POORNIMA
COLLEGE OF ENGINEERING

Promoted by Shanti Education Society, Affiliated to Rajasthan Technical University & Approved by AICTE

A Report on 5-days Faculty Development Program

- **TITLE AND DURATION:** "Ubiquitous Computing and Wireless Sensor Networks" from 16 - 21 Sept., 2019
- **SPONSORS:** AICTE Quality Improvement Scheme (AQIS).
- **SUPPORTERS:** Dept. of Computer Engineering Dept. of Electronics & Communication Engineering
- **ORGANIZERS:** Poornima College of Engineering, Jaipur
- **OBJECTIVES:** The aim of the Short-Term Training Program (STTP) is to bring together the Communities who are working in the areas of Ubiquitous computing and wireless sensor network.
  - To make them understand current developments in Ubiquitous computing.
  - To provide knowledge about WSN, communication protocols and algorithms to be used in various industrial and societal applications and to create ubiquitous / pervasive computing environment for such applications.
  - To provide awareness and usage of various tools for implementing Ubiquitous and WSN applications.
  - To provide hands-on practice to carry out further experimental / research work in the area.
- **EXPECTED OUTCOMES:**
  - The objective of bringing together academic scientists, professors, research scholars and students working in various fields of engineering and Technology.
  - It will provide the authors, research scholars, listeners with opportunities for national and international collaboration and networking among universities and institutions for promoting research and developing the technologies globally.
  - To promote translation of basic research into institutional and industrial research and convert applied investigation into real- time application.

Dr. Mahesh Bundele
B.E., M.E., Ph.D.
Director
Poornima College of Engineering
ISI-6, RIICO Institutional Area
Sitapura, JAIPUR

♦ BROCHURE / POSTER / LEAFLET / FLYER:

Short Term Training Programme (STTP)
on
Ubiquitous Computing & Wireless Sensor Networks
September 16-21, 2019

REGISTRATION FORM

Name: .....

Designation: .....

Department: .....

Institute: .....

Institute Address: .....

.....

Mailing Address: .....

.....

Mobile No. : .....

E-mail: .....

Accommodation Required: ..... (Yes/No)

Details of the D.D*: No. ..... Dated .....

Issued by (Bank & Branch) .....

*Demand Draft drawn in favor of **"Poornima College of Engineering"**, payable at Jaipur.

Declaration of the Candidate

I declare that the details furnished are true to the best of my knowledge and I agree to abide by the rules and regulations governing the conduct of the AICTE sponsored programme

Place: Signature of Participant

Sponsorship Certificate

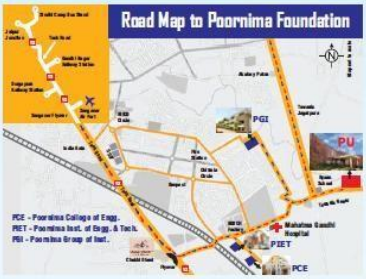
Mr/Ms/Dr. .....is an employee of our Institute and is hereby sponsored by us. He / She will be permitted to attend the course if selected.

Seal & Signature of Director / Principal

ACCOMMODATION & TRANSPORT

Mr. Ashwini Lata	Dean (Hostel), PG
Mr. Anmol Chaturvedi	Proctor, PCE
Mr. Amit Gupta	Proctor-In-Chief, PG
Mr. B. P. Yadav	Transport Officer, PG

HOW TO REACH



For further information contact

Dr. Ajay Khunteta
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E-mail : khutetaajay@poornima.org

Dr. Garima Mathur
✆ : 9829393517
E-mail : drg.mathur@poornima.org

Department of Computer Engineering
Department of Electronics & Comm. Engineering

POORNIMA
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www.pce.poornima.org

Short Term Training Programme (STTP)
on
Ubiquitous Computing & Wireless Sensor Networks
September 16-21, 2019

Sponsored by

All India Council For Technical Education
Under
AICTE Quality Improvement Scheme (AQIS)

Organized by

Department of Computer Engineering
Department of Electronics & Comm. Engineering

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POORNIMA COLLEGE OF ENGINEERING

Poornima College of Engineering (PCE), established as a brand of technical education in the year 2000, has its own glorious legacy of leading the young engineers to the mammoth sky of success. Its accomplishments forecast its journey through the hardships and its triumph over them one after another. PCE left no stone unturned since its establishment in turning the glorious vision into unbelievable reality providing the platform for knowledge and research and their practical implementations in different engineering professional prospects. Glorious glimpses of PCE:

Highly recognized and renowned affiliated technical institution all over Rajasthan with built up area more than 3.5 lacs square feet

Affiliated to RTU, Kota & approved by AICTE, New Delhi

The most preferred NBA Accredited Engineering College with running of six specializations of Engineering at UG Level (CSE, ECE, EE, ME, IT, CIV) and two at PG level (CS & VLSI)

The only institution permitted by RTU to admit FN/PIO/Gulf students & designated as centre of excellence by IBM

An excellent institution building its rapport in all sectors of education, research and development

ABOUT THE PROGRAM

Recent years, there has been development of new technologies related to Internet of Things, Industrial IoTs (IIoT), Industry 4.0, Smart Factories, Smart HealthCare, Smart Logistic and Supply Chains, Smart Mobility, and Smart Energy etc. Sensor nodes are the backbone of these technologies and these nodes can be worn, carried, embedded in the environment those can provide interesting contextual information. A significant increase in real world event monitoring capability with Wireless Sensor Networks will lead to a further evolution of ubiquitous computing applications. This new paradigm is about networked processors embedded in everyday objects, surrounding us, talking to each other over wireless links. Wireless Sensor Network along with RFID plays a vital role for ubiquitous computing as both the components can couple the physical world and virtual world. Ubiquitous computing and wireless sensor network has emerged as multi-disciplinary area of research and development.

Course participants will learn these topics through lectures and hands-on experiments. Also case studies and assignments will be shared to stimulate research motivation of the participants.

PROGRAM OBJECTIVES

The aim of the Short Term Training Programme (STTP) is to bring together the communities who are working in the areas of Ubiquitous computing and wireless sensor network and;

- To make them understand current developments in Ubiquitous computing.
- To provide knowledge about WSN, communication protocols and algorithms to be used in various industrial and societal applications and to create ubiquitous / pervasive computing environment for such applications.
- To provide awareness and usage of various tools for implementing Ubiquitous and WSN applications.
- To provide hands-on practise to carry out further experimental / research work in the area.

COURSE CONTENTS

Wireless Sensor Networks:

- Introduction to Wireless Sensor Networks and its Application
- Architecture ,Routing Algorithms
- Clustering algorithms
- Energy Efficient Schemes in WSN
- Application areas and Research issues in WSN
- Security issues in WSN
- WSN and NS-2: Hands-on experience
- Introduction to Sensnut: A hands-on session

Ubiquitous Computing

- Architectural Structure, Design Decisions and Philosophies
- Autonomic Management of Ubiquitous Systems
- Intelligent Devices and Environments
- Wearable Computers and Technologies
- Ubiquitous intelligent applications like Health care system, wearable devices

IMPORTANT DATES

Deadline for receiving Registration Form	10. 09. 2019
Intimation of Selection :	11. 09. 2019

ACCOMMODATION

Accommodation will be provided to the participants on prior request based on availability in hostel on payment.

REGISTRATION FEES

No fees for this STTP

ELIGIBILITY

Faculty members/PG /Ph.D Scholors from AICTE recognized Engineering colleges & Polytechnic colleges.

EMINENT SPEAKERS

Dr. Uday Desai	IIT, Hyderabad
Dr. Shankar Prakriya	IIT, Delhi
Dr. Rahul Banerjee	LNMIIT, Jaipur
Dr. Santhi Thilagam	NIT, Surathkal, Karnataka
Dr. T.S. Pradeep Kumar,	VIT University, Tamil Nadu
Dr. L. Nirmala Devi	O. U. College of Engineering, Telangana

PATRON

Dr. S. M. Seth	**Ar. Shashikant Singhi**
Chairman (Emeritus) Poornima Group	Chairman, Poornima Group

ADVISORS

Mr. M. K. M. Shah	**Ar. Rahul Singhi**
Director (Admin & Finance)	Director
Poornima Group	Poornima Group
Dr. Mahesh M. Bundele	**Er. Pankaj Dhemla**
Principal & Director,	Vice-Principal
Poornima College of Engineering	Poornima College of Engineering

COORDINATORS

Dr. Ajay Khunteta	Coordinator
Dr. Garima Mathur	Co-ordinator

PCE ACADEMIC COMMITTEE

Dr. Surendra Kumar Yadav	HOD, CSE
Dr. Virendra Sangtani	HOD, EE
Mr. Amol Saxena	HOD, IT
Dr. Ashok Kajla	Professor, ECE
Dr. Sunil Pathak	Professor, CSE
Dr. Praveen Gupta	Professor, CSE
Dr. Sunil Gupta	Asso. Professor, CSE
Dr. Neelam Chaplot	Asso. Professor, CSE
Dr. Satya Prakash Maurya	Asso. Professor, CSE
Dr. Sonal Sharma	Asso. Professor, CSE
Dr. Meenakshi Naval	Asso. Professor, CSE
Dr. Anila Dhingra	Asso. Professor, ECE
Mr. Manish Bhardwaj	Asst. Professor, CSE
Mr. Rajveer	Asst. Professor, ECE
Mr. Tarun Mishra	Asst. Professor, ECE

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♦ PROGRAM SCHEDULE:

Poornima College of Engineering (PCE), under the aegis of its Department of Computer Engineering, and Department of Electronics & Comm. Engineering, organized the Short-Term Training Program on Ubiquitous Computing and Wireless Sensor Networks from 16-21st September, 2019. This STTP was sponsored by AICTE under AQIS scheme. Programme schedule for all six days and Q Sheet of Inaugural function are as follows

Programme Outline	
Monday, Day 1: 16th September, 2019	
8.00 am – 09.00 am	Welcome Reception and Registration Opens
9.00 am – 10.00 am	**Inaugural Function** A. Chief Guest Prof. (Dr.) Uday B. Desai, Former Director, IIT, Hyderabad B. Guest of Honour Prof. (Dr.) Rahul Banerjee, Director, LNM IIT, Jaipur C. Dr. Mahesh Bundele, Director, Poornima College of Engineering D. Mr. Pankaj Dhemela, Vice Principal, Poornima College of Engineering E. Dr. Ajay Khunteta, Coordinator STTP Venue: CG-05 Poornima College of Engineering,Jaipur
10.00 am – 10.30 am	**High Tea / Coffee Break**
10.30 am -11.45 am	**Keynote Address-1** Resource Person: Prof. (Dr.) Uday B. Desai, Former Director, IIT, Hyderabad Venue: CG-05 Poornima College of Engineering, Jaipur
11.45 am - 1.00 pm	**Keynote Address -2** Resource Person: Prof. (Dr.) Rahul Banerjee, Director, LNM IIT, Jaipur Venue: CG-05 Poornima College of Engineering, Jaipur
1.00 pm - 2.00 pm	**Lunch Break**
2.00 pm - 4.00 pm	**Lab Session 1: Introduction & Hands-on on NS-3** Resource Person: Mr. Rahul Hada, System Engineer, Criterion Networks Ltd, Bangalore Venue: IBM Lab
Tuesday, Day 2: 17th September, 2019	

