th & 14th
February, 2021

- Statutory Meetings of Computer Society of India
- Award Ceremonies
- Pre-convention Tutorials
- International Conference
- Student-level Poster/Paper Presentation Sessions
- Student Level Competitions