

# **NATIONAL INSTITUTE OF TECHNOLOGY TIRUCHIRAPPALLI**

## **IEEE STUDENT BRANCH ACTIVITIES - 2020**

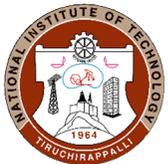


## Inauguration of THE IEEE STUDENT BRANCH activities for the year 2020

- IEEE activities for the year 2020 was inaugurated on January 29, 2020.
- Dr. Arumugam Nallanathan, IEEE Fellow, Professor, Queen Mary University of London, UK was the chief guest and Dr. V. Sankaranarayan, HoD, EEE Department, NIT Tiruchirappalli presided over the function.
- Dr. Nallanathan, briefly spoke on the importance and value of IEEE membership and other responsibilities of being an IEEE member.
- Dr. M.P. Selvan, Counselor, IEEE SB NIT-T introduced the Student Branch office bearers to the gathering.
- Mr. M. Ananada Reddy, Chairperson, IEEE SB NIT-T, presented the plan for the year 2020.



Inauguration of IEEE SB Activities for 2020 on  
29.01.2020



IEEE Student Branch NIT-T - STB99061

## Awareness Program on “Power and Energy” for School Students

- An awareness program on power & energy was conducted for students of REC Middle School, Thuvakudi on 04.02.2020 as a part of technical symposium “CURRENTS 20”.
- Dr. P. Raja, Associate Professor/EEE, NITT addressed the students at the EEE Auditorium, NIT Trichy.
- Topics such as the house wiring from service mains to the load, working principle of transformer and principle and technology of e-bike were explained to the students with the help of demonstrations.
- The importance of wind and solar energy was also described to the participants.



Awareness Program on “Power and Energy” for School Students on 04.02.2020

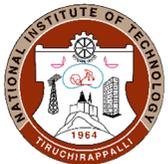


## Training on “Role of IoT in Smart Grid” for NLC Executives

- A training programme was conducted for NLC executives on “Role of IoT in Smart Grid”.
- Dr. M.P. Selvan, Counselor, IEEE SB NIT Trichy handled a session on “Applications of IoT in Smart Grid”.
- Dr. S. Moorthi, Assoc. Prof., EEE Dept., NIT Trichy gave a talk on “Embedded Controllers for Power Applications”.
- Demonstrations of real-time applications such as ‘Environmental Quality Monitoring using IoT’, ‘Home Energy Management System’, ‘Smart Metering’, ‘Smart Street Lighting’, ‘Fault detection in transmission lines’ were also given by the research scholars of Hybrid Electrical Systems Lab to the participants.



Training on “Role of IoT in Smart Grid” for NLC Executives on  
19.02.2020



## Invited talk on “Signal Processing Techniques for IoT Enabled Wide-Area Smart Grid Monitoring System”

- Dr. M.P. Selvan, Counselor, IEEE SB NIT Trichy introduced the speaker.
- Dr. Sabarimalai Manikandan, Assistant Professor, School of Electrical Sciences, IIT Bhubaneswar briefly spoke about the different signal processing techniques that can be used to assess the power quality (PQ) of Smart Grids. He then talked about the sparse signal decomposition technique that he had proposed to detect & classify PQ disturbances. He also touched upon the role IoT could play in Smart Grids.
- Dr. P. Raja, Assoc. Prof., EEE Dept., NIT Trichy felicitated the speaker with a memento.



Invited talk on “Signal Processing Techniques for IoT Enabled Wide-Area Smart Grid Monitoring System” on

21.02.2020



## Invited talk on “Research Article Writing : Scientific Artist!”

- Dr. M.P. Selvan, Counselor, IEEE SB NIT Trichy introduced the speaker.
- Dr. Dushantha Nalin K. Jayakody, Associate Professor, IEEE Senior Member, School of Computer Science and Robotics, National Research Tomsk Polytechnic University, Russia, briefly spoke about the Research Article Writing which will help as guideline in Academic Research Journal writing. He also gave some tips that utmost care to be taken in writing the research journals.
- Dr. P. Muthuchidambaranathan, Professor, ECE Dept., NIT Trichy felicitated the speaker with a memento.



Invited talk on “Research Article Writing : Scientific Artist!”

on 27.02.2020



## IEEE-WIE (Women in Engineering) Membership Drive

- Dr. M. Venkata Kirthiga, Senior Member, IEEE and Associate Professor, Dept. of EEE, NIT Trichy conducted a membership drive for IEEE-WIE at NIT Tiruchirappalli.
- Dr. Kirthiga encouraged the women in the audience to become IEEE-WIE members by highlighting various benefits like discounted registration to events, networking opportunities, awards, scholarships and travel grants. She also spoke about the opportunities to connect and collaborate with peers across the world by attending IEEE WIE global events like International Leadership Summits and the International Leadership Conference (IEEE-WIE ILC).



IEEE-WIE (Women in Engineering) Membership Drive  
on 09.03.2020



## Industrial Visit to 100kWp Rooftop Solar Power Plant

- Dr. M.P. Selvan, Counselor, IEEE SB, NIT Trichy organised an Industrial visit for the M.Tech. students of EEE Department.
- The students visited the 100kWp solar rooftop power plant installed at the Lecture Hall Complex building in the college campus.
- Dr. Selvan explained the working of the plant and elaborated on the role played by the grid-tied inverter. He also demonstrated the functionality of the data logging system which collects and stores information such as solar irradiance, power produced by the panels, units delivered and so on. With the help of these data, the students were able to observe the variation of electric power produced by the plant with changes in solar irradiance.
- Mr. Karthick, operation of the Solar PV plant helped the students to understand electrical wiring of the panels and grid connection of the plant at the LT distribution box.



Industrial Visit to 100kWp Rooftop Solar Power Plant  
on 13.03.2020



IEEE Student Branch NIT-T - STB99061

## Invited talk on “Smart Metering- Technology & Benefits”

- The IEEE SB of NIT-Tiruchirappalli in association with Institute of Engineers (IEI India)- Tiruchirappalli Local Centre (TLC) & Tamil Nadu State Centre (TNSC) organized a technical webinar using Zoom software.
- The webinar was handled by Dr. M.P. Selvan, Associate Professor, Department of EEE, NIT Tiruchirappalli. The participants comprised UG students, PG students and Ph.D. research scholars from CSE, EEE and ECE departments. Engineers affiliated with IEI association were also in attendance.
- Dr. Selvan compared different conventional metering systems and explained the need, architecture and benefits of smart metering systems. The talk was followed by a brainstorming session.

**Institution of Engineers (India)**  
TIRUCHIRAPPALLI LOCAL CENTRE  
BHHL Main Office Road, Tiruchirappalli - 620 014.

Phone: +91-431-2554200 & 2574022,  
E-Mail: ielth@ieai.com  
Web: http://www.ielth.org/

"100 Years of Relentless Journey towards Engineering Advancement for Nation Building"

We are pleased to inform you that we have arranged Online lecture on below title through Zoom

### Smart Metering - Technology & Benefits

On 5<sup>th</sup> May 2020 Tuesday at 6.30 PM through Zoom

<https://us02web.zoom.us/j/81384778146?pwd=WjJ5aFpkSmFmZlN1dRcFdLNmJLRnowZz09>

**Speaker**  
Dr. M.P. Selvan,  
Associate Professor,  
EEE Department,  
National Institute of Technology,  
Tiruchirappalli.

Meeting ID: 813 8477 8146  
Password: 721933

in association with IEI TNSC  
& IEEE SB NITT

All are cordially invited to attend the online lecture talk. Non-members are also welcome.

Dr. N. K. Manojan P., Chairman | Dr. N. Srinivasan M., Hon. Joint Secretary | Dr. Karim Arif Kamal M., Hon. Joint Secretary | Dr. A. Anand M., Honorary Secretary  
Ph. No. 943-226-1287, Mob. 9483619191 | Ph. No. 9432746768 | Ph. No. 9431-287-8109, Mob. 9489324328 | Ph. No. 9431-287-7201, Mob. 9422334674

**IEEE**  
Student Branch - NITT

## SMART METERING - TECHNOLOGY & BENEFITS

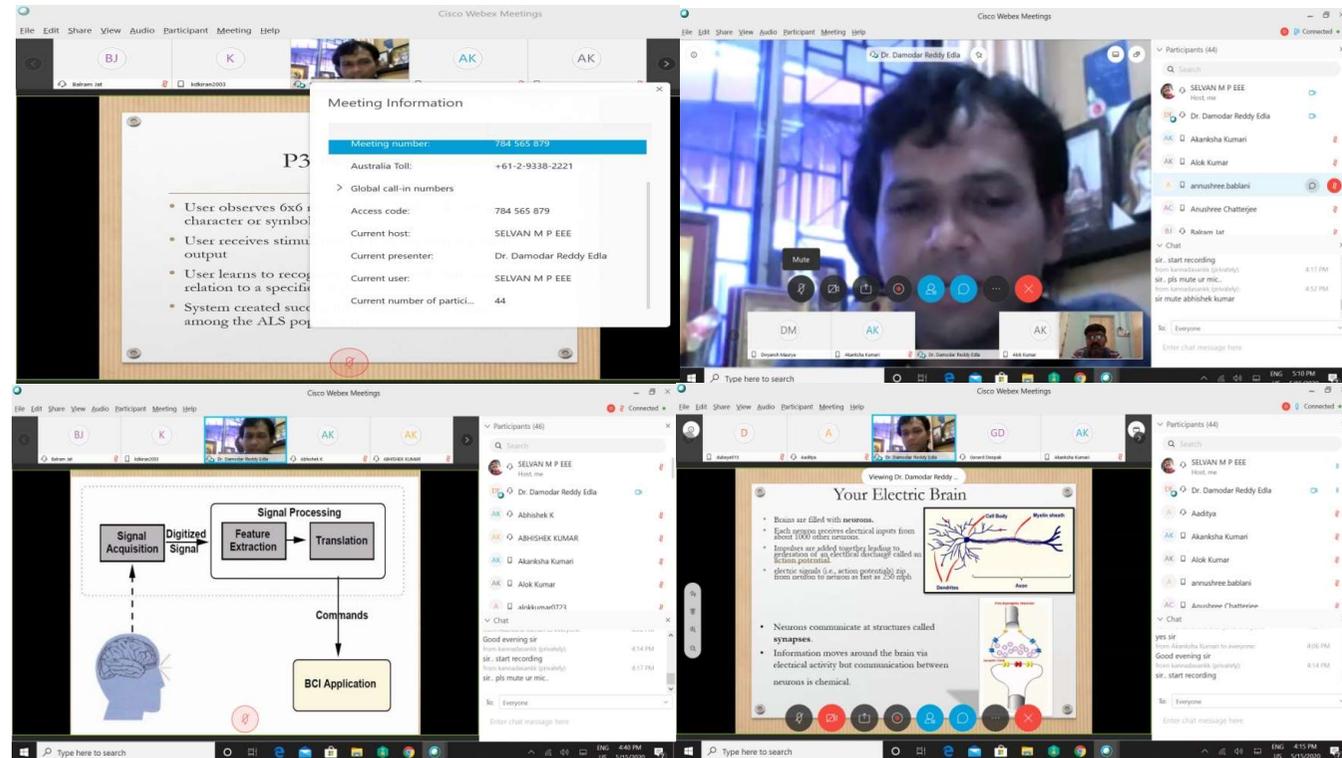
**Dr. M.P. SELVAN**  
ASSOCIATE PROFESSOR  
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING  
NATIONAL INSTITUTE OF TECHNOLOGY TIRUCHIRAPPALLI

Invited talk on “Smart Metering - Technology & Benefits” on 05.05.2020



## Invited talk on “Advances in Brain Computer Interface ”

- An online technical talk was given by Dr. Damodar Reddy Edla, Senior member, IEEE, Assistant professor, Department of Computer Science and Engineering, NIT Goa through Cisco Webex Meetings.
- Dr. Reddy gave a brief introduction to the domain of Brain Computer Interface (BCI) along with several real time applications. He gave an overview of research works going on in the field of BCI and the role they could play in modern society.
- The participants from CSE, EEE and ECE departments were encouraged by Dr. Reddy to perform research in the emerging field of BCI.