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9.00 am -11.00 am	**Session 1** Title: Popular Routing Algorithms WSN Resource Person: Dr. L. Nirmala Devi, Osmania University. Hyderabad Venue: CF-05 Poornima College of Engineering, Jaipur
11.00 am – 11.30 am	**High Tea / Coffee Break**
11.30 am - 1.30 pm	**Session 2** Title: Popular Clustering Algorithms in WSN Resource Person: Dr. L. Nirmala Devi, Osmania University. Hyderabad Venue: CF-05 Poornima College of Engineering, Jaipur
1.30 pm - 2.00 pm	**Lunch Break**
2.00 pm - 4.00 pm	**Lab Session 2: Hands-on on NS-3** Resource Person: Mr. Rahul Hada, System Engineer, Criterian Networks Ltd, Bangalore Venue: IBM Lab
Wednesday, Day 3: 18th September, 2019	
9.00 am -11.00 am	**Session 3** Topic: Extending Battery Lifetime Through Energy Harvesting, and the Journey Towards Self-Sustaining Nodes Resource Person: Dr. Shankar Prakriya, Professor, Deptt of ECE, IIT Delhi Venue: CF-05 Poornima College of Engineering, Jaipur
11:00 am – 11:30 am	**High Tea / Coffee Break**
11.30 am -1.30 pm	**Session 4** Title : Towards Higher security and Spectral Utilization Efficiency through Interference Management Resource Person: Dr. Shankar Prakriya, IIT Delhi Venue: CF-05 Poornima College of Engineering, Jaipur
1.30 pm-2.00 pm	**Lunch Break**
2.00 pm - 4.00 pm	Lab Session 3: Introduction & Hands-on on SenseNut WSN Tool Resource Person: Dr. Garima Mathur, HoD, ECE, PCE Jaipur Venue: IBM Lab
Tuesday, Day 4: 19th September, 2019	
9.00 am – 11.00 am	**Session 5** Title: Research on WSN at IIT Bombay Resource Person: Dr. Shabbir Merchant, IIT Bombay, Mumbai Venue: CG-05 Poornima College of Engineering, Jaipur

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11:00 am – 11:30 am	**High Tea / Coffee Break**
11.30 am - 1.30 pm	**Session 6** Title: WSN Taxonomy of Simulation Tools Resource Person: Dr Tarun Kumar Dubey, Manipal University, Jaipur Venue: CG-05 Poornima College of Engineering, Jaipur
1.30 pm - 2.00 pm	**Lunch Break**
2.00 pm - 4.00 pm	**Lab Session 4: Hands-on on SenseNut WSN Tool** Resource Person: Dr.Garima Mathur, HoD, ECE, PCE Venue: IBM Lab
09:00 am – 11:00 am	**Session 7** Title: Data Management Issues in WSNs Resource Person: Dr. Santhi Thilagam, Professor, NIT, Surathkal, Karnataka Venue: CG-05 Poornima College of Engineering, Jaipur
11:00 am – 11:30 am	**High Tea / Coffee Break**
11.30 pm - 1.30 pm	**Session 8** Title: Wireless Sensor Networks and Network Simulator 2 Hands On Experience Resource Person: Dr. T.S. Pradeep Kumar, Professor, VIT University, Tamil Nadu Venue: CG-05 Poornima College of Engineering, Jaipur
1.30 pm - 2.00 pm	**Lunch Break**
2.00 pm - 4.00 pm	**Lab Session 5: Hands on Practise on NS2** Resource Person: Dr. T.S. Pradeep Kumar, Professor, VIT University, Tamil Nadu Venue: IBM Lab
Tuesday, Day 6: 21st September, 2019	
9:00 am – 10:00 am	**Session 9** Title: Challenges in Ubiquitous Computing & WSN Resource Person: Dr. Mahesh Bundele, PCE Venue: CG-05 Poornima College of Engineering, Jaipur
10:00 am -11:00am	**Evaluation Test** Venue: CG-05 Poornima College of Engineering, Jaipur
11:00 am - 11:30 am	**High Tea / Coffee Break**
11.30 am - 12.30 pm	**Valedictory Function**
12.30 pm - 1.30 pm	**Lunch Break**
1.30 pm - 5.30 pm	**Jaipur Visit**

♦ INAUGURAL SESSION:

Short Term Training Program on

Ubiquitous Computing and Wireless Sensor Networks September 16 -21, 2019

Sponsored by

AICTE Quality Improvement Scheme

(AQIS)

Organized by:

Department of Computer Engineering Department of Electronics & Comm. Engineering

Poornima College of Engineering, Jaipur

Q- Sheet Inaugural Session

Monday 16th September, 2019, Venue: CG 05, PCE, Jaipur

S. No	Activity	Duration	Time
1.	Reporting and Registration of Delegates	30 Min	08:30 am-09:00 am
2.	Welcome of Dignitaries by the anchors	05 Min	09:00 am-09:05 am
3.	Request the dignitaries for lighting of lamp (Parallel Saraswati Vandana) • **Chief Guest Prof. (Dr.) Uday B. Desai,** Former Director, IIT, Hyderabad • **Guest of Honour Prof. (Dr.) Rahul Banerjee**, Director, LNM IIT, Jaipur • **Dr. Mahesh Bundele**, Director, Poornima College of Engineering • **Mr. Pankaj Dhemela**, Vice Principal, Poornima College of Engineering • **Dr. Ajay Khunteta,** Coordinator STTP	05 Min	09:05 am-09:10 am

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4.	• **Felicitation of Chief Guest Prof. (Dr.) Uday B. Desai, Former Director, IIT, Hyderabad** by **Dr. Mahesh Bundele**, Director, Poornima College of Engineering • **Felicitation of Guest of Honour (Dr.)Rahul Banerjee, Director, LNM IIT, Jaipur by Mr. Pankaj Dhemela**, Vice Principal, Poornima College of Engineering	5 Min	09:10 am-09:15 am
5.	Introduction of STTP by Coordinator **Dr. Ajay Khunteta**, Professor CSE, PCE	5 Min	09:15 am-09:20 am
6.	Welcome address by **Dr. Mahesh Bundele**, Director, Poornima College of Engineering	5 Min	09:20 am-09:25 am
7.	Address by **Porf. (Dr.) Rahul Banerjee,** Director, LNMIIT, Jaipur	10 Min	09:25 am-09:35 am
8.	Inaugural Address by **Chief Guest Dr. Uday B. Desai, IIT, Hyderabad**	15 Min	09:35 am-09:50 am
9.	Vote of Thanks by **Dr. Garima Mathur**, HoD, ECE	05 Min	09:50 am-09:55 am
10	Group Photograph	05 Min	09:55 am-10:00am
11	High Tea	30 Min	10:00 am-10:30 am

♦ DETAILS OF RESOURCE PERSONS:

- Dr. Uday Desai, Professor, IIT, Hyderabad Dr. Shankar Prakriya, Professor, IIT, Delhi
- Dr. Rahul Banerjee, Professor, LNMIIT, Jaipur
- Dr. Shabbir Merchant, Emeritus Professor, IIT Bombay, Mumbai Dr. Santhi Thilagam, Professor NIT, Surathkal, Karnataka
- Dr. T.S. Pradeep Kumar, Professor, VIT University, Tamil Nadu
- Dr. L. Nirmala Devi, Associate Professor, O. U. College of Engineering, Tamil Nadu Dr. Mahesh Bundle, Professor, Poornima College of Engineering, Jaipur
- Dr. Tarun Kumar Dubey, Associate Professor, Manipal University, Jaipur Dr. Garima Mathur, Professor, Poornima College of Engineering, Jaipur.
- Mr. Rahul Hada, System Engineer, Criterion Networks Ltd, Bangalore

♦ GLIPMSES OF CONDUCTION:

On First day 16th September, 2019, the inaugural ceremony was organized in Conference

Hall CG-05. Prof. Dr. Uday B. Desi, Former Director, IIT Hyderabad was invited as the Chief Guest and Dr. Rahul Banerjee, Director, LNM IIT, Jaipur was invited as Guest of Honor in the ceremony. Presence of students and faculty members of various engineering colleges across India as audience made the event lively. The inaugural ceremony started with lighting of lamp by the dignitaries.

Anchor of Inaugural Session

Lighting of Lamp by Prof. Dr. Rahul Banerjee

Lighting of Lamp by Prof. Dr. Mahesh Bundele

Dr. Mahesh Bundele
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Lighting of Lamp by Prof. Pankaj Dhemela

Lighting of Lamp by Dr. Ajay Khunteta

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Dignitaries were felicitated by bouquets and mementos. The ceremony was enlightened by precious words of Dignitaries.

Felicitation of Dr. Uday B. Desi By Dr. Mahesh Bundele

Felicitation of Dr. Uday B. Desi By Dr. Mahesh Bundele

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Felicitation of Dr.Rahul Banerjee by Prof. Pankaj Dhemela

Felicitation of Dr. Rahul Banerjee by Prof. Pankaj Dhemela

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- ## Introduction of One Week STTP on Ubiquitous Computing and WSN:

Dr. Ajay Khunteta Professor and Coordinator of this STTP, welcome and introduced all guests to the audience. He threw a light on importance and relevance of this STTP in current scenario. He informed to all that total 42 PG students and faculty members across India are participating in this Training Program. He briefly introduced all the experts of STTP and lab session on NS3 and Sensnut.

Introduction of STTP by Dr. Ajay Khunteta

- ## Address by Director, PCE:

Dr. Mahesh Bundele (Director, PCE) congratulated all the participant to be a part of this training program. Dr. Mahesh Bundele spoke about the steps taken by Poornima Engineering College for improvement in research and development. He also informed the audience about ongoing and upcoming IEEE conferences organizing by college in near future. He also invited all audience for submit their research paper in upcoming IEEE conference ICRAIE-2019 (International Conference on Recent Advances in Engineering - 2019) to be held in Malaysia in month of November 2019.