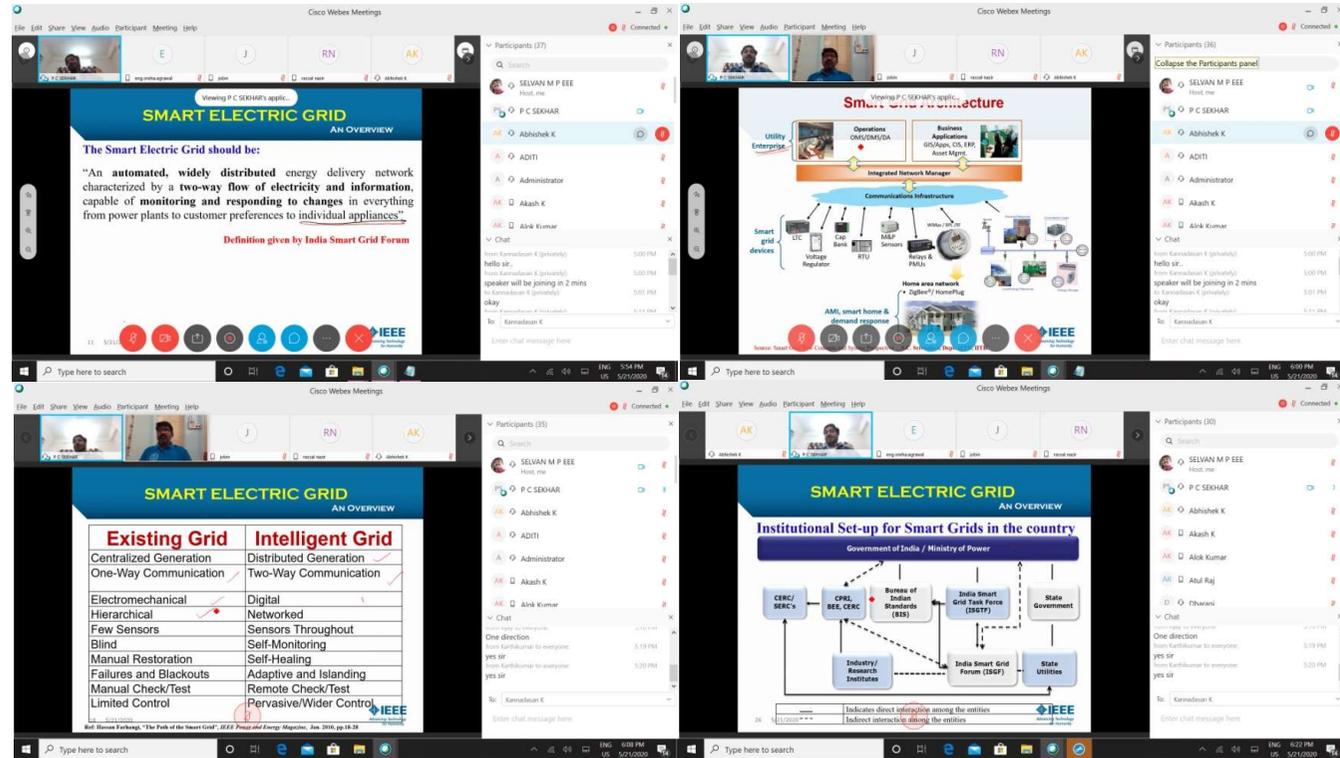


Invited talk on “Advances in Brain Computer Interface”  
on 15.05.2020



# Invited talk on “Smart Grid- The Future Electric Grid- An Overview”

- An online technical talk was given by Dr. Chandrasekhar Perumala, Assistant Professor, School of Electrical Sciences, IIT Bhubaneswar via Cisco Webex Meetings.
- Dr. Perumala started with the conventional grid, its shortcomings and the motivation behind development of smart grids. He compared different definitions given to smart grids by different countries.
- Dr. Perumala focused on the architecture of the smart grid and its many advantages. He concluded the talk by reminding the participants from CSE, EEE & ECE departments that the smart grid is not exclusive to EEE department, but needs coordination between these departments for its successful deployment.

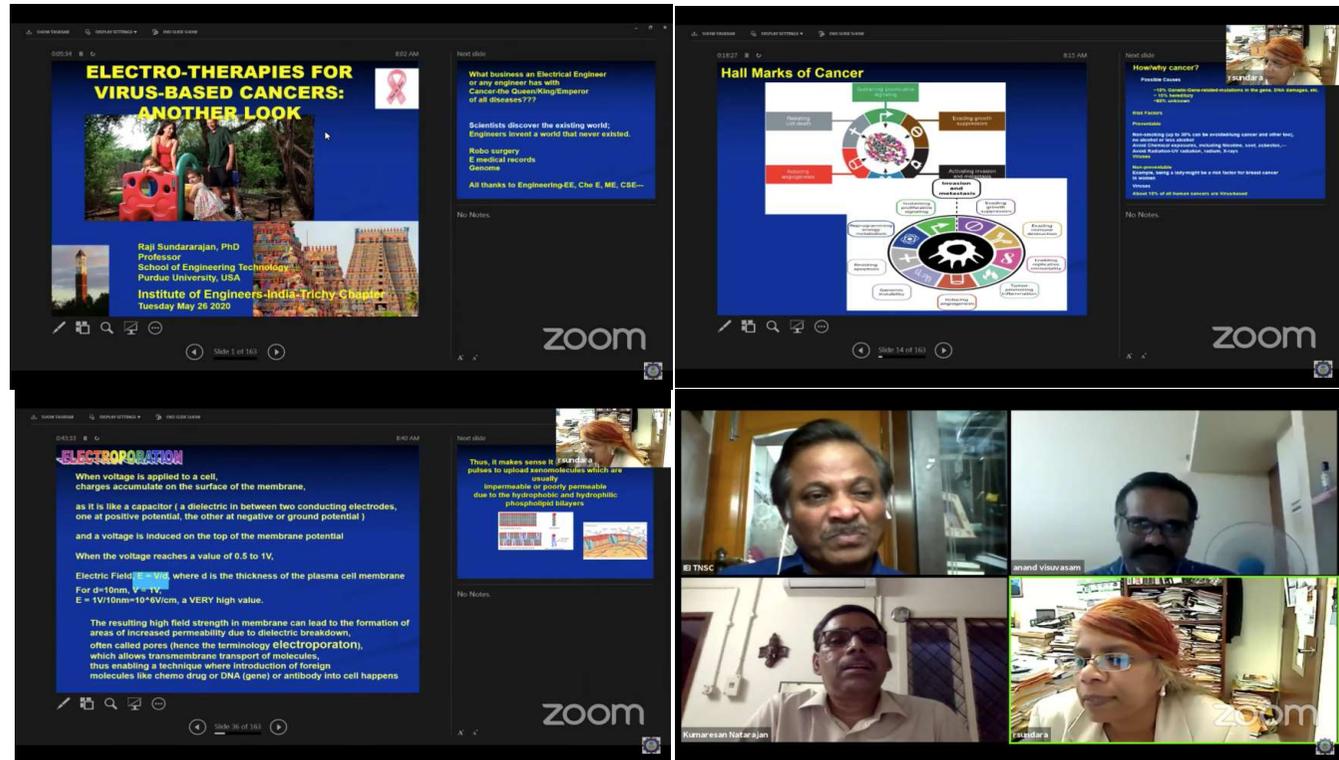


Invited talk on “Smart Grid- The Future Electric Grid- An Overview” on 21.05.2020



# Invited talk on “Electro-Therapies for Virus-based Cancers: Another Look”

- The IEEE SB of NIT-Tiruchirappalli in association with Institute of Engineers (IEI India)- Tiruchirappalli Local Centre (TLC) & Tamil Nadu State Centre (TNSC) organized a technical webinar using Zoom software.
- The webinar was handled by Dr. Raji Sundararajan, Professor, School of Engineering Technology, Purdue University, Indiana, USA.
- Dr. Sundarajan started by describing Cancers and how they are different from other diseases. She then spoke about cancer treatments and its challenges. She then explained about Electrochemotherapy, an alternative therapy based on Electroporation.



## Invited talk on “Electro-Therapies for Virus-based Cancers:

Another Look” on 26.05.2020



# Invited talk on “Flash charging technology for new generation e-Bus”

- An online technical talk was given by Dr. B. Dastagiri Reddy, Assistant Professor, Department of EEE, NIT Surathkal through Cisco Webex Meetings.
- Dr. Reddy was one of the team members behind ABB’s flash charging technology for electric buses. He started the session by discussing some of the practical solutions to charge e-buses.
- Dr. Reddy then compared on-board and off-board chargers. He also gave details of international projects where this technology is being tried out.

The screenshot displays a Cisco Webex meeting interface with a presentation on ABB's flash charging technology for e-buses. The presentation consists of several slides:

- Slide 1: Enabling a new generation of electric buses**  
Flash-charging technology for sustainable e-mobility  
Rail and Urban Transportation, Power Grids, Grid Integration  
ABB logo
- Slide 2: Flash technology: enables emission-free public transport in Brisbane**  
Brisbane Metro Bus Project  
Line X  
24m bus length, 60 buses  
>155 Passenger capacity per bus  
1 Bus in every 3 min  
Technology: X/Y stops Flash charging, 600 kW Flash charging  
ABB logo
- Slide 3: eBus flash charging**  
Operating your fleet  
The importance of TCO: Buses present a particular challenge as operators want the vehicles on the road transporting passengers, neither transporting batteries nor waiting at charging stations.  
Timetable: High-power in-route charging at selected bus stops and short layover time at terminal in same driving hours and commercial speed as a diesel fleet.  
High-passenger capacity (up to 4,000 passengers/h): All technology mounted on the roof. In-route charging while passengers are on-board and layover time compatible with high-frequency lines.  
Long-life battery: Thanks to in-route charging principle, the high-power/low-energy battery pack is used in its optimal operating range.  
Grid Compatible: Connection fee and energy cost minimized through embedded peak shaving functionality.  
Light infrastructure at depot: Either free parking after fast (4-5 min) high-power charging upon arrival or low-power (50 kW) mutualized charging for four buses.  
ABB logo
- Slide 4: Flash charging**  
What's different?  
The flash charging concept uses the on-board converter to provide a simple, reliable interface for efficient battery charging. It can also recuperate energy generated during braking.  
OppCharge (i.e. CC2 or CHAdeMO protocol used in 12m buses)  
Driving mode: On-board converter, Battery  
Charging mode: The grid (AC/DC - DC/DC), On-board converter, Battery  
Flash-Charging (no communication)  
Driving mode: On-board converter, Battery  
Charging mode: The grid, AC/DC converter / Feeding station, On-board converter, Battery  
ABB logo

Invited talk on “Flash charging technology for new generation e-Bus” on 29.05.2020



## Invited talk on “Achieving Sustainable Development goals through ICTs”

- The IEEE SB of NIT-Tiruchirappalli in association with Institute of Engineers (IEI India)- Tiruchirappalli Local Centre (TLC) & Tamil Nadu State Centre (TNSC) organized a technical webinar on the topic “Achieving Sustainable Development goals through ICTs” using CISCO Webex Meetings app.
- The technical webinar was handled by Dr. N.V.S.N.Sarma, Director, IIIT Trichy. The session was attended by several UG & PG students along with engineers from IEI.
- Dr. Sarma talked in detail about sustainable development and the seventeen goals it is expected to meet. He also spoke about the role of ICT in bringing about the sustainable development age after having paved the way for the information age. He also presented an ICT framework for meeting the said goals.



Invited talk on “Achieving Sustainable Development goals through ICTs” on 02.06.2020



# Invited talk on “Fundamentals of Block Chain and its Applications ”

- An online technical talk was given by Dr. Modi Chirag Navinchandra, Assistant professor, Department of Computer Science and Engineering, NIT Goa.

The image displays four screenshots from a Cisco Webex meeting, arranged in a 2x2 grid. Each screenshot shows a presentation slide with a chat window on the right side of the interface.

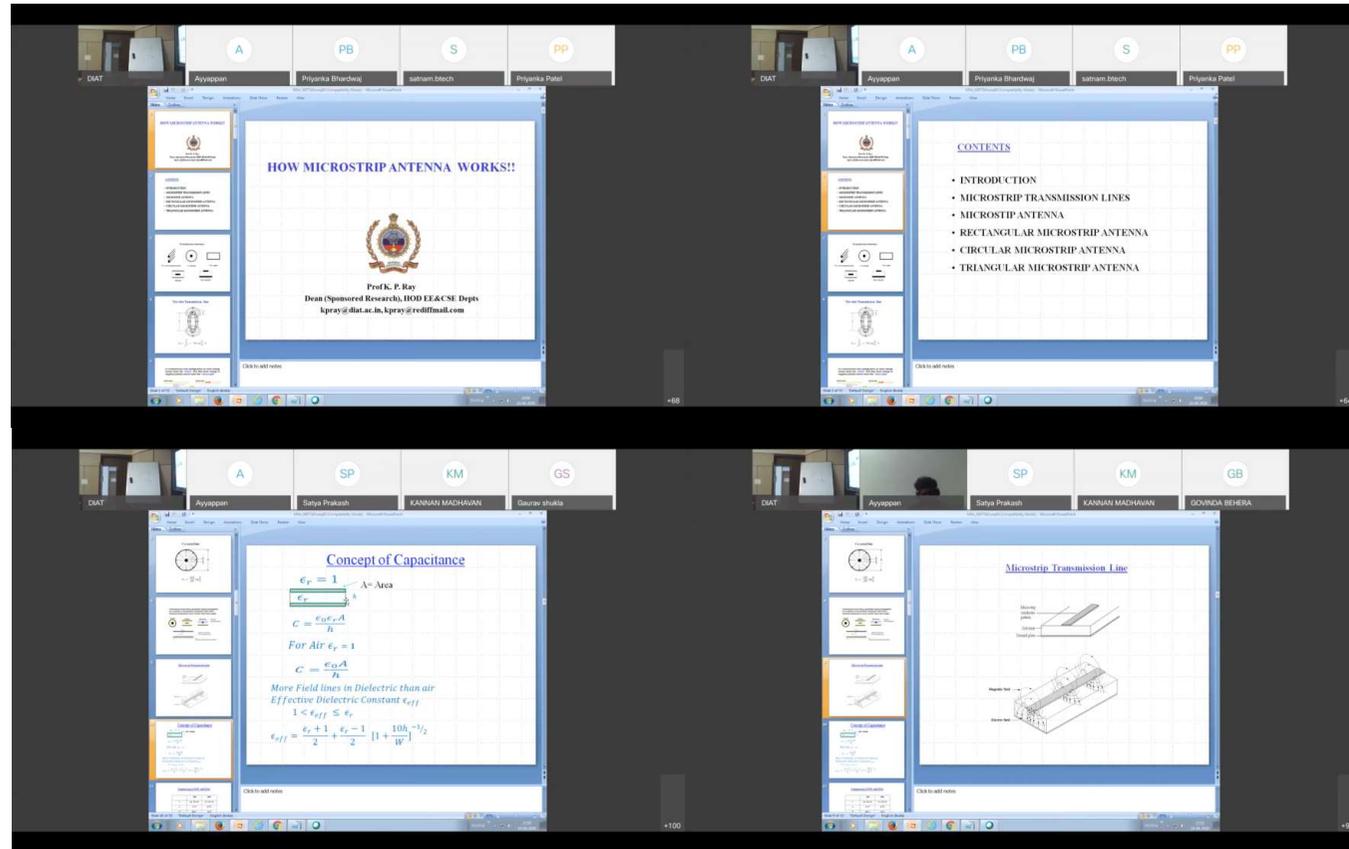
- Top Left:** Slide titled "Blockchain/DLT" with the text: "Distributed database that is practically immutable, maintained by decentralized P2P network using consensus mechanism, cryptography and back referencing blocks to order and validate the transactions".
- Top Right:** Slide titled "ECC Security" featuring a line graph titled "COMPARISON OF SECURITY LEVELS ECC and RSA & DSA". The graph shows ECC having a significantly higher security level than RSA and DSA for the same key size.
- Bottom Left:** Slide titled "Transaction Signature" with a bulleted list:
  - Hashes are often used in combination with signatures
  - For example, a certain user – is the owner of the inputs corresponding to a certain hash
  - Signing inputs is not efficient, therefore signatures are used for signing hash-values
  - Hash of a transaction gets generated by user A
  - Using the private key, the hash is signed
  - Signed hash is sent to user B with the public key of user A
  - User B takes the inputs and re-generates the hash
  - Using a cryptographic algorithm user B verifies the signed hash
  - User B compares the hashes and verifies that user A owns the inputs
- Bottom Right:** Slide titled "Smart Grid" showing a complex diagram of a smart grid system. It includes components like Energy Storage, Energy Conversion, and Distributed Ledger Technology (DLT). The diagram illustrates the flow of energy and data between various nodes in the grid.

Invited talk on “Fundamentals of Block Chain and its Applications” on 05.06.2020



## Invited talk on “How Microstrip antenna works”

- An online technical talk was given by Dr. K.P.Ray, Dean (Research), Head of Electronics Engineering & Computer Science Department, Professor In Charge of International Cooperation & MOU in Defence Institute of Advanced Technology (DIAT), Ministry of Defence, Pune via Cisco Webex Meetings application.
- Dr. Ray explained in great detail the working of microstrip transmission line and microstrip antenna (MSA). He then discussed the different configurations of MSA, in particular the rectangular, circular and triangular MSA configurations.
- The talk was attended by UG & PG students from CSE, EEE & ECE departments of NIT Tiruchirappalli.

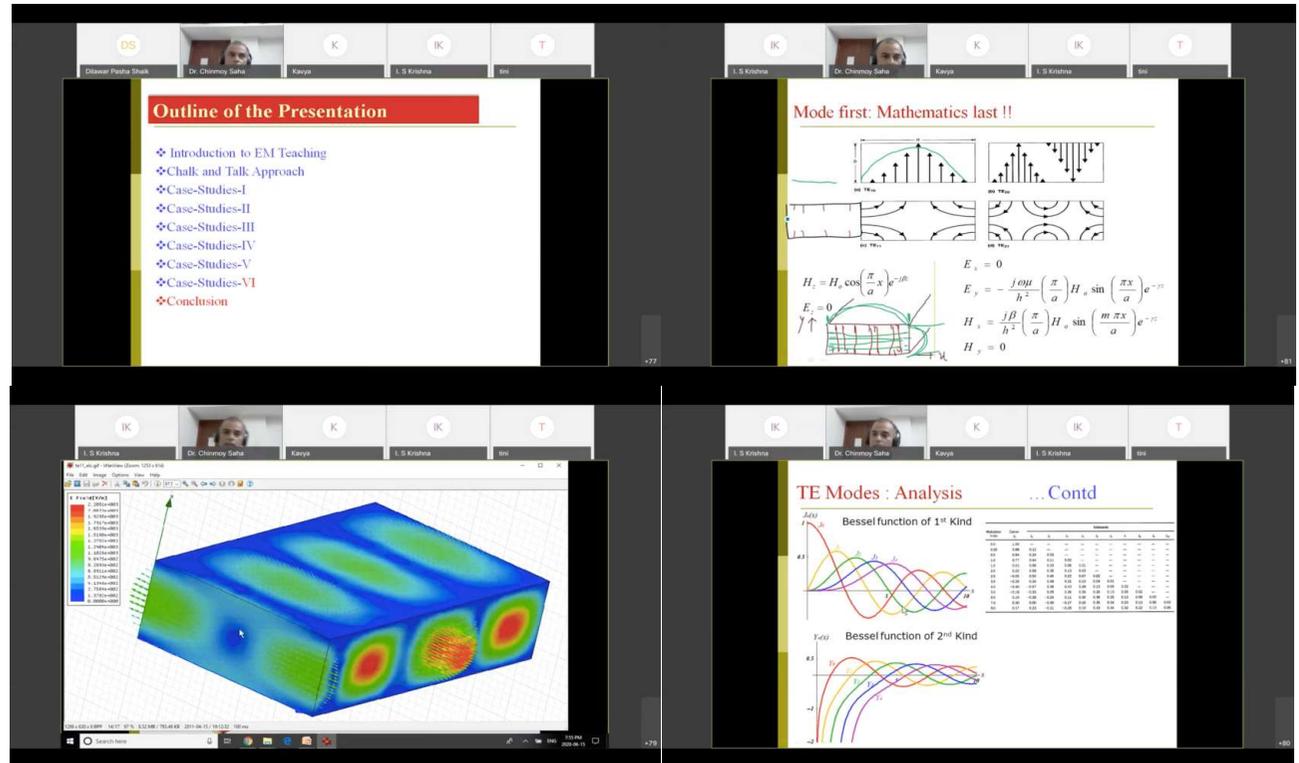


Invited talk on “How Microstrip Antenna works” on  
10.06.2020



# Invited talk on “Engineering Electromagnetics: Concept, Methodology and Techniques for High Impact Learning and Teaching ”

- The IEEE Student Branch of NIT-Tiruchirappalli in association with IEEE-MTTS chapter organized a technical webinar using CISCO Webex Meetings app.
- The webinar was handled by Dr. Chinmoy Saha, Associate Professor, Department of Avionics, IIST Thiruvananthapuram .
- During the session, Dr. Saha compared two ways of teaching Electromagnetics - the traditional ‘chalk and talk’ technique that relies heavily on lengthy mathematical derivations and an innovative computer based technique that utilizes graphic aids. Topics like Rectangular and circular waveguides, Dielectric Resonator & Circular Polarization were explained to the attendees with the help of animations.



Invited talk on “Engineering Electromagnetics: Concept, Methodology and Techniques for High Impact Learning and Teaching ” on 15.06.2020



# Inauguration of IEEE Computer Society Student Chapter

- The inaugural ceremony of the student chapter of IEEE Computer Society was held via CISCO Webex Meetings application.
- The Chief guest of the inaugural ceremony was Dr. Chandra Shekar Lakshminarayanan, Asst. Prof., Dept. of CSE, IIT Palakkad. The proceedings were presided over by Dr. N Ramasubramanian, CSE Dept., NITT.
- Mr. K. Kannadasan, Chairman & Secretary, IEEE SB NITT gave the welcome address. This was followed by the presidential address and the inaugural address by the respective dignitaries. Dr. M.P. Selvan, SB Counselor released the list of office bearers. The action plan for the chapter was presented by Dr. B. Shameeda Bhegum, Chapter Advisor. The vote of thanks was given by the chapter chairman Mr. C. Sekar.

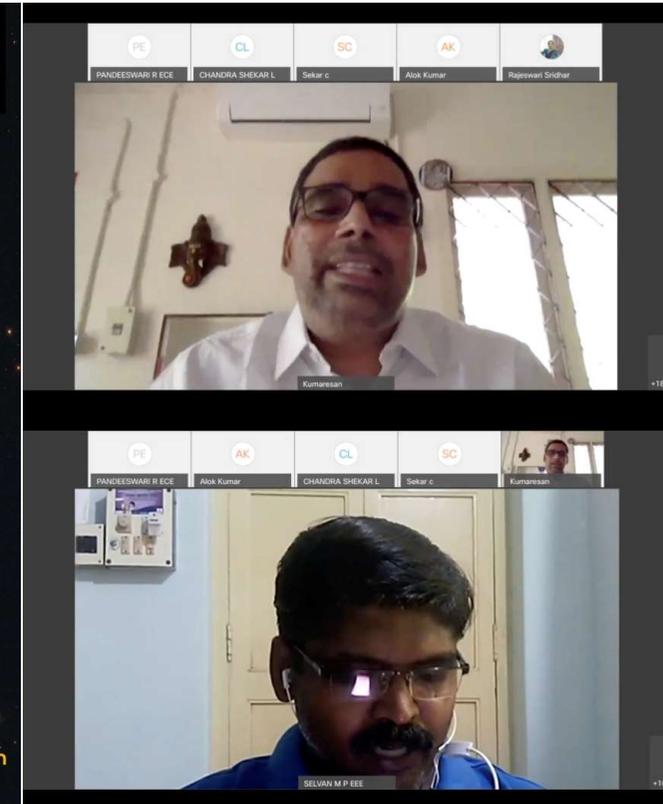
IEEE Student Branch  
National Institute of Technology Tiruchirappalli  
*cordially invites you for the*  
**Inauguration**  
of  
**IEEE COMPUTER SOCIETY STUDENT CHAPTER**  
National Institute of Technology, Tiruchirappalli  
on 27<sup>th</sup> JUNE, 2020 at 4.00 pm

Chief Guest  
**Dr. Chandra Shekar Lakshminarayanan**  
Assistant Professor, Dept. of CSE, IIT Palakkad