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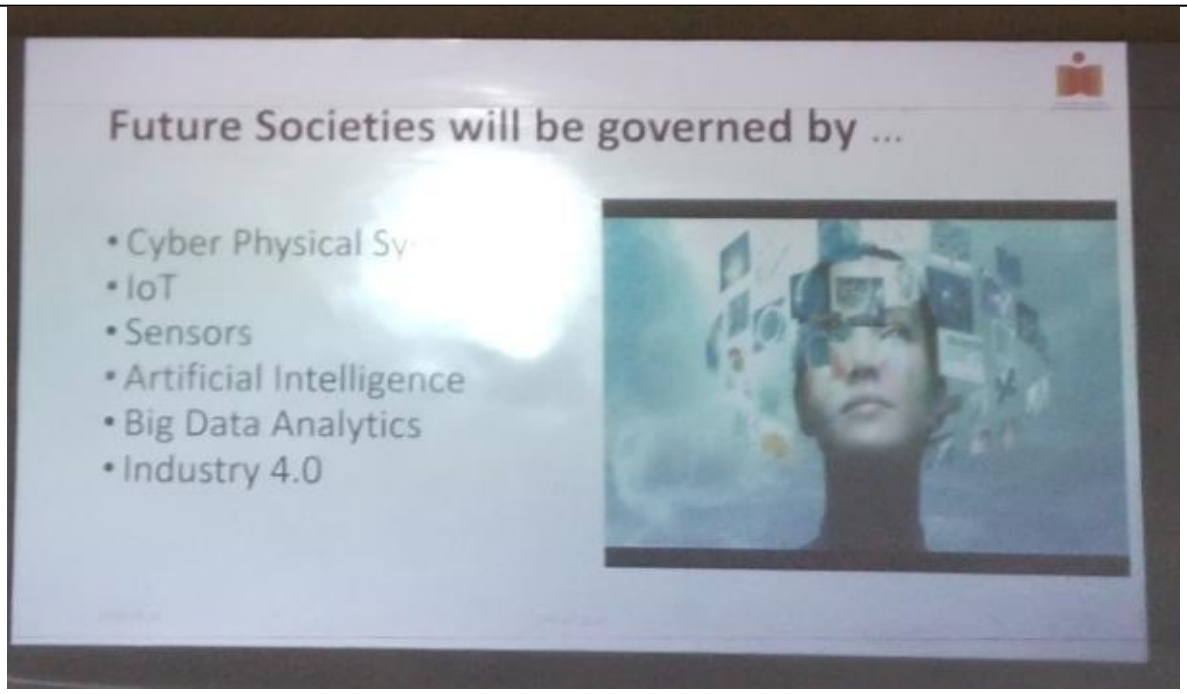
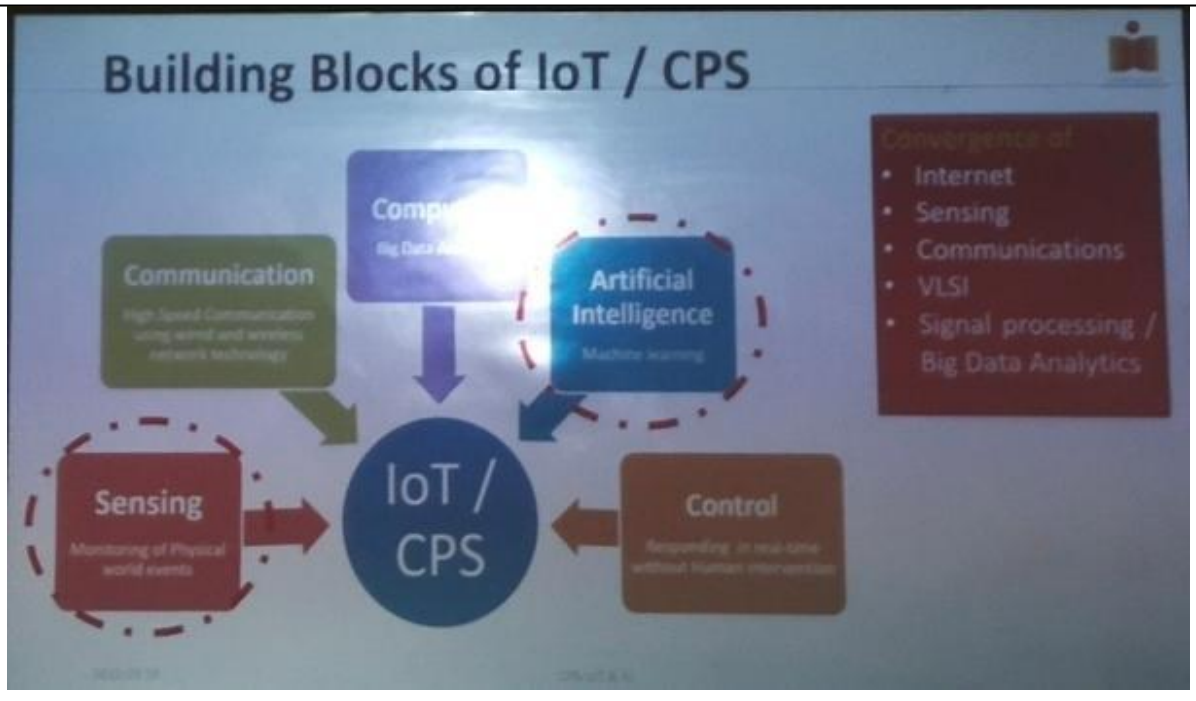
Welcome Address by Dr. Mahesh Bundele, Director, PCE

The Expert talk were conversed by Prof. Dr. Uday B. Desi Former Director, IIT Hyderabad and Dr. **Rahul Banerjee.** , Director, LNM IIT, Jaipur.

Expert Talk by Prof. Dr. Udai Desi, Former Director, IIT Hyderabad

Prof. Dr. Uday B. Desi, Former Director, IIT Hyderabad delivered a talk on challenges of Ubiquitous computing and WSN. He motivated students to work on some challenging problems and discussed some project and research work carried out at IIT Hyderabad in areas of Robotics, Healthcare, IOT and Agriculture. He also shown some video of projects of woman security using wsn, autopilot drone, Drone based remote sensing, IOT network for smart agriculture, detection of flowering panicles, Emergency alarming device with LoRa, and crop prediction of rice etc carried out at IIT H by his team and students.





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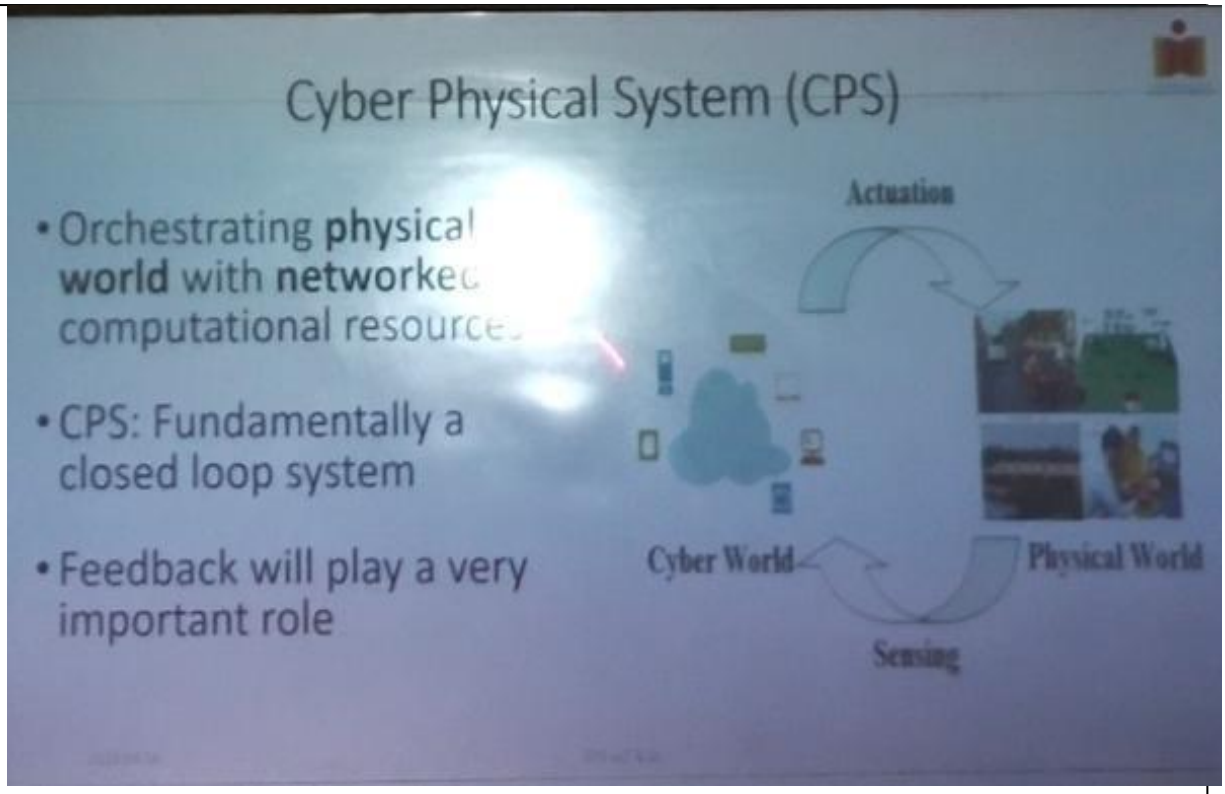

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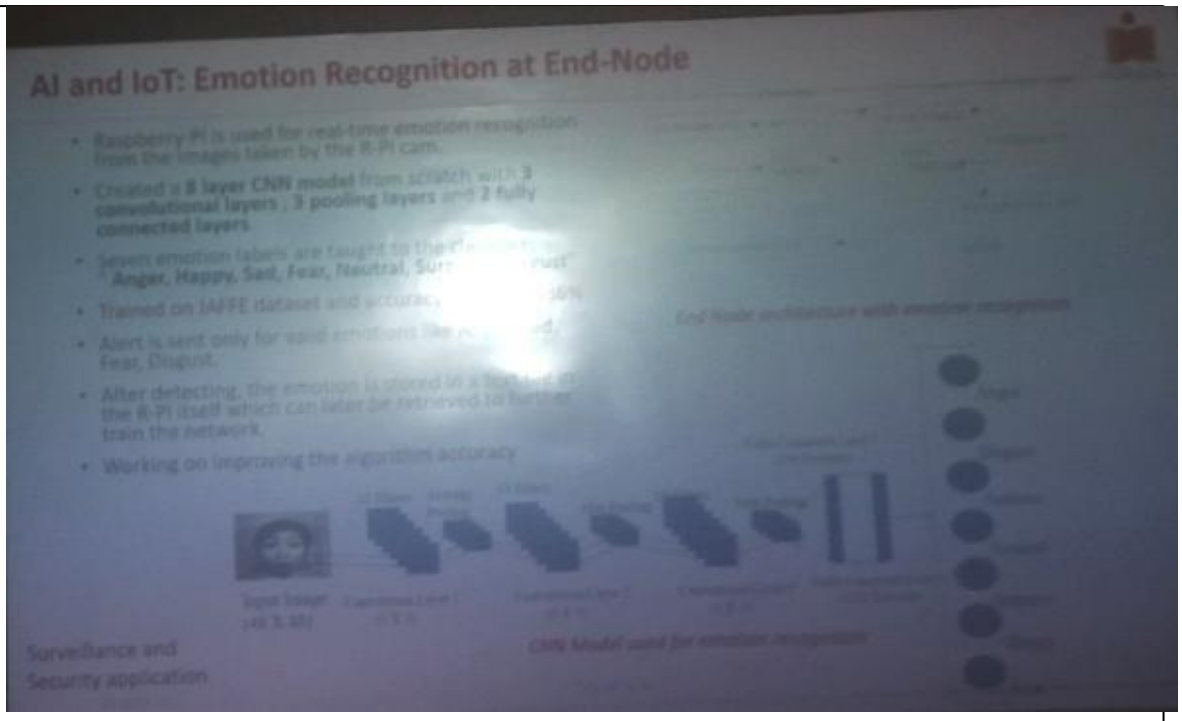