**Prof. N Ramasubramanian**  
Dept. of CSE, NIT Tiruchirappalli  
*will preside over the function*

K. Kannadasan  
Chairman & Secretary

Dr. M.P. Selvan  
Counsellor

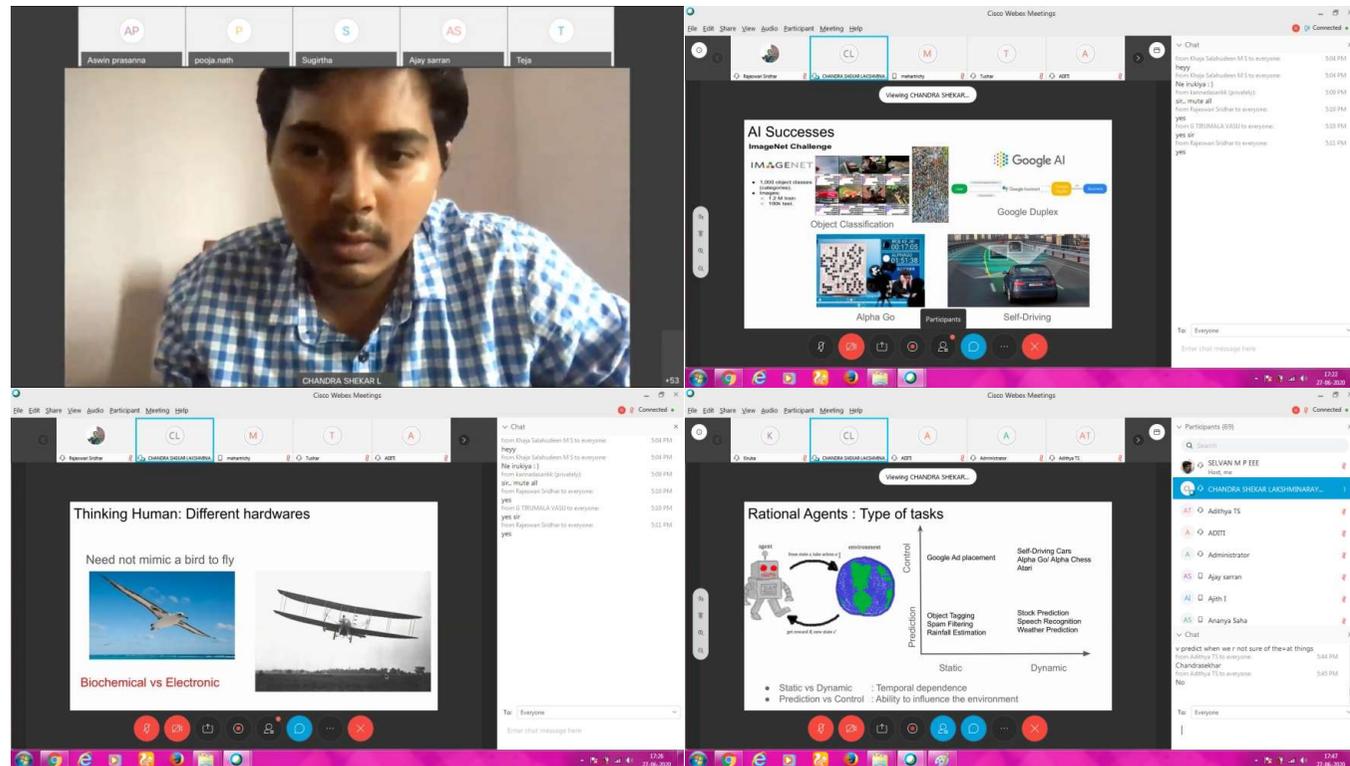


Inauguration of IEEE Computer Society Student Chapter  
on 27.06.2020



# Invited talk on “Reinforcement Learning: The frontier of Artificial Intelligence”

- The IEEE Student Branch of NIT-Tiruchirappalli in association with IEEE-Computer Society chapter organized a technical webinar using CISCO Webex Meetings application.
- The webinar was handled by Dr. Chandra Shekar Lakshminarayanan, Asst. Prof., Dept. of CSE, IIT Palakkad.
- Dr. Lakshminarayanan introduced several state of the art AI applications from across the world. He explained the need for smart programs to perform real world tasks that cannot be broken down into a sequence of commands. He also covered hot topics like Machine Learning and Reinforcement Learning. He highlighted probability & decision theory as the most important subjects for students wishing to pursue AI.



Invited talk on “Reinforcement Learning:  
The frontier of Artificial Intelligence” on 27.06.2020



# Invited talk on "Analog Beamforming Networks"

- An online technical talk was given by Dr. Mrinal Kanti Mandal, Senior Member, IEEE working as Associate Professor, Department of ECE in IIT Kharagpur.
- After giving a general introduction to beamforming networks, Dr. Mandal compared the pros and cons of analog beamforming networks against their digital counterparts. He then moved on to the theory and working of analog beamforming networks, the central topic of the session. He explained both the time domain and frequency domain approaches of analysing these networks. He also talked about the relevant ongoing research in IIT Kharagpur and their developments.
- The talk was attended by UG & PG students from CSE, EEE & ECE departments of NIT Tiruchirappalli.



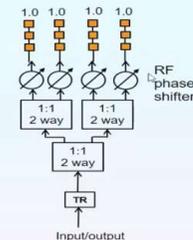
## Analog Beamforming Networks

Mrinal Kanti Mandal  
 mkmandal@ece.iitkgp.ac.in  
 Department of E & ECE  
 I.I.T. Kharagpur.



## Analog Beamformers

- RF phase shifters: continuous or switchable phase shifters.
- A set of transmission lines of different lengths are switched by PIN diodes.
- The RF properties are controlled by a computer.
- Each antenna can be connected with an LNA or T/R module.



Analog beamformer for continuous scanning.

Dept. of E & ECE, I.I.T. Kharagpur, India, 721302.

mkmandal@ece.iitkgp.ernet.in

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## Analog Vs. Digital Beamforming



**Digital beamforming:** N number of signals from N antennas passes through analog-to-digital converters. Direct signal processing from computer.

**Analog beamforming:** direct processing of analog signal at RF frequencies. Use RF hardware to generate the required amplitude and phase distributions for an antenna array.

- Dreher et al., "Antenna and receiver system with digital beamforming for satellite navigation and communication", *IEEE Trans. Microwave Theory Tech.*, Jul. 2003.
- H. Steyskal et al., Digital Beamforming for radar systems, *Microwave Journal*, Jan. 1989.

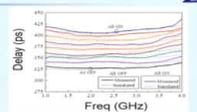
Dept. of E & ECE, I.I.T. Kharagpur, India, 721302.

mkmandal@ece.iitkgp.ernet.in

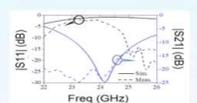
6

## Components Developed at IIT Kharagpur

- Switchable time delay line using open-stubs.



- Switchable time delay line using stepped-imp stubs.



- High performance SPST switch using PIN diode



- J. Mandal and M.K. Mandal, Computer aided design of a switchable true time delay (TTD) line with shunt open-stubs, *IEEE trans. on CAD-Integrated Circuits and Systems*, Mar. 2019.
- J. Mandal and M.K. Mandal, Reconfigurable RF dispersive delay circuits by stepped impedance shunt stubs, *IEEE trans on Circuits and Systems II*, published online.
- A. Singh and M. K. Mandal, Parasitic Compensation and Hence Isolation Improvement of PIN Diode Based Switches, *IEEE trans on Circuits and Systems II*, accepted.

Dept. of E & ECE, I.I.T. Kharagpur, India, 721302.

mkmandal@ece.iitkgp.ernet.in

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Invited talk on "Analog Beamforming Networks" on 06.07.2020



# Technical Workshop on “Deep Learning”

- A five-day technical workshop on Deep Learning was organized by the IEEE Student Branch and IEEE Computer Society Chapter of NIT Tiruchirappalli in association with Pantech Solutions from 6<sup>th</sup> to 10<sup>th</sup> July 2020.
- On day 1, the participants were introduced to deep learning & neural networks. On day 2, the basics of Python programming were covered, along with different types of data structures & modules available in Python. Scientific Python was covered on day 3 with the help of libraries like NumPy, Pandas, TensorFlow & Keras. The design and working of popular classification algorithms like MLP & PNN were explained on day 4. Classification using CNN algorithm and a few real time projects were discussed on the last day of the workshop.

**DEEP LEARNING**  
Using Python programming  
Organized by  
IEEE Students Branch  
&  
IEEE Computer Society Chapter  
National Institute of Technology, Tiruchirappalli

PALANIVELG  
Project Engineer  
Pantech Solutions

**Learning**  
Machines learn from human's instructions

```
##data2=np.array(b)
##print(data1+data2)

##import numpy as np
##data=np.array([[1,2,3],[3,4,5]],[[1,2,3],[4,5,6]])
##print(data)

##import numpy as np
##data=np.array([1,2,3,4,5],ndmin=4)
##print(data)

##import numpy as np
##data=np.array([[1,2,3,4],[6,7,8,9]],[[10,11,12],[13,14,15]])
##print(data)
##print(data[0][1][2])

import matplotlib.pyplot as plt
x=
```

**Line plot**

```
import matplotlib.pyplot as plt
import numpy as np
x=[0.1, 0.2, 0.3, 0.4]
y=[1, 2, 3, 4]
plt.plot(x, y)
plt.show()
```

Technical Workshop on “Deep Learning”  
from 06.07.2020 to 10.07.2020



# Invited talk on "SIW Technology towards 5G Applications: Miniaturization, Design and Materials"

- An online technical talk was given by Dr. Maurizio Bozzi, Fellow, IEEE currently working as Full Professor, University of Pavia, Italy.
- Dr. Bozzi started the session by introducing the current trends in microwave technology applicable to 5G. He then spoke about Substrate Integrated Waveguide (SIW) technology. He then explained how SIW components could be miniaturized and innovated with new materials like 3D printed materials, textile and paper.
- The talk was attended by UG & PG students from CSE, EEE & ECE departments of NIT Tiruchirappalli.



**IEEE** National Institute of Technology (NITT)  
Tiruchirappalli, India - 14 July 2020



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## SUBSTRATE INTEGRATED WAVEGUIDE (SIW) TECHNOLOGY TOWARDS 5G APPLICATIONS: MINIATURIZATION, DESIGN, AND MATERIALS

**Maurizio Bozzi**

University of Pavia (Italy)  
maurizio.bozzi@unipv.it  
<http://microwave.unipv.it/bozzi/>

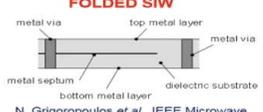
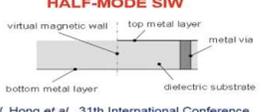
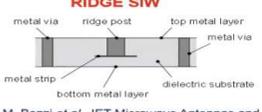


UNIVERSITÀ DI PAVIA

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### MINIATURIZED SIW STRUCTURES



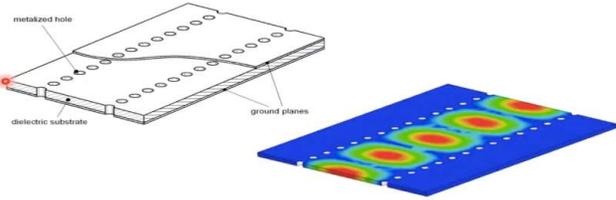
<p style="text-align: center;"><b>FOLDED SIW</b></p>  <p style="font-size: small;">N. Grigoropoulos <i>et al.</i>, IEEE Microwave Wireless Comp. Letters, 2005.</p>	<p style="text-align: center;"><b>HALF-MODE SIW</b></p>  <p style="font-size: small;">W. Hong <i>et al.</i>, 31th International Conference on Infrared Millimeter Waves, 2006.</p>
<p style="text-align: center;"><b>SLAB SIW</b></p>  <p style="font-size: small;">M. Bozzi <i>et al.</i>, Intern. Journal RF &amp; Microwave Computer-Aided Engineering, 2005.</p>	<p style="text-align: center;"><b>RIDGE SIW</b></p>  <p style="font-size: small;">M. Bozzi <i>et al.</i>, IET Microwave Antennas and Propagation, 2010.</p>

Maurizio Bozzi - NITT, India, 2020

## SUBSTRATE INTEGRATED WAVEGUIDE



Substrate Integrated Waveguides (SIW) are novel transmission lines that implement rectangular waveguides in planar form.



SIW consist of two rows of conducting cylinders embedded in a dielectric substrate that connect two parallel metal plates.