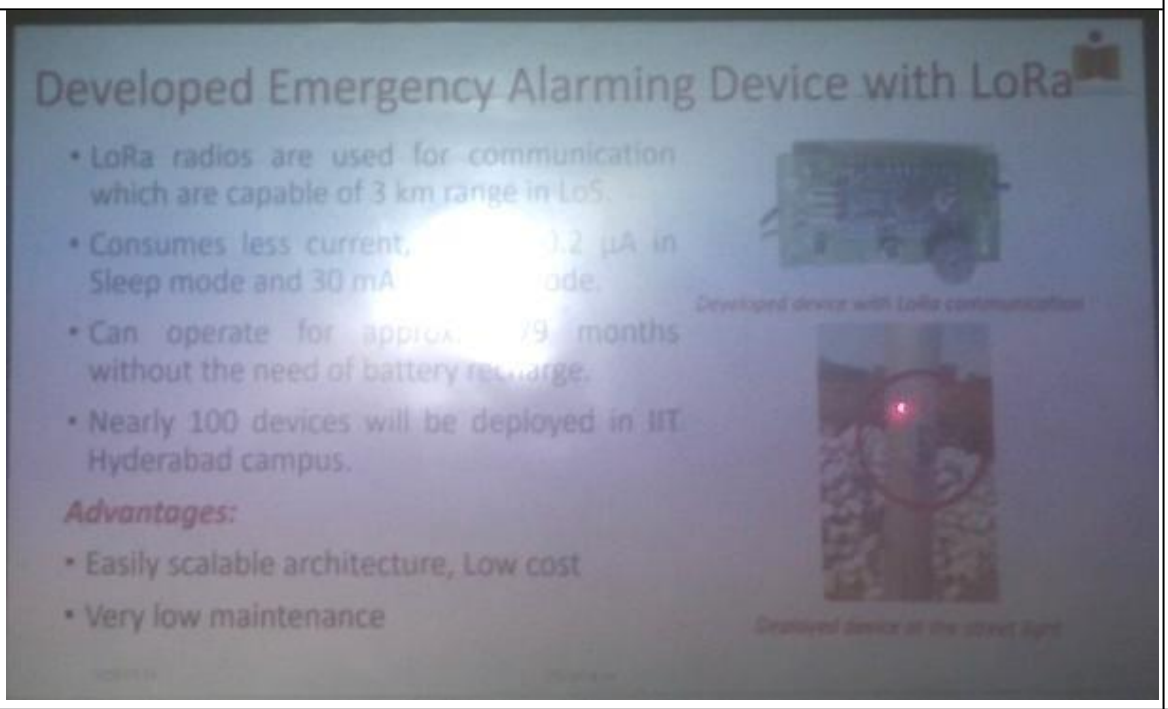

Some of slides during talk of Prof. Dr. Uday B. Desi

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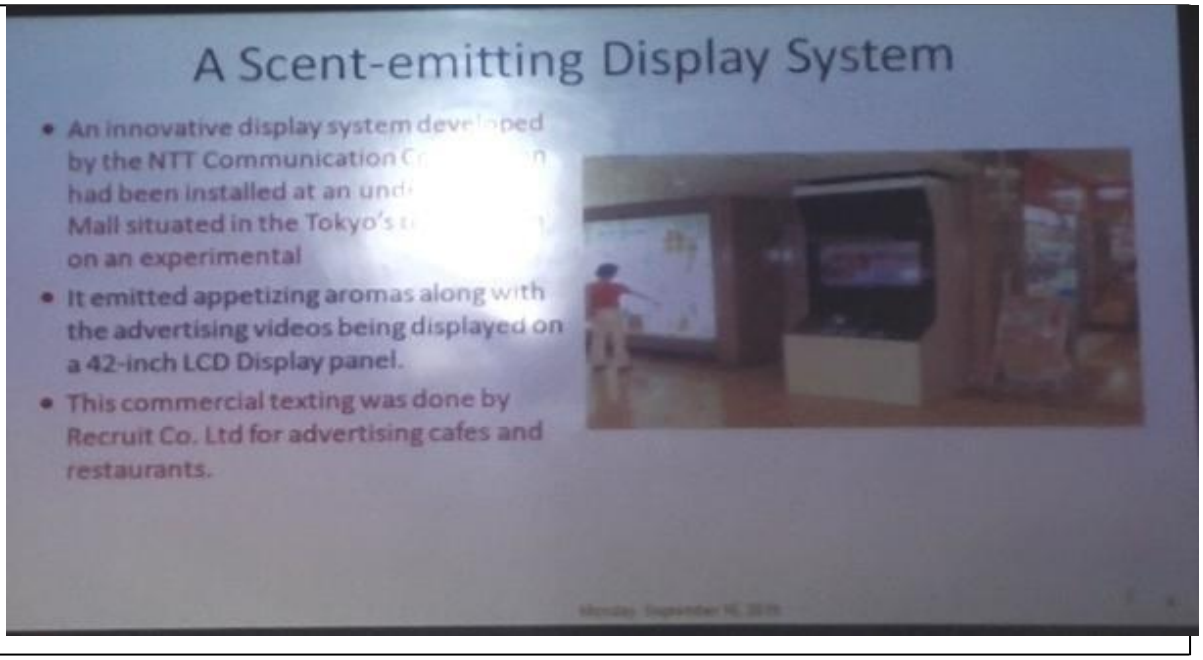
The other keynote speaker **Dr. Rahul Banerjee.** , Director, LNMIIT, Jaipur shared his experiences in field of Ubiquitous computing. He shared some challenging problems and their possible solutions with the participants. He discussed a scent emitting display system, MS EL Project carried out at an MSR laboratory, and Emotion recognition at end node using AI and IOT.

Expert Talk by Prof. Dr. Rahul Banerjee, Director, LNMIIT, Jaipur



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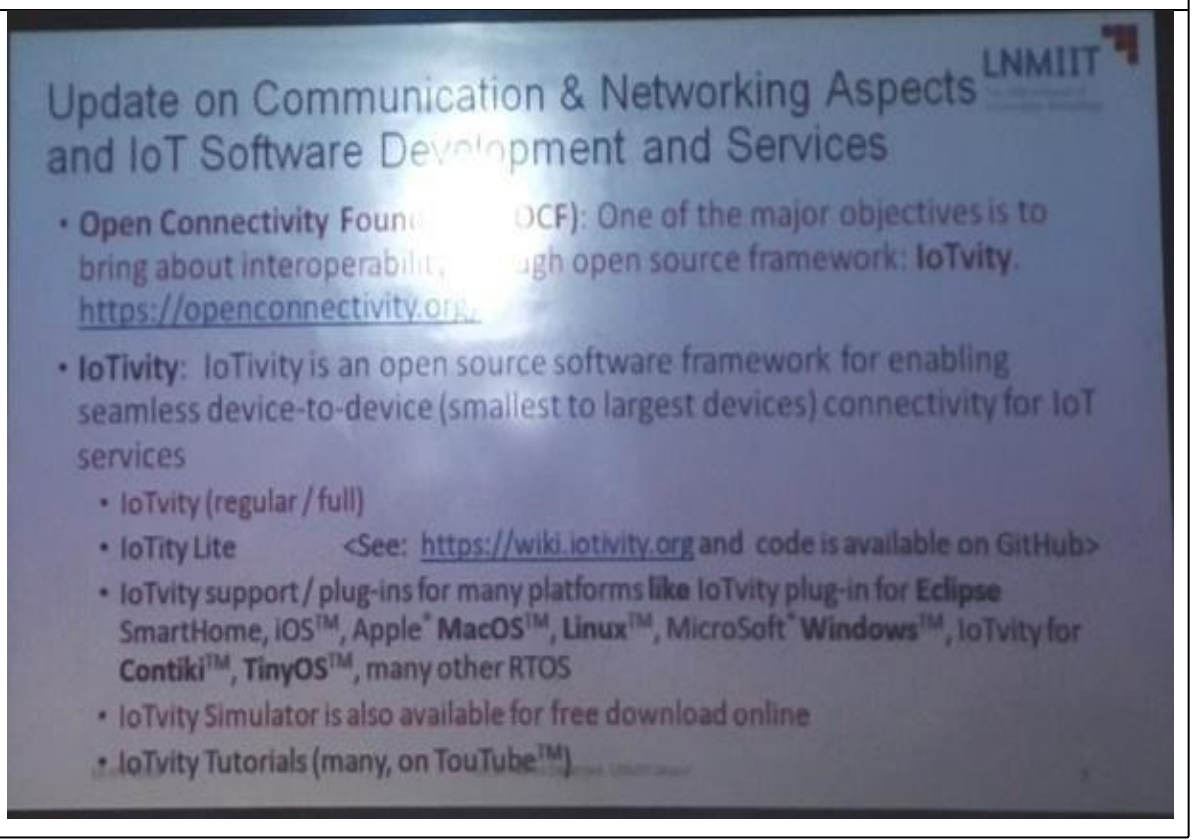

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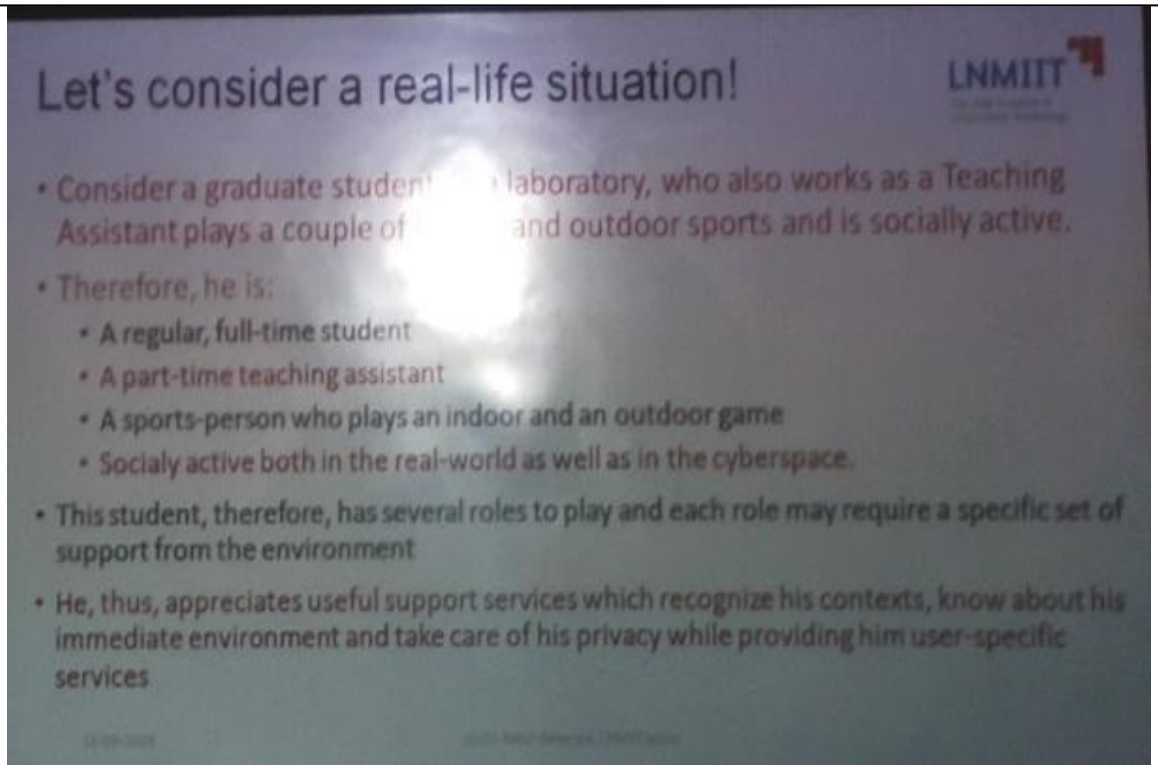