Maurizio Bozzi - NITT, India, 2020

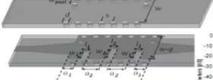
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## TEXTILE COMPONENTS & ANTENNAS

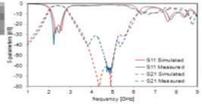




**INTERCONNECT**



**FOLDED FILTER**





R. Moro, S. Agneessens, H. Rogier, M. Bozzi, "Wearable Textile Antenna in Substrate Integrated Waveguide Technology," *Electronics Letters*, 2012

2014 Premium Award for Best Paper in Electronics Letters



**CAVITY-BACKED ANTENNA**

Maurizio Bozzi - NITT, India, 2020

Invited talk on "SIW Technology towards 5G Applications: Miniaturization, Design and Materials"

on 14.07.2020

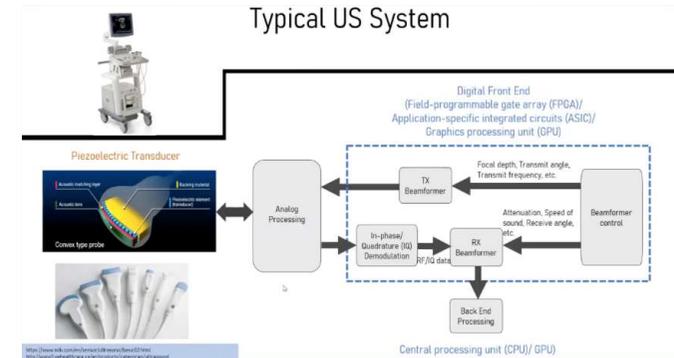
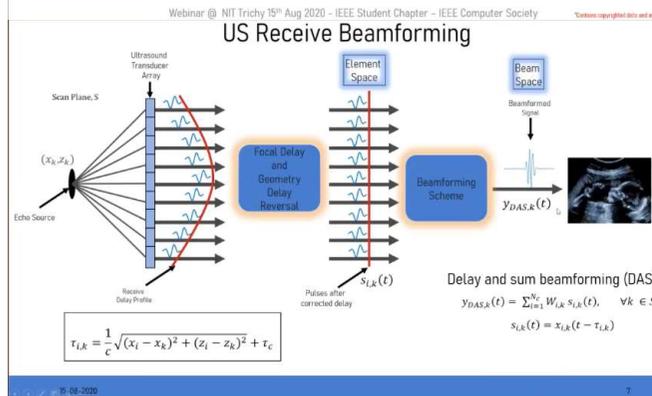


# Invited talk on “Lung Ultrasound Imaging for COVID19: From Physics to Neural Networks”

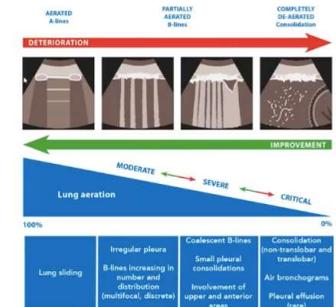
- An online technical talk was given by Dr. Mahesh Raveendranatha Panicker, Assistant Professor, Department of EE in IIT Palakkad.
- Dr. Panicker started the session by explaining about the physics behind ultrasound imaging and the different components in a typical ultrasound system. He then described the anatomy & ultrasound image of healthy lungs and highlighted how lung infection due to COVID19 appears in ultrasound. After a brief introduction to deep learning, Dr. Panicker moved on to the applications of neural networks in classifying the severity of infection.
- The talk was attended by UG & PG students from CSE, EEE & ECE departments of NIT Tiruchirappalli.

## Lung Ultrasound Imaging for COVID19 – “From Physics to Neural Networks”

Mahesh R Panicker, PhD  
Assistant Professor,  
Electrical Engineering and Center for Computational Imaging,  
Indian Institute of Technology Palakkad  
Email: mahesh@iitpkd.ac.in



## How Ultrasound Sees COVID19 Infection



## Invited talk on “Lung Ultrasound Imaging for COVID19: From Physics to Neural Networks” on

15.08.2020



# Invited talk on "Antenna Systems for Satellite, Aircraft & Ground Communication"

- An online technical talk was given by Dr. Sudhakar Rao, IEEE Life Fellow, Senior Technical Fellow, Northrop Grumman Aerospace Systems, California, USA
- Dr. Rao started the session by introducing antenna systems with special emphasis on satellite antennas. He covered the basics of satellite based communication and different types of satellites. Dr. Rao also explained reflector antennas and phased arrays in great detail. He concluded the session by highlighting the recent developments in ground and vehicular antennas.
- The talk was attended by UG & PG students from CSE, EEE & ECE departments of NIT Tiruchirappalli.

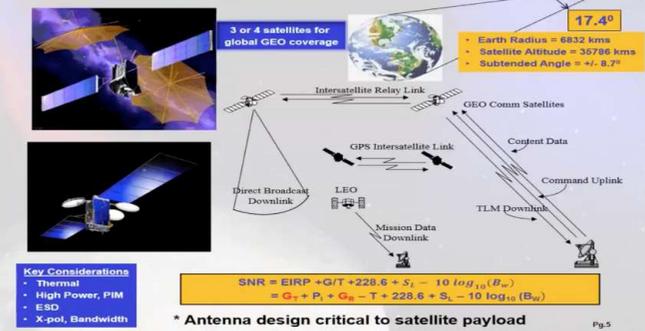


## Satellite Antenna Types

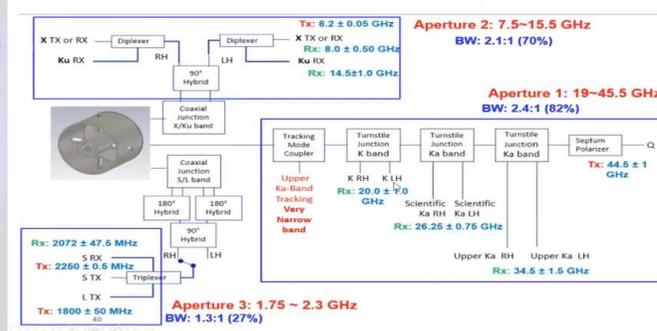
- > High Gain Antennas (30 dBi to 70 dBi)
  - Reflector Antennas (frequently used)
  - Lens Antennas (hardly used)
  - \* Dielectric Lenses: ESD issues
  - \* Waveguide Lenses: Narrow Bandwidth
  - Array Antennas (occasionally used)
- > Medium Gain Antennas (15 dBi to 25 dBi)
  - Global coverage horns
- > Low Gain Antennas (0 dBi to 12 dBi)
  - Biconical Antennas
  - Waveguides
  - Horn Antennas
- > Services: FSS, BSS, MSS, ISS, PCS

Radiation of satellite antennas depends on spacecraft structure, antenna suite, & mutual coupling effects. RF analyses and tests need to be carried out to validate the designs.

## Introduction to SATCOM Antennas: Definition of Satellite Communications



## Nested Multi-Coaxial Feed Array



Invited talk on "Antenna Systems for Satellite, Aircraft & Ground Communication" on 23.08.2020



# Invited talk on “Power Controllers for Wind Energy Conversion Systems”

- An online technical talk was given by Dr. Vijayakumar Krishnasamy, Assistant Professor, Department of ECE, IITDM Kancheepuram.
- Dr. Krishnasamy started the session with the expected energy transformation and renewable energy by 2050. He then compared the horizontal & vertical axis wind turbines. He also described the grid connected & stand alone operation of wind energy conversion systems. He further highlighted the key differences between fixed speed and variable speed wind turbines.
- The talk was attended by UG & PG students from CSE, EEE & ECE departments of NIT Tiruchirappalli.



## Power Electronic Controllers for Wind Energy Conversion System

Dr. Vijayakumar Krishnasamy | M.Tech., Ph.D., PDF (NTU-Singapore) |  
 Assistant Professor, Department of Electrical Engineering |  
 Indian Institute of Information Technology Design and Manufacturing |  
 Mobile: (91) 9549659069 | Email: krishnavijay@gmail.com |  
 LinkedIn: <https://in.linkedin.com/in/dr-vijayakumar-krishnasamy-06106838> |



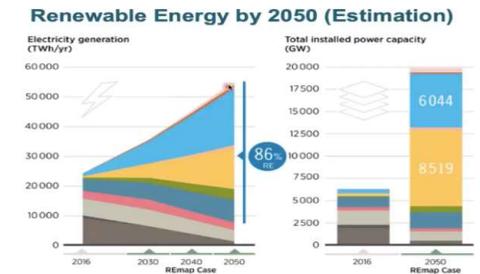
### Wind energy conversion system (WECS)

Grid Connected System      Stand-alone System (or isolated system)

### Main components of WECS



Dr. Vijayakumar K/EE/IITDM Kancheepuram



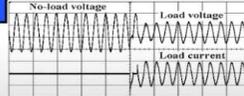
### Self-Excited Induction Generators (SEIG)



Both Terminal voltage and frequency depend on

- Speed
- Excitation capacitor
- Load parameters
- Generator parameters

output is of Variable Voltage Variable Frequency (VV-VF)



V and f unknown

Dr. Vijayakumar K/EE/IITDM Kancheepuram

Invited talk on “Power Controllers for Wind Energy Conversion Systems” on 26.08.2020



# Invited talk on "Recent Trends in Autonomous Vehicles"

- An online technical talk was given by Dr. Anbalagan Thangavel, Technical Project Manager, BOSCH Coimbatore.
- Dr. Thangavel started the session by introducing some of the recent megatrends in demography, urbanization, energy & connectivity with emphasis on vehicle trends in ownership, business models and usage. He then explained the foundations of automated driving like legislation, safety & security, surround sensing & system intelligence. Dr. Thangavel then described the role of HMI in autonomous driving.
- The talk was attended by UG & PG students from CSE, EEE & ECE departments of NIT Tiruchirappalli.

**The way to highly automated driving**  
Dr. Anbalagan Thangavel  
Technical Project manager, Robert Bosch

**Megatrends**  
The world is changing

**Demography**  
Democratization of mobility: Over-65 segment growing 50% faster than overall population → Allow all age ranges to be mobile  
Improved safety: 90% of all accidents caused by human errors → Reduction in motor vehicle accident rates

**Urbanization, Energy & climate**  
Higher fuel efficiency: Fewer traffic jams, less waiting time at intersections and lights → 80% improvement in traffic throughput → 23 to 39% improvement in highway fuel economy  
Reduced congestion

**Connectivity**  
Gain in productivity: Time in transit becomes more productive → 56 minutes per day freed up for other uses

**Five Levels of Vehicle Autonomy**

- Level 0:** No automation: the driver is in complete control of the vehicle at all times.
- Level 1:** Driver assistance: the vehicle can assist the driver or take control of either the vehicle's speed, through cruise control, or its lane position, through lane guidance.
- Level 2:** Occasional self-driving: the vehicle can take control of both the vehicle's speed and lane position in some situations, for example on limited-access freeways.
- Level 3:** Limited self-driving: the vehicle is in full control in some situations, monitors the road and traffic, and will inform the driver when he or she must take control.
- Level 4:** Full self-driving under certain conditions: the vehicle is in full control for the entire trip in these conditions, such as urban ride-sharing.
- Level 5:** Full self-driving under all conditions: the vehicle can operate without a human driver or occupants.

**Vehicle trends**  
Changes in ownership, business models and usage

**Mobility revolution**

- Change in vehicle ownership:** Sharing, not growing. WaiveCar has launched first advertisement-financed carsharing program.
- New vehicle types and usage:** Google, Lyft, etc.

**Car sharing market:**  
2015: 5,8 Mn users, 650 € Mn  
2021: 35 Mn users, 4,7 € Bn  
Source: Boston consulting

37% of population in large cities discarded the vehicle  
50% thereof using "free floating" car sharing

Invited talk on "Recent Trends in Autonomous Vehicles"

on 29.08.2020



# Invited talk on "Artificial Intelligence in Healthcare Applications"

- An online technical talk was given by Dr. P. Krishnamoorthy, Scientist II at Philips Research, Bangalore.
- Dr. Krishnamoorthy started the talk by explaining the basics of Machine Learning & Artificial Intelligence (AI). He introduced various applications of AI in healthcare and explained how AI helps prevent treatment delays, spots subtle signs of deterioration, and aids doctors in going through a lot of data. He highlighted liver segmentation & lesion detection, patient motion detection and cardiovascular disease(CVD) risk prediction as the areas in which AI is utilized the most.
- The session was attended by UG & PG students , PhD scholars and faculties from all over the country.

**Artificial Intelligence (AI) in Healthcare Applications**

P. Krishnamoorthy  
Scientist-II  
Philips Research India  
Bangalore

**Artificial Intelligence**

**ARTIFICIAL INTELLIGENCE**  
Engineering of making intelligent Machines and Programs.

**MACHINE LEARNING**  
Ability to learn without being explicitly programmed

**DEEP LEARNING**  
Learning based on Deep Neural Network

1950's 1960's 1970's 1980's 1990's 2000's 2006's 2010's 2012's 2017's

**Medical Data**

**Different Medical Images**

**Ultrasound**  
• Movement of the body's internal organs as well as blood flowing through blood vessels

**X-Ray**  
• View and diagnose bone disease, degeneration, fractures, dislocations, infections and tumors.  
• Assessing injury

**Computer Tomography (CT)**  
• Imaging bone, soft tissue and blood vessels at the same time  
• Pinpointing issues with bony structures (injuries)  
• Evaluating lung and chest issues  
• Detecting cancers

**Magnetic Resonance Imaging (MRI)**  
• Imaging organs, soft tissue an internal structures  
• Showing tissue difference between normal and abnormal

Invited talk on "Artificial Intelligence in Healthcare Applications" on 07.09.2020



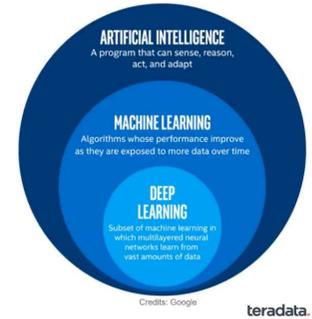
# Invited talk on "Alchemy of Data in AI"

- An online technical talk was given by Mr. Mohit Agrawal, Senior software engineer, Teradata R&D Labs.
- Mr. Agrawal started the talk by explaining the basic difference between Artificial Intelligence (AI), Machine Learning (ML) and Deep Learning (DL). He then introduced DL models such as ImageNet, AlexNet and GoogleNet. He pointed out power consumption as the key challenge to be overcome in the field of AI. He concluded the talk by suggesting some open research problems to the audience worth pursuing.
- The session was attended by UG & PG students, PhD scholars and faculties from all over the country.

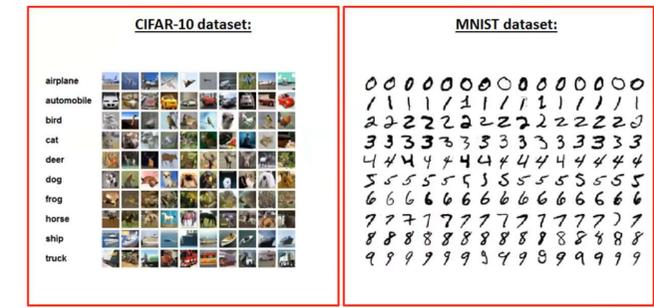


### AI vs ML vs DL

- Are AI, ML, and DL same?
- Are they completely different?
- Are they related in some way?



### Artificial Intelligence



Invited talk on "Alchemy of Data in AI" on 11.09.2020



## Invited talk on “Tunable SIW Antennas”

- An online technical talk was given by Dr. Arani Ali Khan, Assistant Professor, Dept. of Electrical Engineering, IIT Jodhpur.
- Dr. Khan started the talk by briefly introducing the Substrate Integrated Waveguide antennas, crucial design aspects and the challenges of attaining a better design. The tunability of such structures and their demands in RF industry were explained in detail. The mode of propagation of electric fields in the structure was analyzed and explained. He concluded the talk by encouraging the participants to identify novel solutions in this field.
- The session was attended by UG & PG students , PhD scholars and faculties from all over the country.



NATIONAL INSTITUTE OF TECHNOLOGY  
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JOIN THE TECHNICAL TALK ON  
**Tunable SIW Antennas**  
VIA 'CISCO WEBEX EVENTS'



**Dr. Arani Ali Khan**  
Assistant Professor  
Department of EE,  
IIT Jodhpur.



SEPT.  
25

5:00  
PM(IST)

Invited talk on “Tunable SIW Antennas”  
on 25.09.2020



## Invited talk on “Power Management Techniques in Current SOCs”

- An online technical talk was given by Mr. Shankar Ganesh, RTL Design Engineer at Intel Corporation, Bengaluru.
- Mr. Ganesh started the session by introducing the types of power losses found in a chip such as switching, leakage & internal power losses. He then highlighted the components in a chip that consume power viz. combinational and sequential circuits, clock network, memory and analog components. After that, he talked in length about the techniques of power reduction in HDL, which are clock gating, minimizing signal transition, resource sharing & state encoding. He also spoke about sensors in the chip that aid in power management.
- The session was attended by UG & PG students , PhD scholars and faculties from over the country.

### Power Management Techniques in SoC

Leakage vs Dynamic Power

Technology (nm)	Dynamic Power (Watts)	Leakage Power (Watts)
250	~40	~10
180	~45	~15
130	~50	~25
90	~55	~45
70	~60	~140

Source: microprocessor power, Intel

Figure 1: Increasing Impact of Power Consumption

### Power Reduction Opportunity

- Here "Enable" is asserted longer than Select
- If "Enable" asserted is long, possibility of greater power usage
- Use the "Select" as Clock-Enable

SoC level Power Management

```
graph TD
    subgraph SoC_PM [SoC PM AS3]
        direction TB
        Req[Req]
        Ack[Ack]
        NOC[NOC]
    end
    subgraph PM [PM]
        direction TB
        USB[USB SS]
    end
    SoC_PM --- NOC --- PM
    subgraph CPU_Core0 [CPU Core0]
        direction TB
        AS3_0[AS3]
        PM_0[PM]
    end
    subgraph CPU_Core1 [CPU Core1]
        direction TB
        AS3_1[AS3]
        PM_1[PM]
    end
```

Invited talk on “Power Management Techniques in Current SOCs” on 26.09.2020



# Invited talk on “Digital Twins AI and IoT over Tea”

- An online technical talk was given by Mr. Rajbarath KR, IoT consulting practice & business development, TCS.
- Mr. Rajbarath started by explaining the different layers in IoT and data collection process of digital twins. He explained about the dimensions of digital twin and designing a digital twin technology for a given problem with examples. He depicted a case study for better understanding of the digital twins. He concluded the session by summarising about the applications of digital twin technologies in TCS for their service and products.
- The session was attended by UG & PG students, PhD scholars and faculties from all over the country.

**Digital Twins, Analytics & IoT over tea**

Rajbarath KR  
Global Lead – IoT Consulting Practice, Utilities  
Tata Consultancy Services  
rajbarathkr@gmail.com

**Some examples of digital twins**

- Product X Design X Visualize
- Process X Build X Simulate
- Multi-system X Optimize X Predict

**How to build a digital twin?**

**Digital Twin models**

- Operations Data:** Real-time sensor data, Historic operations data, Historic event data, Performance curves
- Maintenance Data:** Asset performance data, SOPs, Maintenance history, Inspection reports
- Enterprise Data:** ERP data, External softwares, Work order details, Public / Market data
- Knowledge:** Domain insights, O&M procedures, Diagnostics knowledge, First principle knowledge
- Prediction models:** KPI Prediction, Forecasting, Soft sensors
- Diagnostic models:** Root cause analysis, Anomaly detection, Pattern recognition
- Simulation models:** Training simulation, What-if analysis, Monitoring
- Visualization models:** Dynamic 3D models, Interactive animation, Visualization
- Optimization models:** Set-point recommendation, Multi-objective optimization, Mode based operation
- Lifing models:** Remaining useful life, Asset health index, Maintenance advisory

**A practical implementation of Digital twins – Intelligent Power Plant**

Remote monitoring & Diagnostics, Process Optimization, Predictive Maintenance, Cognitive Worker

Plant level Monitoring, alerts & Insights, Heat rate deviation diagnostics & what-if analysis, FMEA based process upset remediation, Setpoints for process Optimization, Emission reduction, Failure prediction, Remaining useful life, Asset health index, maintenance recommendation, Operator roundup, Contactless shift turnovers, Mobile, AR/VR, wearables

Customer Data Platform / Data lake

Enterprise Layer: Historian, EAM, ERP, LIMS, APM

Control Layer: DCS, PLCs, SCADA

Plant Layer: Boiler, Turbines, Generator, Fuel handling, BOP

AI, ML driven

Source: TCS: <https://youtu.be/OwVtEmeQJk8>

Invited talk on “Digital Twins AI and IoT over Tea”  
on 29.09.2020



## Technical Poster Contest

- The IEEE Student Branch of NIT-Tiruchirappalli organized a technical poster contest for students and research scholars on the occasion of IEEE Day 2020.
- The theme of the poster contest was “Evolution of a technology” as applicable to the four engineering streams – Electrical, Electronics, Computer Science and Communication connected with IEEE.
- Cash prizes were announced for the best poster in each stream. The winners were selected by a set of panelists who reviewed the posters based on their creativity and information conveyed.



**Technical Poster Contest**

*Win Cash Prizes!!*

First Prize - Rs. 500/-  
Second Prize Rs.300/-  
Third Prize -Rs.200/-  
*\*Prizes will be given for each stream*

**4 Streams**

**ELECTRICAL  
ELECTRONICS  
COMPUTER SCIENCE  
COMMUNICATION**

For further queries,  
Mr. Nagendra Tiwari,  
9205975581

**Details**  
*Create a poster which depicts evolution of particular technology from any stream, since historic time till today's modern world*

*Images can be downloaded from internet but the concept should be informative and have a chronological order*

*Submissions will be evaluated by panelists and prizes will be given at IEEE day celebrations*

Submission Deadline: October 6, 2020, 10 AM

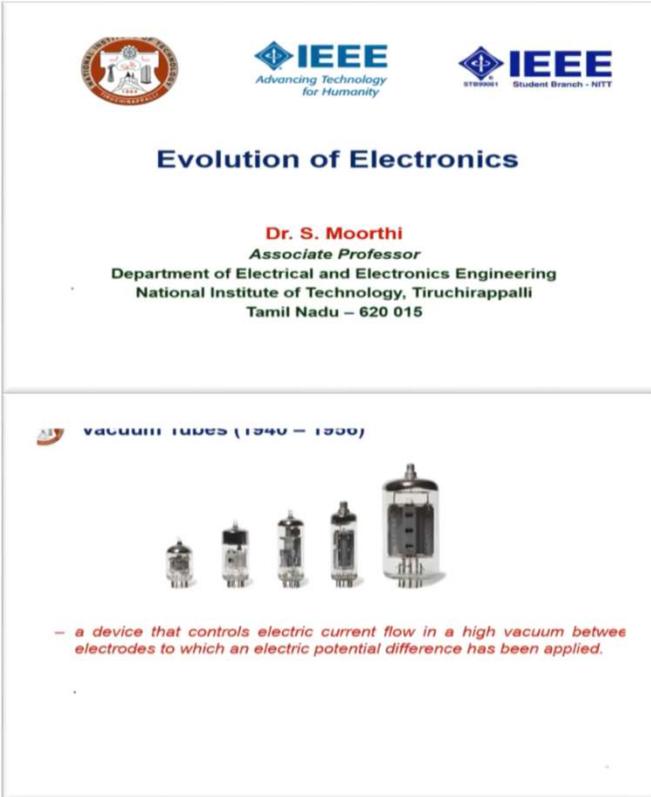
IEEE Student Branch of NITT

Technical Poster Contest  
on 06.10.2020

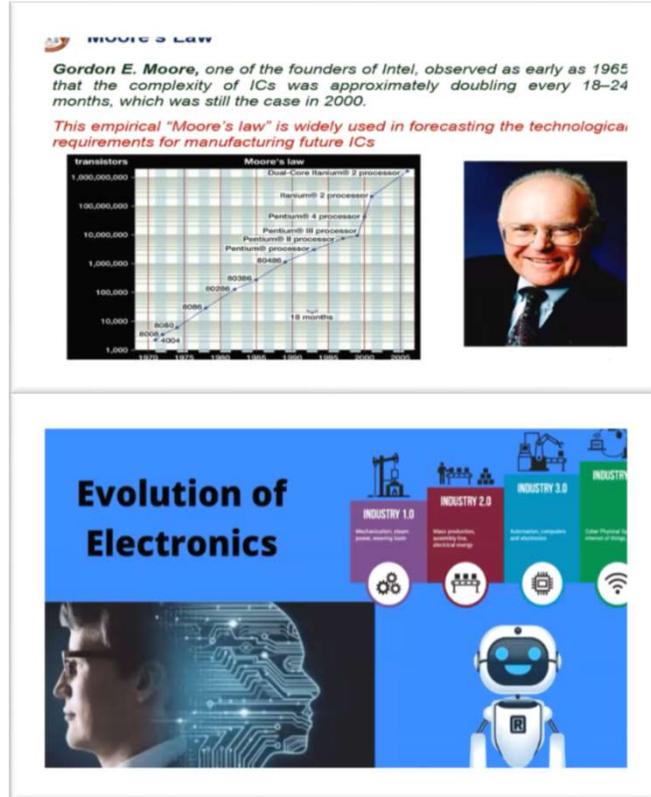


## Invited talk on “Evolution of Electronics”

- An online technical talk was given by Dr. S. Moorthi, Associate Professor, Dept. of EEE, NIT Tiruchirappalli.
- Dr. Moorthi started the talk with vacuum tubes, which was the first electronic device invented by a group of scientists. Gradually he moved on to modern electronic devices used in today’s technology. A detailed evolution of electronics since its origin was presented. He also mentioned about the Moore’s law and the expectations and challenges for future technologies. Dr. Moorthi concluded his talk with the status of research in micro/nano electronics.
- The session was attended by UG & PG students , PhD scholars and faculties from all over the country.



The slide features the logos of NIT Tiruchirappalli and IEEE Student Branch - NITT. The title "Evolution of Electronics" is centered, followed by the speaker's name "Dr. S. Moorthi" and his affiliation: "Associate Professor, Department of Electrical and Electronics Engineering, National Institute of Technology, Tiruchirappalli, Tamil Nadu – 620 015". Below this, a section titled "vacuum tubes (1940 – 1950)" shows five vacuum tube components of increasing size. A caption reads: "– a device that controls electric current flow in a high vacuum between electrodes to which an electric potential difference has been applied."