Some of slides during talk of Prof. Dr. Rahul Banerjee

Vote of Thanks by Dr. Garima Mathur, Professor, PCE, Jaipur

Dr. Mahesh Bundele
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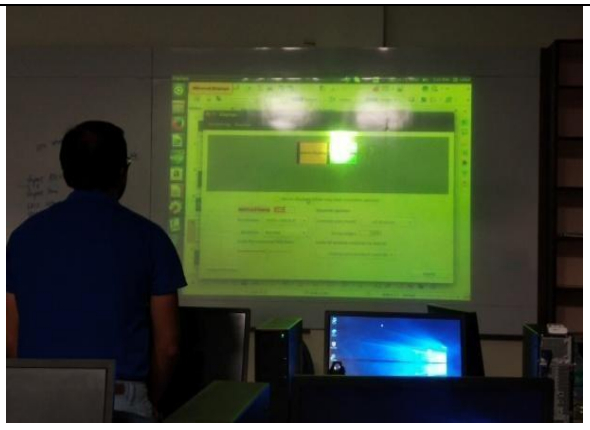
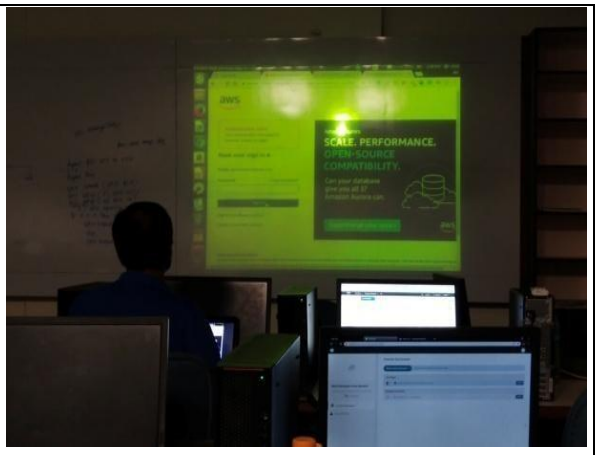
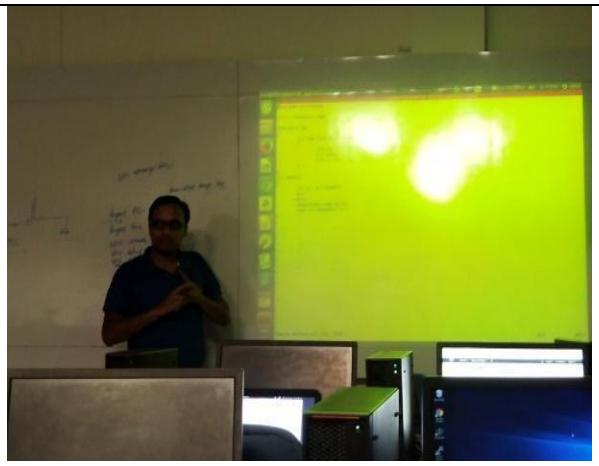
Dr.Garima Mathur Prof. ECE department proposed vote of thanks. Celebration was successfully completed under the encouraging support and guidance of Dr. Mahesh Bundele, Director, Mr. Pankaj Dhemla, Vice Principal, Mr. Punit Shukla, Registrar, Dr. Suchi Dave, Chair WISE, Mr. Amol Saxena HOD-IT, Poornima College of Engeering.

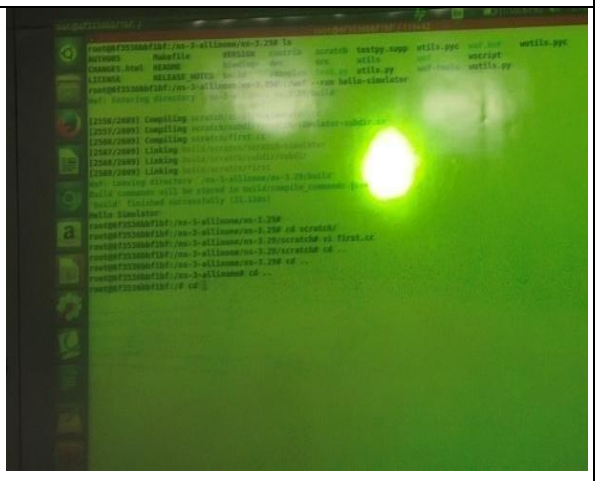
♦ CONTENT DELIVERY / PRACTICAL SESSIONS:

After lunch Mr. Rahul Hada has taken the lab session on NS3. He discussed the importance features of NS3 which are useful in research in area of network. He demonstrated the method through which anybody can use NS3 from cloud which was deployed by himself. He also demonstrated the process of installation of NS3 on desktop PC.









Some Screenshot of lab session taken by Mr. Rahul Hada

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Day 2:

On day 2 Tuesday Prof. **Dr. L. Nirmala Devi**, from Osmania University. Hyderabad was resource person. She took two different session on WSN from 9.00am to 11 am and 11.30 am to 1:30 pm. In first session form 9:00am to 11:00 am she explained some very popular routing algorithms in field of WSN.

Felicitation of Dr. L. Nirmala Devi by Dr. Mahesh Bundele

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She discussed the challenges and limitation with exiting routing algorithms in wsn. She discussed some of her publications related possible solution of energy problems in exiting routing algorithm. She was very much focused on energy harvesting systems in WSN and related protocols. She explained the architecture of some very famous solution of battery problem with real time examples. In next session form 11:30am to 1:30 pm she demonstrates some projects which were carried out by PG students under her supervision.

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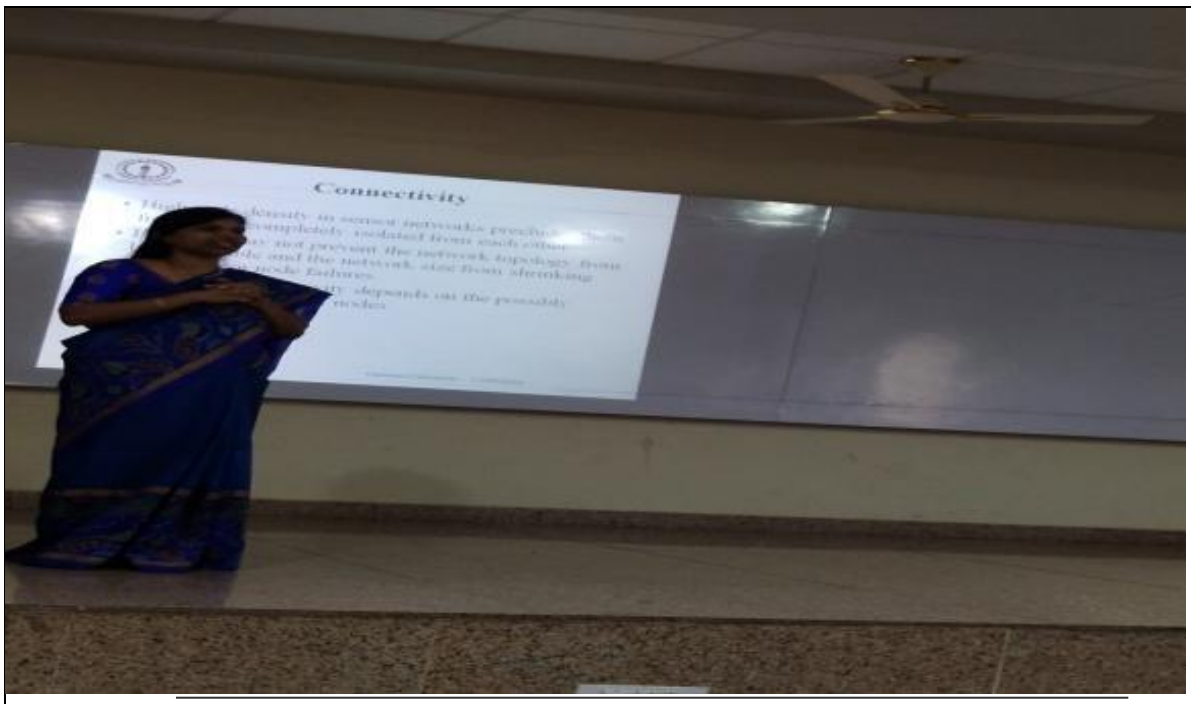


Some Screenshot during talk of Dr. L. Nirmala Devi

She also discussed one DST project on measurement of water quality on hill areas at Hyderabad. She explained the role of wsn in water problem using sensors and 3D printing machine.

Lab session: on day 2 Mr. Rahul Hada continued with previous session. He demonstrates the implementation of some routing algorithms using NS3.