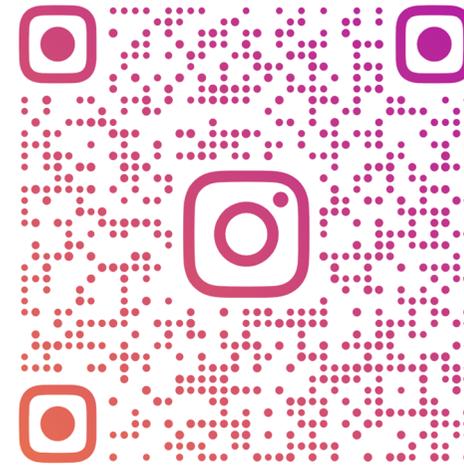
The top slide is titled "MOORE'S LAW" and features a portrait of Gordon E. Moore. The text states: "Gordon E. Moore, one of the founders of Intel, observed as early as 1965 that the complexity of ICs was approximately doubling every 18–24 months, which was still the case in 2000. This empirical 'Moore's law' is widely used in forecasting the technological requirements for manufacturing future ICs". A line graph shows the number of transistors on various Intel processors (Intel 4004, Intel 8008, Intel 8085, Intel 8088, Intel 80286, Intel Pentium processor, Pentium II processor, Pentium III processor, Pentium 4 processor, Dual-Core Pentium D processor) plotted against time, demonstrating exponential growth. The bottom slide is titled "Evolution of Electronics" and shows a progression from Industry 1.0 (mechanical production) to Industry 2.0 (mass production) to Industry 3.0 (automation) to Industry 4.0 (smart production). It includes icons for a gear, a factory, a robot, and a Wi-Fi symbol, along with a graphic of a human head with a circuit board inside.

Invited talk on “Evolution of Electronics”  
on 06.10.2020



## Creation of official INSTAGRAM account

- On the occasion of IEEE Day 2020, IEEE SB NITT created its official account in Instagram to connect with young people and students.
- IEEE SB NITT already has official accounts in Facebook and LinkedIn to connect with people outside NITT.



IEEESBNITT

INSTAGRAM account opened  
on 06.10.2020



## Inauguration of FDP on “Smart Grid Features and Blockchain Technology for Smart Grid”

- The IEEE Student Branch of NIT Tiruchirappalli and the student chapters of IEEE Computer Society, Industry Applications Society, and Power & Energy Society organized a five-day Online Faculty Development Programme (FDP) via WebEx Meetings on "Smart Grid Features and Blockchain Technology for Smart Grid". The five-day workshop began on 16th November and ended on 20th November 2020.
- The FDP was inaugurated by Dr. Mini Shaji Thomas, Director, NIT Tiruchirappalli on 16th November at 9:30 a.m. The inauguration ceremony was presided over by Dr. N. Kumaresan, IEEE SB Advisor, NIT Tiruchirappalli.



Inauguration of FDP on “Smart Grid Features and Blockchain Technology for Smart Grid” on 16.11.2020



# Day 1 of FDP on “Smart Grid Features and Blockchain Technology for Smart Grid”

- Two sessions were arranged on Day 1 of the FDP.
- The first session was on “Introduction to Smart Grid” by Dr. M. P. Selvan, Associate Professor, Dept. of EEE, NIT Tiruchirappalli. Topics like evolution of power grid, smart grid components, initiatives in India, smart meters, smart home and P2P energy trading were covered during this session.
- The second session was on “Communication Technologies, Standards & Protocols for Smart Grid” by Dr. A. Paventhan, Director (R&D), ERNET India, IIT Madras Research Park. Dr. Paventhan covered several topics like Internet of Things, wireless sensor networks, emerging standards towards IoT, connectivity options in SG, and software frameworks required for their effective implementation.

**Introduction to Smart Grid**

Dr. M.P. SELVAN  
ASSOCIATE PROFESSOR/EEE  
NIT TIRUCHIRAPPALLI

Online FDP on Smart Grid Features and Blockchain Technology and its Applications to Smart Grid  
IEEE Student Branch, NIT Tiruchirappalli

IEEE Student Branch - NIT

Communication Technologies, Standards and Protocols for Smart Grid

Online FDP on Smart Grid Features and Blockchain technology for Smart Grid  
Organized by IEEE Student Branch NIT Tiruchirappalli  
16<sup>th</sup> October 2020

Dr A. Paventhan,  
Director (R&D),  
ERNET India (autonomous society under Ministry of Electronics & IT, Govt. of India),  
IIT Madras Research Park, Chennai  
paventhan@eis.ernet.in

ERNET India

Day 1 of FDP on “Smart Grid Features and Blockchain Technology for Smart Grid” on 16.11.2020



## Day 2 of FDP on “Smart Grid Features and Blockchain Technology for Smart Grid”

- Two sessions were arranged on Day 2 of the FDP.
- The first session was on “Battery Energy Storage for Seamless Transitions in AC Microgrid” by Dr. B. Dastagiri Reddy, Assistant Professor, Dept. of EEE, NIT Surathkal. Dr. Reddy explained the key features of Microgrids. He covered the control aspects of grid interactive microgrids with several distributed energy resources.
- The second session was on “Demand Side Management” by Dr. Arun S.L., Assistant Professor, Dept. of EE, SELECT, VIT Vellore. Dr. Arun started the session with traditional power systems. He then elaborated on popular demand side management schemes like demand response, peak load management and energy conservation. He also explained how household loads maybe modelled.

**BATTERY ENERGY STORAGE FOR SEAMLESS TRANSITIONS IN AC MICROGRID**

By  
**Dr. B. Dastagiri Reddy**



Acknowledgements: Dr. Priyesh Chuhan, Dr. S. K. Panda, Mr. S. Bandari, EMDL, NUS Singapore,



11/17/20



**Demand Side Management**

**Dr. ARUN S L**  
Assistant professor,  
Dept. of Electrical Engineering, SELECT  
VIT University, Vellore, Tamil Nadu, India, 632014

Day 2 of FDP on “Smart Grid Features and Blockchain Technology for Smart Grid” on 17.11.2020



## Day 3 of FDP on “Smart Grid Features and Blockchain Technology for Smart Grid”

- Two sessions were arranged on Day 3 of the FDP.
- The first session was on “Electric Vehicles in Smart Grids” by Dr. C. Vyjayanthi, Associate Professor, Dept. of EEE, NIT Goa. Dr. Vyjayanthi spoke about the benefits of EVs over conventional vehicles. She then explained the different types of EVs, their components, different modes of charging & discharging like G2V, V2G, V2H & V2L, the Indian scenario & cyber security challenges.
- The second session was on “Embedded Systems and its influence on Smart grids” by Dr. S. Moorthi, Associate Professor, Dept. of EEE, NIT Tiruchirappalli. Dr. Moorthi covered several interesting topics like Industry 4.0, cyber physical systems, characteristics of embedded systems, IoT, real time systems, co-design ladder, configuration of embedded controllers for microgrids.

### Electric Vehicles (EV) in Smart Grids

Dr. C. Vyjayanthi  
Associate Prof., Dept. of EEE  
National Institute of Technology Goa  
18-Nov-2020



Online Faculty Development Programme on  
Smart Grid Features and Blockchain Technology  
for Smart Grid  
16.11.2020 to 20.11.2020



### Embedded Systems and its influence on Smart grids

Dr. S. Moorthi

Associate Professor

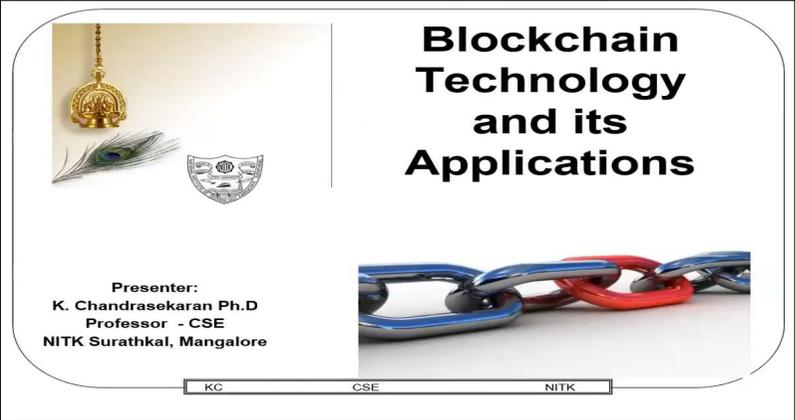
Department of Electrical and Electronics Engineering  
National Institute of Technology Tiruchirappalli  
Tamil Nadu – 620 015

Day 3 of FDP on “Smart Grid Features and Blockchain Technology for Smart Grid” on 18.11.2020



## Day 4 of FDP on “Smart Grid Features and Blockchain Technology for Smart Grid”

- Two sessions were arranged on Day 4 of the FDP.
- The first session was on “Blockchain Technology and its Applications” by Dr. K. Chandrasekaran, Professor, Dept. of CSE, NIT Surathkal. Dr. Chandrasekaran covered several interesting topics like business model & ledgers, distributed ledger technology, benefits of blockchain, differences between blockchain, bitcoin, smart contract and DLT, and several analogies on blockchain technology.
- The second session was on “Concepts of Blockchain Technology” by Dr. Kunwar Singh, Assistant Professor, Dept. of CSE, NIT Tiruchirappalli. Dr. Singh covered several important topics like when to use Blockchains, hash puzzles, decentralized goofy coin (Bitcoin), consensus algorithm and forking.

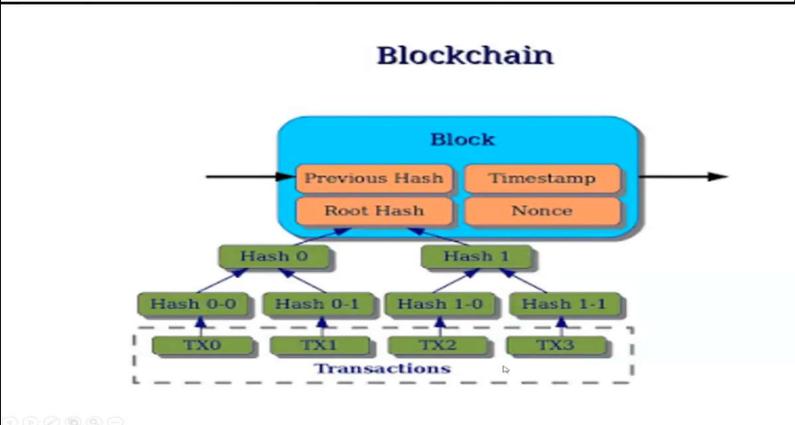


**Blockchain Technology and its Applications**

Presenter:  
K. Chandrasekaran Ph.D  
Professor - CSE  
NITK Surathkal, Mangalore

KC CSE NITK

**Blockchain**



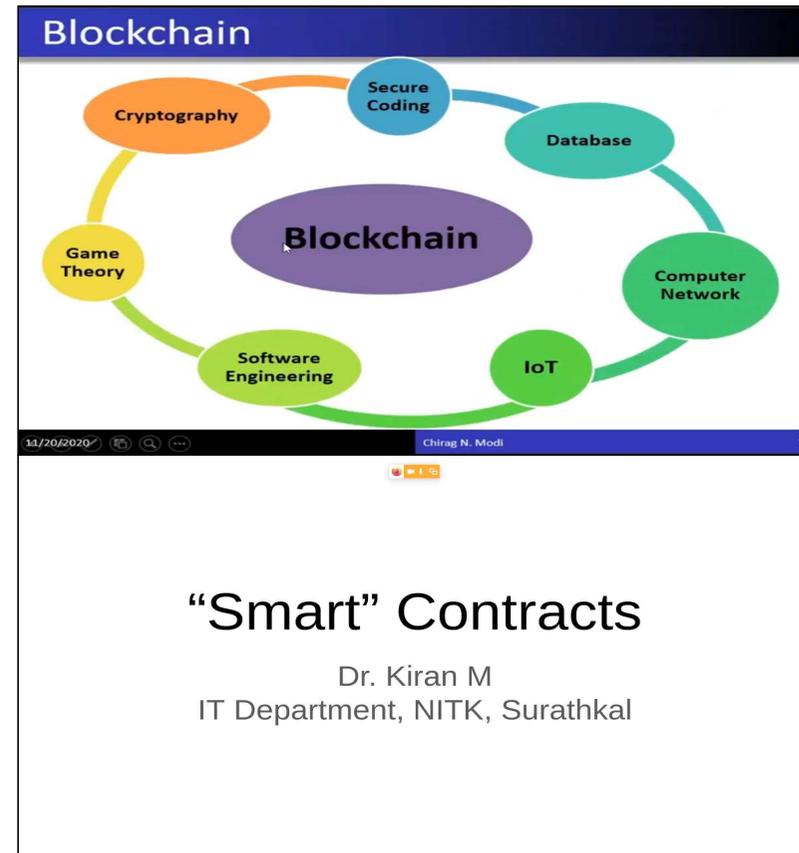
The diagram illustrates a blockchain block structure. A central blue box labeled 'Block' contains four orange boxes: 'Previous Hash', 'Timestamp', 'Root Hash', and 'Nonce'. Arrows point from the 'Previous Hash' box to the left and from the 'Timestamp' box to the right. Below the 'Block' box, two green boxes labeled 'Hash 0' and 'Hash 1' are connected to the 'Root Hash' box. Below these, four green boxes labeled 'Hash 0-0', 'Hash 0-1', 'Hash 1-0', and 'Hash 1-1' are connected to the 'Hash 0' and 'Hash 1' boxes. Below these, four green boxes labeled 'TX0', 'TX1', 'TX2', and 'TX3' are connected to the 'Hash 0-0', 'Hash 0-1', 'Hash 1-0', and 'Hash 1-1' boxes respectively. A dashed box labeled 'Transactions' encloses the TX0, TX1, TX2, and TX3 boxes.

Day 4 of FDP on “Smart Grid Features and Blockchain Technology for Smart Grid” on 19.11.2020



## Day 5 of FDP on “Smart Grid Features and Blockchain Technology for Smart Grid”

- Two sessions were arranged on Day 5 of the FDP.
- The first session was on “Blockchain Technology for Smart Grid” by Dr. Modi Chirag Navinchandra, Assistant Professor, Dept. of CSE, NIT Goa. Dr. Navinchandra covered topics like introduction to blockchain, blockchain vs normal database, applications of blockchain in smart grids, and integrating smart grids with electric vehicles using blockchain.
- The second session was on “Smart Contracts” by Dr. Kiran M, Associate Professor, IT Department, NIT Surathkal. Dr. Kiran explained the theoretical background of smart contracts. He then explained how to write smart contracts using Ganache, Ethereum and Solidity programming language.



The image shows a screenshot of a presentation. The top part is a slide titled "Blockchain" with a central purple oval labeled "Blockchain". Surrounding it are seven other ovals: "Cryptography" (orange), "Secure Coding" (blue), "Database" (teal), "Computer Network" (green), "IoT" (light green), "Software Engineering" (green), and "Game Theory" (yellow). Below this is a slide titled "Smart Contracts" by Dr. Kiran M, IT Department, NITK, Surathkal. The date 11/20/2020 and the name Chirag N. Modi are visible in the top left and right corners of the screenshot respectively.

Day 5 of FDP on “Smart Grid Features and Blockchain Technology for Smart Grid” on 20.11.2020



## Invited talk on "Gateway to PMRF"

- An online talk was given by the PMRF scholars Ms. Merlin Mary and Mr. Sundaramahalingam, and their research guides Dr. Shelas Sathyan and Dr. Sivashanmugam of NIT Tiruchirappalli.
- Dr. Sivashanmugam and Dr. Sathyan stressed on the need for a good research proposal. Dr. Sathyan described the different parameters that were considered like academic performance, GATE/NET score, performance during PhD course work and publications. Dr. Sathyan's talk was followed by a presentation from the PMRF scholars, in which they shared their experience and gave tips for junior research scholars.

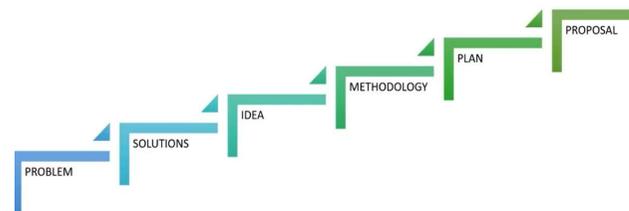
**Broad Technical guidelines in preparing for PMRF**

Dr P. Sivashanmugam,  
Professor (HAG),  
Department of Chemical Engineering,  
National Institute of Technology,  
Trichy-620015.

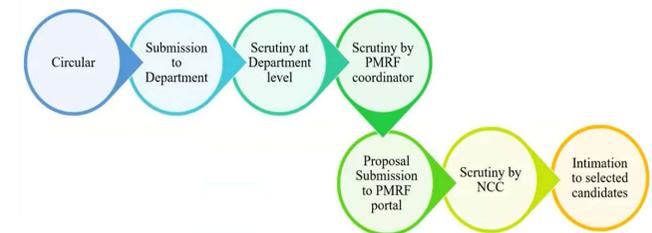
**TALK ON PRIME MINISTER RESEARCH FELLOW SCHEME**

<b>Presented By</b>	<b>MERLIN MARY N J</b> Research Scholar II year EEE Department	<b>SUNDARAMAHALINGAM M A</b> Research Scholar II year Chemical Engineering Department
<b>Project Guide</b>	<b>DR. SHELAS SATHYAN</b> Assistant Professor EEE Department	<b>DR. P. SIVASHANMUGAM</b> Professor (HAG Scale) Chemical Engineering Department

### STAGES IN PREPARING A PROPOSAL



### PMRF APPLICATION PROCEDURE



Invited talk on "Gateway to PMRF"  
on 11.12.2020



## Invited talk on “Energy Conservation & Energy Efficiency”

- The IEEE SB of NIT-Tiruchirappalli in association with Institute of Engineers (IEI India)- Tiruchirappalli Local Centre (TLC) & Tamil Nadu State Centre (TNSC) organized a technical webinar on the topic “Energy Conservation & Energy Efficiency” using Zoom Meetings app.
- The technical webinar was handled by Dr. R Harikumar, Director (in-charge), Energy Management Centre, Government of Kerala.
- The session was attended by UG & PG students , PhD scholars and faculties from all over the country. Engineers from IEI were also in attendance.

The poster features the IEEE logo and NIT Tiruchirappalli emblem at the top. It includes the text 'IEEE STUDENT BRANCH (STB99061) NATIONAL INSTITUTE OF TECHNOLOGY TIRUCHIRAPPALLI' and contact information. The main title is 'JOIN THE TECHNICAL TALK ON Energy Conservation and Energy Efficiency Via Zoom Meetings'. It specifies the event is part of 'Energy Conservation Day - 2020' on 'December 14, 2020' at '6:15 PM (IST)'. Meeting details include 'Meeting ID: 848 4414 9248' and 'Passcode: 604733'. A photo of Dr. R. Harikumar is shown speaking at a podium. The background includes images of solar panels, a globe, and icons for recycling, a lightbulb, and a wind turbine.

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in association with  
THE INSTITUTE OF ENGINEERS  
TAMIL NADU STATE CENTRE

JOIN THE TECHNICAL TALK ON  
**Energy Conservation  
and Energy Efficiency**  
Via Zoom Meetings

Energy Conservation Day - 2020

December 14, 2020  
6:15 PM (IST)

Meeting Details:  
Meeting ID: 848 4414 9248  
Passcode: 604733

Dr. R. Harikumar  
Director (in-charge)  
Energy Management Centre  
Government of Kerala

Invited talk on “Energy Conservation & Energy Efficiency”  
on 14.12.2020



# IEEE Membership Drive

- As part of the IEEE membership drive, an online session was handled by Dr. P Raja, Asso. Prof., Department of EEE, NIT Tiruchirappalli and Mr. Kannadasan K, Chairman, IEEE SB NITT.
- Dr. Raja started the session with the history of IEEE. He then introduced the ten regions of IEEE. Dr. Raja spoke in detail about the Madras Section. He explained about the different types of IEEE memberships and their benefits. He also highlighted the importance of IEEE Xplore digital library.
- Mr. Kannadasan's talk was about IEEE SB NITT and its student chapters. He listed some of the IEEE activities organized over the years. He then highlighted the benefits of student membership and revealed a special promo code for students.



### A glance at IEEE

P. RAJA  
Associate Professor, EEE  
NIT Tiruchirappalli

IEEE  
Advancing Technology  
for Humanity

### Institute of Electrical and Electronics Engineers

History

- 1884 – American Institute of Electrical Engineers (AIEE)
  - Increasingly focused on electrical power and its ability to change people's lives
- 1912 - Institute of Radio Engineers (IRE)
  - wireless telegraphy, John Fleming's diode and Lee de Forest's triode
- linking members through publications, standards, and conferences and encouraging them to organize local sections and meetings to exchange information and ideas.

IEEE

### NATIONAL INSTITUTE OF TECHNOLOGY TIRUCHIRAPPALLI IEEE STUDENT BRANCH

CONTENTS

- About IEEE SB NITT
- IEEE SB NITT Activities
- IEEE Student Membership benefits
- Membership application Process
- Special Promo Code for 50% Discount

IEEE  
Student Branch - NITT

### IEEE Benefits of IEEE Membership

#### Student Travel Grants & Scholarships



- Project funding from IEEE sections
- Variety of scholarships under various categories
- Travel grants for attending conferences
- Awards for recognition of works

IEEE  
Student Branch - NITT

IEEE Student Branch NIT-T - STB99061

IEEE Membership Drive on 29.12.2020



IEEE Student Branch NIT-T - STB99061

# Technical Society Chapters

1. Antennas & Propagation Society (**APS**) chapter
2. Computer Society (**CS**) chapter
3. Industry Applications Society (**IAS**) chapter
4. Microwave Theory & Techniques Society (**MTTS**) chapter
5. Power & Energy Society (**PES**) chapter



## IEEE Student Branch Activities - 2020

- Invited Talks – 26
- Inauguration Ceremonies – 2
- Awareness Programs – 1
- FDPs - 1
- Training Program – 1
- Membership Drive – 2
- Technical Workshop – 2
- Industrial Visit – 1
- IEEE Day Celebration – 1
- Competitions - 1





## IEEE Student Branch Committee Faculty Members



Name	Designation/Department	Role
Dr. M.P. Selvan	Associate Professor/EEE	Branch Counsellor
Dr. N. Kumaresan	Professor/EEE	IEEE SB Advisor
Dr. A.K. Bakthavatsalam	Professor/T&P	Coordinator, IEEE - EPICS
Dr. K. Dhanalakshmi	Professor/ICE	Women in Engineering & Initiation of IEEE society activities
Dr. Rajeswari Sridhar	Associate Professor & Head / CSE	
Dr. M. Venkatakirthiga	Associate Professor/EEE	Faculty Secretary, IEEE SB, NITT
Dr. P. Raja	Associate Professor/EEE	Membership drive & Faculty Advisor, PES Chapter
Dr. S. Moorthi	Associate Professor/EEE	Student project funding & Faculty Advisor, IAS Chapter
Dr. R. Pandeewari	Associate Professor/ECE	Faculty Advisor, APS Chapter
Dr. S.S. Karthikeyan	Assistant Professor/ECE	Faculty Advisor, MTTS Chapter
Dr. B. Shameedha Begum	Assistant Professor /CSE	Faculty Advisor, Computer Society
Dr. R. K. Kavitha	Assistant Professor / ECE	Membership drive, Student project funding & Mentoring various student activities.
Dr. S. Jaya Nirmala	Assistant Professor / CSE	



## IEEE Student Branch Committee Student Members



Name	Program/Department	Role
Mr. Kannadasan K	Ph.D./CSE	Chairperson
Mr. Nagendra Kumar Tiwari	M.Tech./EEE	Vice-Chairperson
Mr. Kannadasan K	Ph.D./CSE	Secretary
Mr. Patil Ganesh Anil	M.Tech./EEE	Additional Secretary
Mr. B Hanumantha Rao	Ph.D./EEE	Treasurer
Ms. Nandhini C	Ph.D./CSE	Webmaster



## IEEE Student Branch Committee Student Members – Executive Committee



Name	Program/Department
Mr. Mekala Ananda Reddy	Ph.D./ECE
Mr. Nrusingha Charan Pradhan	Ph.D./ECE
Mr. Sandhana Mahalingam M	Ph.D./ECE
Mr. Arjun Visakh	Ph.D./EEE
Mr. Nindra Sekhar	Ph.D./EEE
Mr. N Nageswara Reddy	Ph.D./EEE
Ms. Suhanya M.S.	Ph.D./EEE
Mr. Ritesh Mohan Acharya	M.S./EEE
Mr. Prafulkumar Mulik	M.Tech./EEE
Mr. Sandeep Kumar Singh	M.Tech./EEE
Mr. Alok Kumar	M.Tech./CTM
Mr. Srivathsan K	B.Tech./ICE
Mr. S.Chrisben Gladson	Ph.D./ECE
Mr. Pratik Pawade	MCA

# ONLINE PRESENCE

## Website

<http://sites.ieee.org/sb-nitt/>

<https://www.nitt.edu/home/students/clubsnsassocs/academic/ieee/>

## Social Media

Facebook : <https://www.facebook.com/ieeesbnitt/>

LinkedIn : <https://www.linkedin.com/company/nitt-ieee-student-branch>

Instagram : [ieeesbnitt](https://www.instagram.com/ieeesbnitt)



# CONTACT

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NIT Tiruchirappalli

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IEEE Student Branch NIT-T - STB99061



# Thank You



IEEE Student Branch NIT-T - STB99061