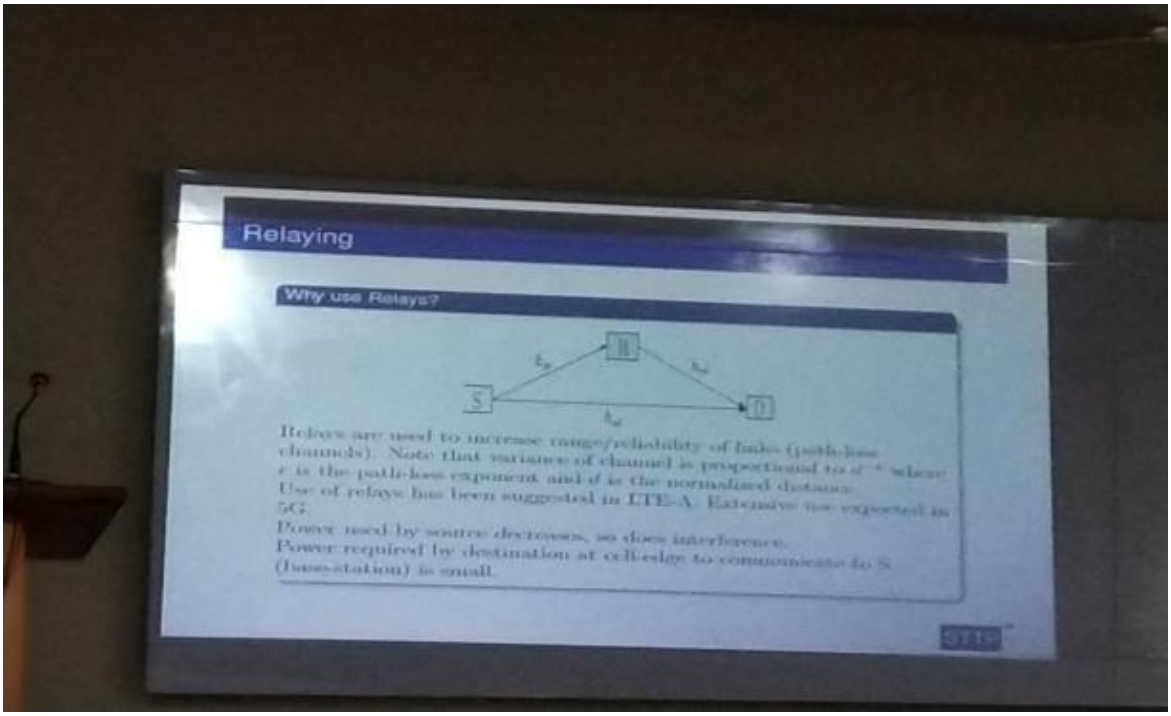
Day 3:

On day 3 Wednesday, **Dr. Shankar Prakriya**, Professor, Dept. of ECE, IIT Delhi was the resource person. He took session first from 9:00am to 11:00am and second session from 11:30am to 1:30 pm.

Felicitation of Dr. Shankar Prakriya by Dr. Mahesh Bundele

Felicitation of Dr. Shankar Prakriya by Dr. Mahesh Bundele

In first session he delivered a talk on "Extending Battery Lifetime through Energy Harvesting, and the Journey towards Self-Sustaining Nodes".



Some Screenshot during talk of Prof. Dr. Shankar Prakriya

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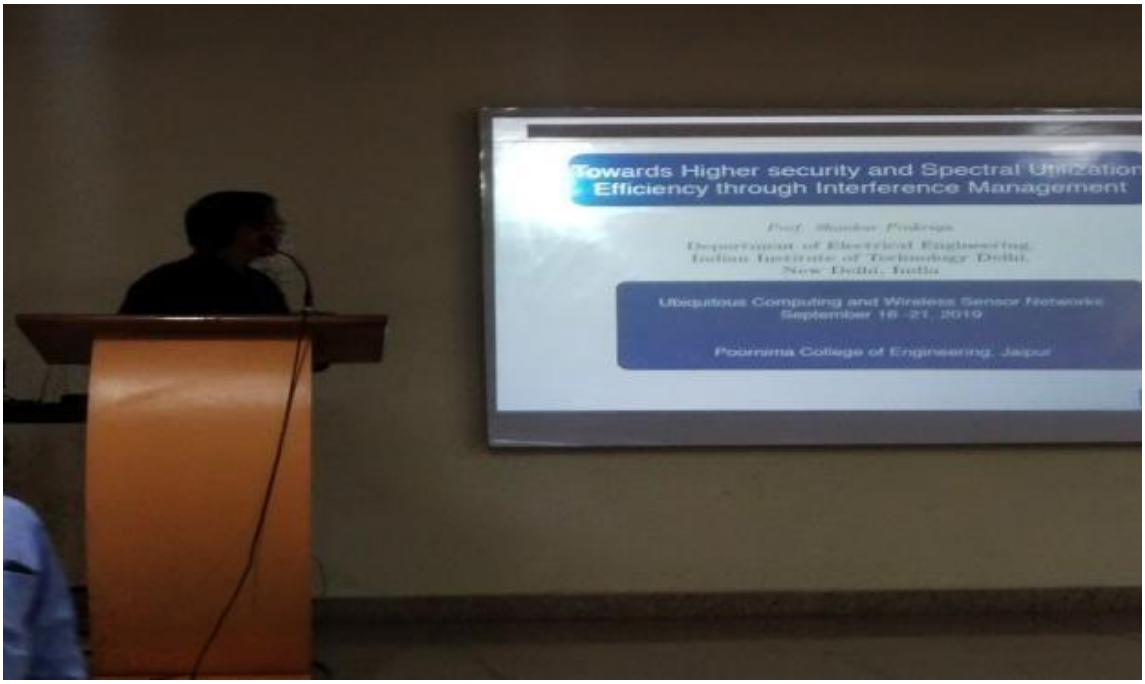

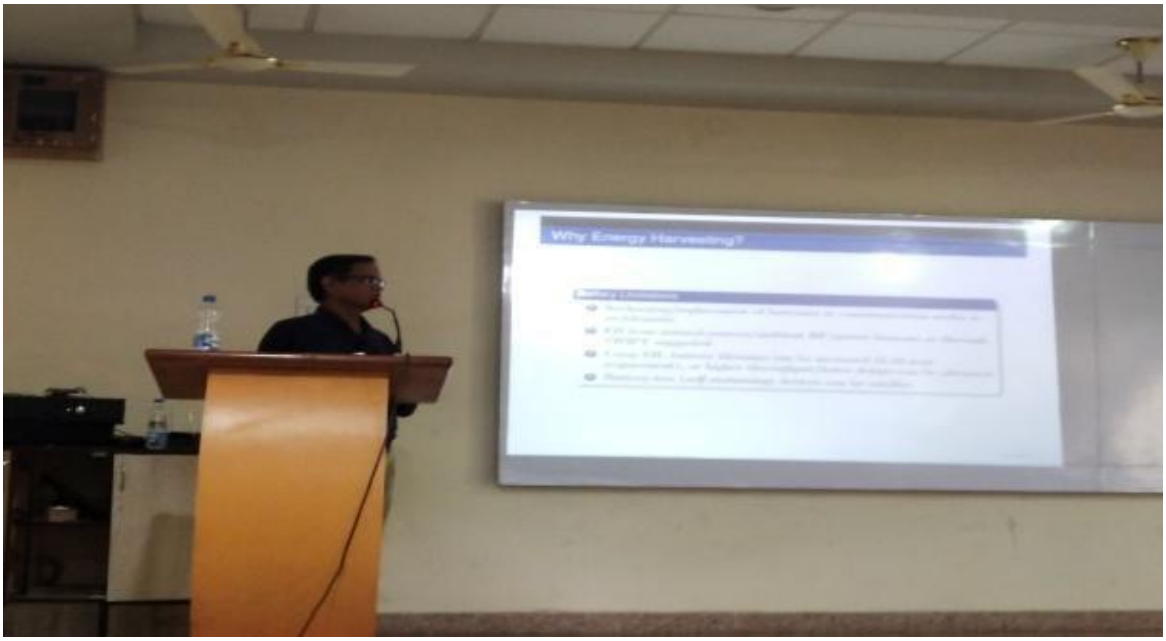

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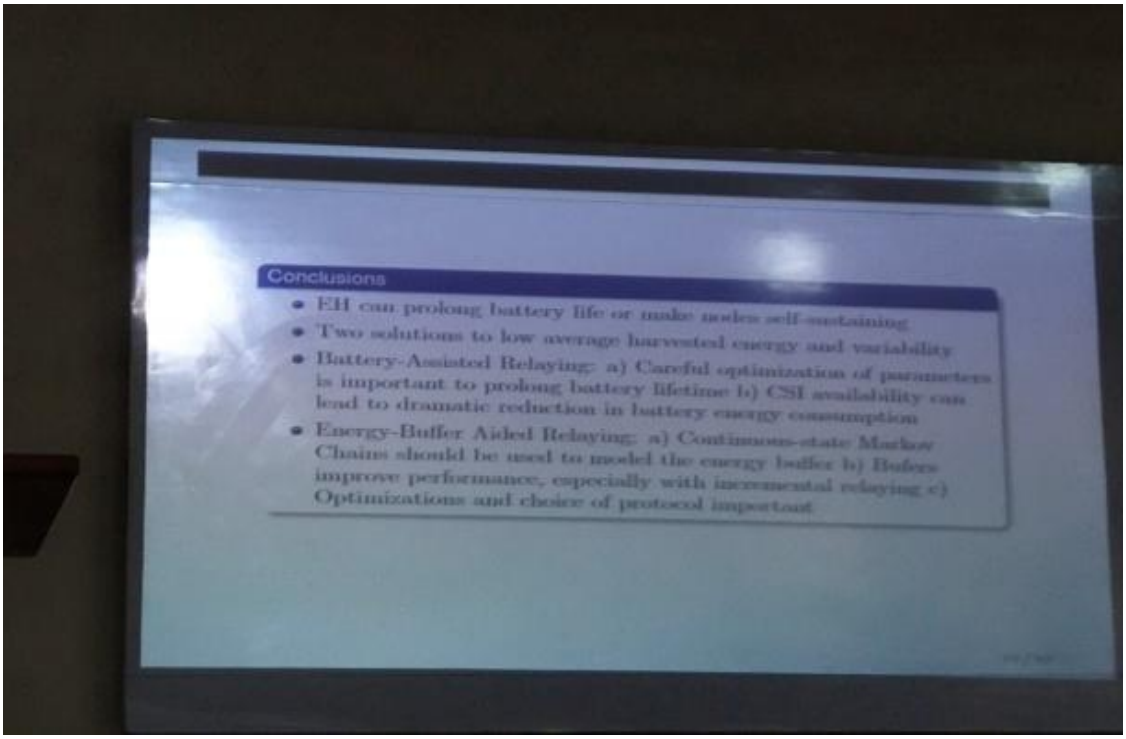

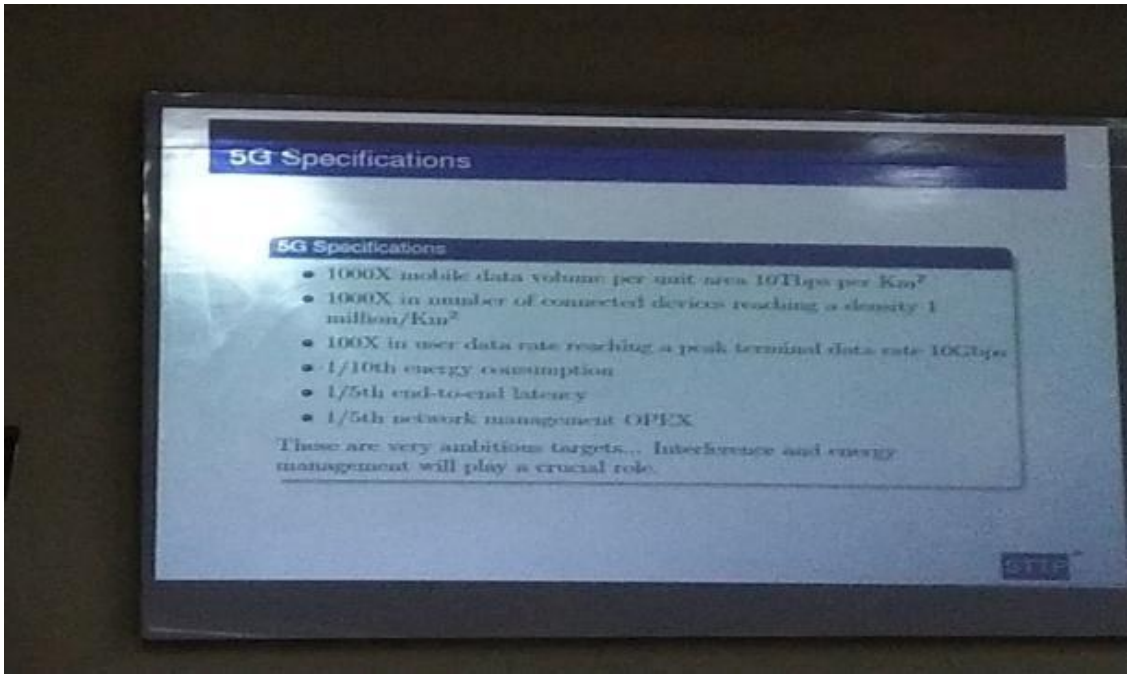

Some Screenshot during talk of Prof. Dr. Shankar Prakriya

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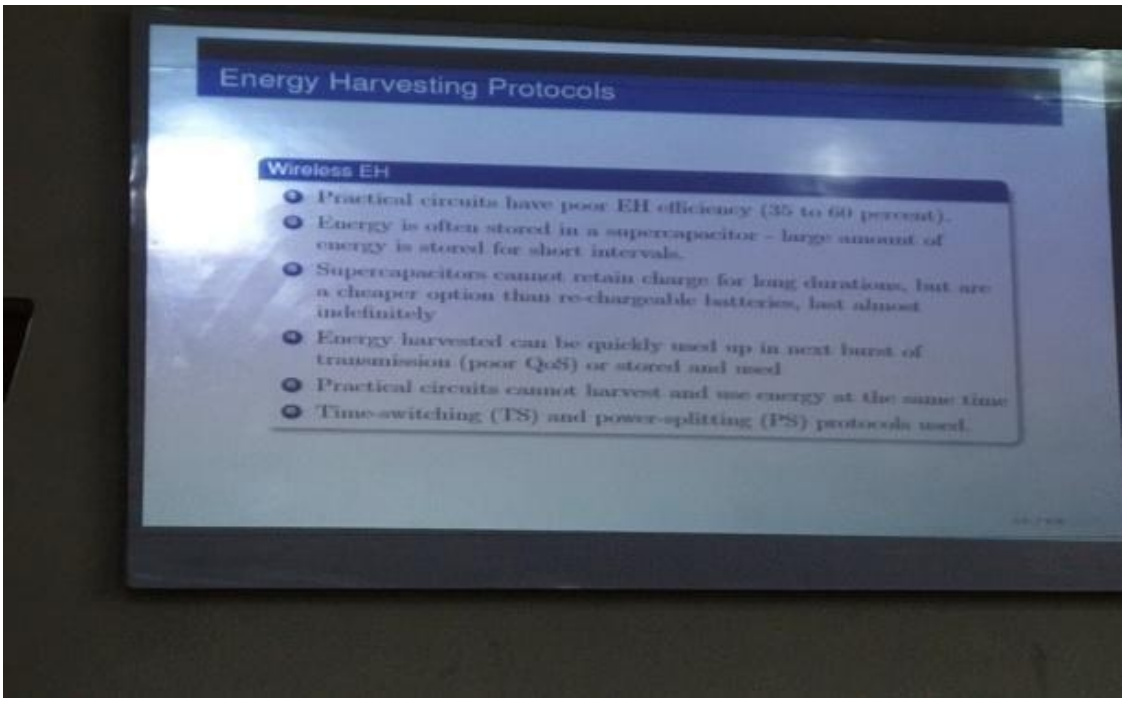

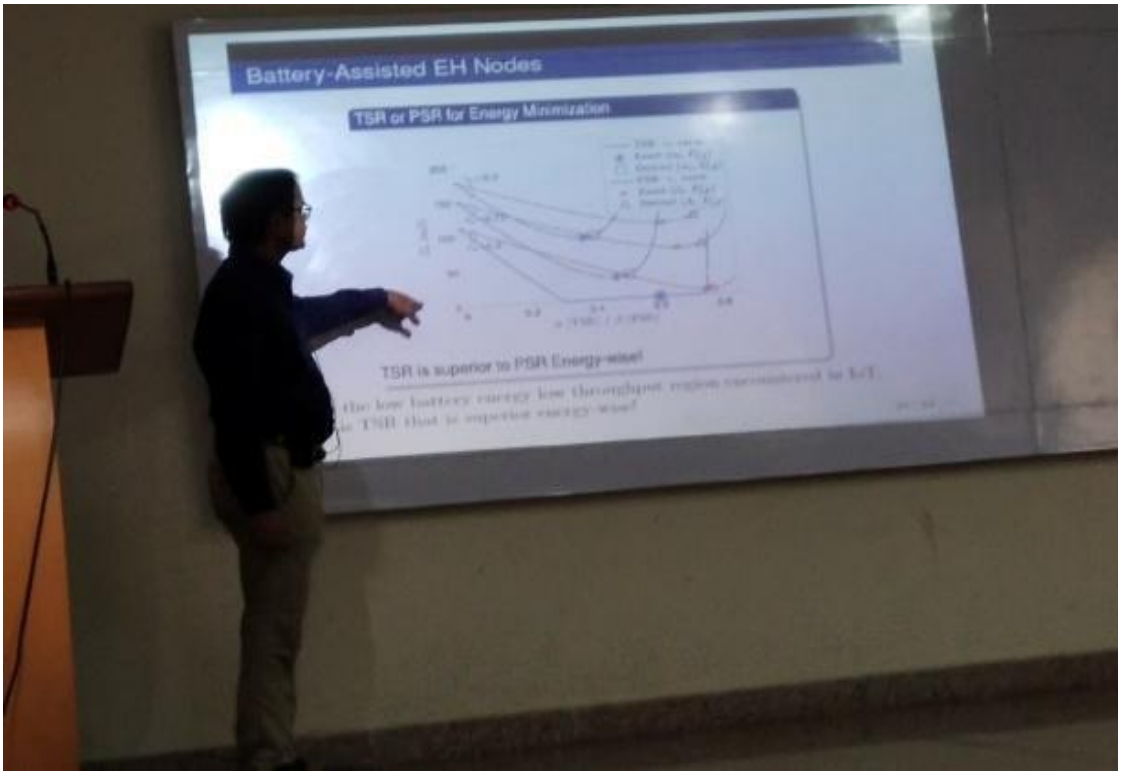

He started his session with some discussion on some communication terminology like Throughput, Relaying, 5G specifications, and then he explained some of his work on energy harvesting protocols. In second session he discussed Optimization methods and battery assisted EH nodes architecture and results of his research work carried out at IIT Delhi. He motivated and invited interested participants to work on WSN in IIT Delhi.

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♦ Lab session:

Day Third Dr. Garima Mathur and his team explain the role of sensnut in field of WSN. They also demonstrated solutions of some small problems using sensnut. The list of experiments is attached with this report as appendix 1.

Lab Session on Sensnut

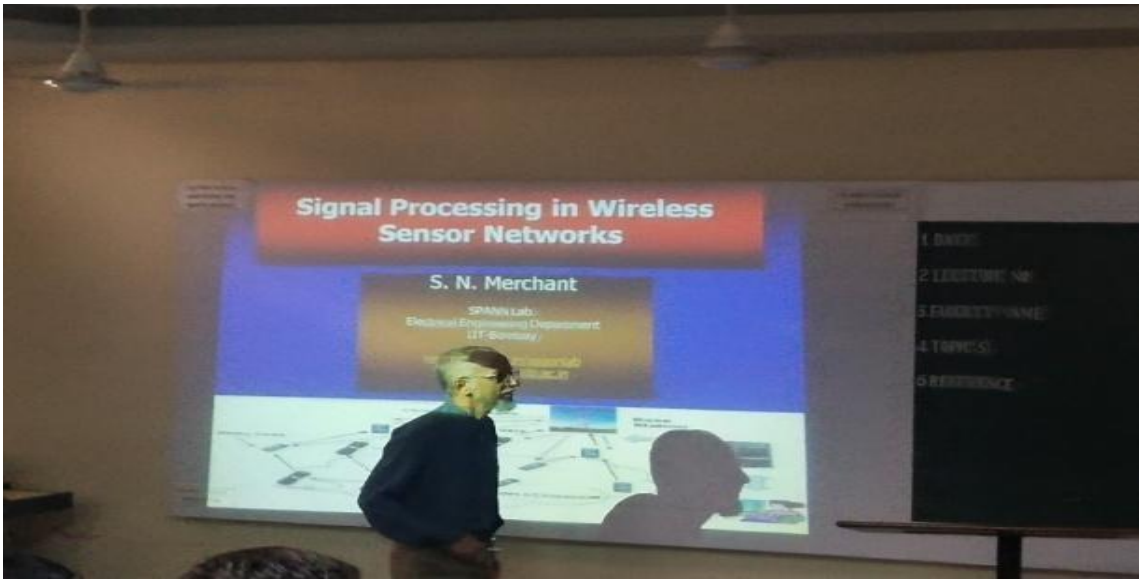
Day 4:

19th September, Day 4, Dr. Shabbir Merchant, Emeritus Professor, IIT Bombay, and Dr. Tarun Dubey, Associate professor were resource person.

Felicitation of Prof. Dr. Shabbir Merchant by Dr. Mahesh Bundele

Dr. Shabbir Merchant discussed various project which they impleted at IIT Bombay related various social problems. He discussed the theoretical concepts of WSN, and architecture of different systems which they developed at IIT Bombay. He discussed signal Processing in WSN, Ubiquitous computing, importance of WSN in agriculture, and then he discuss in details of Design and Development of

Wireless Network for Intra and Inter Vehicular communication.



Some Screenshot during talk of Prof. Dr. Shabbir Merchant

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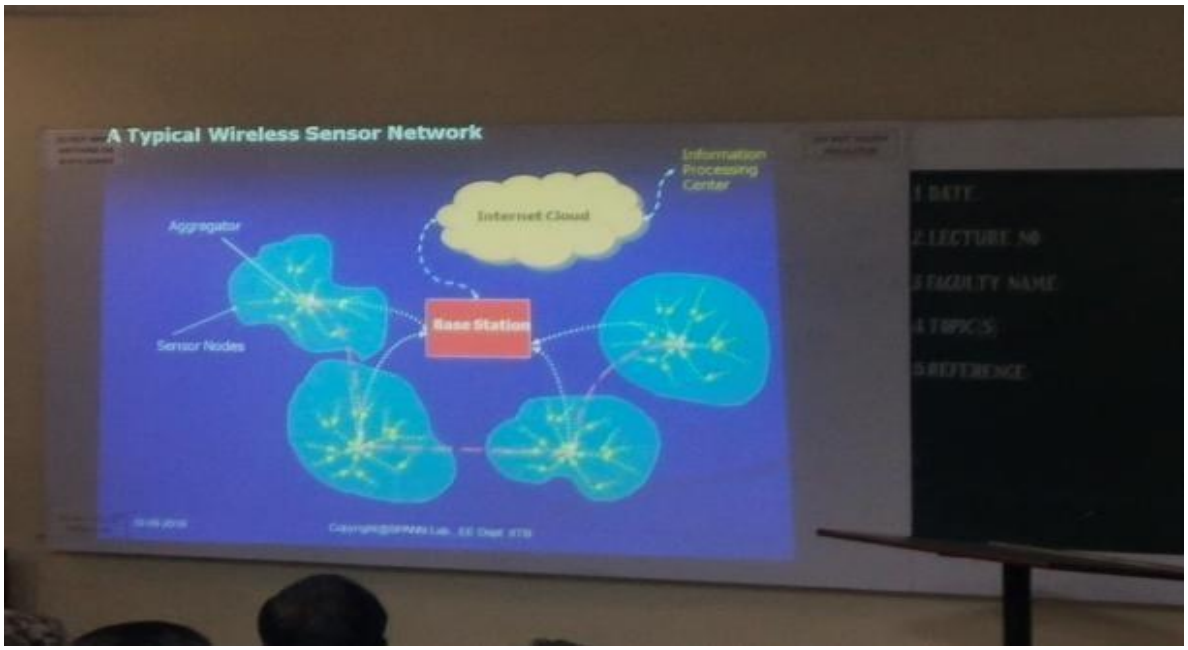
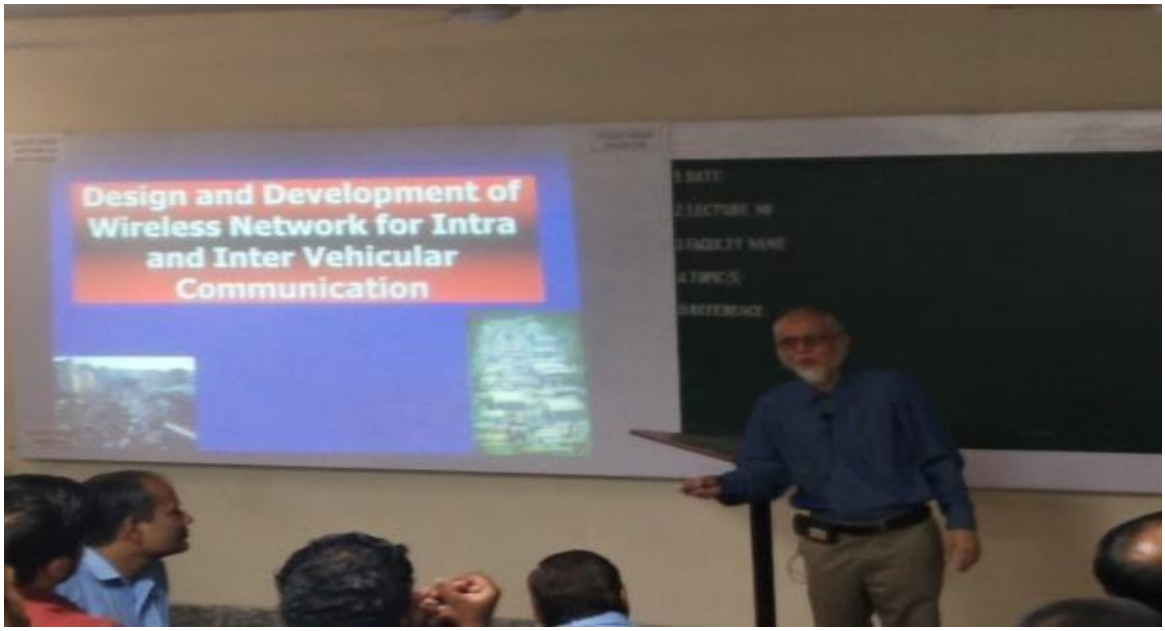


Some Screenshot during talk of Prof. Dr. Shabbir Merchant



Prof. Trun Dubey presented a talk on "Wireless sensor networks: Taxonomy of Simulation Tools"

He discusses various simulation tools available online free of cost in area of WSN. He discussed the limitation and advantages of these tools in details and gave some suggestion as per the need and availability of best tools in different research areas.

Expert Talk by Dr. Tarun Kumar Dubey

- **Lab session:**

Forth Day Dr. Garima Mathur and his team explain and demonstrated solutions of some problems using sensnut. The list of experiments is attached with this report as appendix 1.

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Day 5:

On day 5, 20th September the resource Person were Dr. Santhi Thilagam, Professor, NIT, Surathkal, Karnataka, and **Dr. T.S. Pradeep Kumar**, Professor, VIT University, Tamil Nadu.

Felicitation of Prof. Dr. Santhi Thilagam By Dr. Mahesh Bundele

Felicitation of Prof. Dr. Santhi Thilagam By Dr. Mahesh Bundele

Dr. Santhi delivered a talk on Data Management Issues in WSNs in morning session. She discussed External Storage and Query Management, and TAG approaches as a solution of these types of problems. She also discussed some of her publications in this area.

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Felicitation of Prof. Dr. T.S. Pradeep Kumar by Dr. Mahesh Bundele

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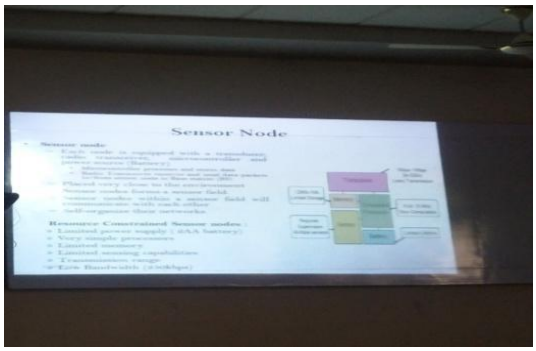
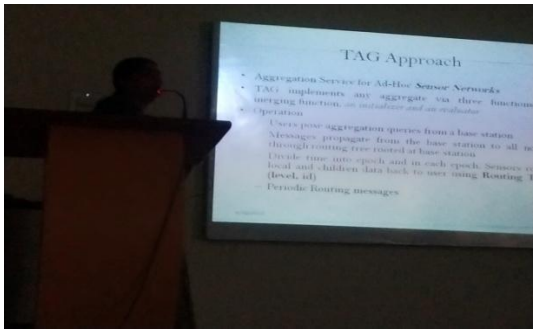
In second session Dr. T.S. Pradeep Kumar delivered a talk on how to design some good projects using WSN and IOT. He Demonstrate some projects implemented at VIT using WSN like Traffic controller, Smart Dustbin, Woman security, Blind Person Kit, Waste Management of Plastic Pen etc. He also demonstrates some of code to implement some ideas in NS2.





Some Screenshot during talk of Prof. Dr. Santhi Thilagam

♦ Lab session:

Fifth Day Dr. Garima Mathur and Dr. T.S.Pradeep Kumar explain some Projects using NS2 and sensnut. The list of experiments is attached with this report as appendix 1.

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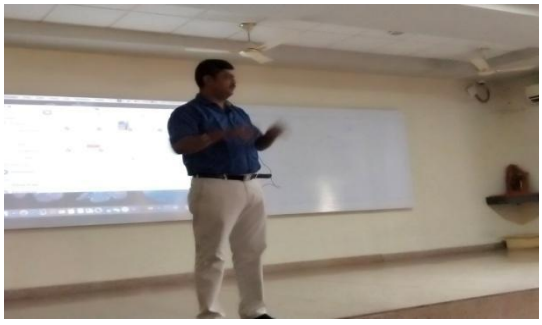

Some Screenshot during talk of Prof. Dr. T.S. Pradeep Kumar

Day 6:

On last day of this STTP Prof. Mahesh Bundle Director delivered a talk on "Challenges in Ubiquitous Computing & WSN Resource". In his talk he discussed various challenges in ubiquitous computing and possible solutions. He motivated all to start work in field of WSN and ubiquitous computing.

A MCQ test was also taken which includes the questions which were discussed and explained in this STTP by different experts. The MCQ paper is attached as Appendix 2.

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After teak break valedictory function started in which Dr. Ajay Khunteta discussed the various outcomes of this sttp. Some of participants shared their views about this STTP. All participants appreciated the efforts done by organized team for success of this STTP. At last participation certificates distributed to participants. After the lunch a bus was available for Jaipur visit.

♦ VALEDICTORY SESSIONS:

9:00 am –10:00 am	**Title:** Challenges in Ubiquitous Computing & WSN **Resource Person: Dr. Mahesh Bundele**, PCE **Venue:** CG-05 Poornima College of Engineering, Jaipur
10:00 am -11:00am	**Evaluation Test** **Venue:** CG-05 Poornima College of Engineering, Jaipur
11:00 am - 11:30 am	**High Tea / Coffee Break**
11.30 am - 12.30 pm	**Valedictory Function**
12.30 pm - 1.30 pm	**Lunch Break**
1.30 pm - 5.30 pm	**Jaipur Visit**

♦ LIST OF PARTICIPANTS:

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♦ FEEDBACK ANALYSIS: * Add Feedback / Attainment Calculations

Assessment test for all participants

Attempt all questions. **Time: 3 hours**

All the questions has one marks.

Topic: Introduction of Ubiquitous & WSN

1. MEMS stands for_____

2. A sensor network is subject to a unique set of resource constraints such as

a: finite on-board battery power

b: limited network communication bandwidth

3. In a typical sensor network, each sensor node operates unethered and has a microprocessor and a small amount of memory for signal processing and task scheduling (true/false)_____

4. Each node is equipped with one or more sensing devices such as acoustic microphone arrays, video or still cameras, infrared, seismic or magnetic sensors (true/false)_____

5. Information collected by and transmitted on a sensor network describes conditions of physical environments and requires advanced query interfaces and search engines effectively

6. support user-level functions (true/false)

7. _____routes user queries or commands to appropriate nodes in a sensor network (bridge/gateway)

8. Communicating 1 bit over the wireless medium at short ranges consumes _____ energy than processing that bit (less/more)

9. For the Sensoria sensors and Berkeley motes, the ratio of energy consumption for communication and computation is in the range of_____to (100/1000/10000)

10. A sensor network is designed to collect information from a enviornment (logical/physical)

11. It is more appropriate to address nodes in a sensor network by than by (IP address/physical properties)

12. Mobility and instability in wireless links prevent the use of many existing edge network gateway protocols for internetworking IP and sensor networks (true/false)_____

13. The challenges we face in designing sensor network systems and applications include a: limited hardware

b: limited support for networking

c: limited support for software development Ans:___(a/b/c/all)

14. Match the following

Limited hardware:	the tasks are typically real-time and massively distributed, involve dynamic collaboration among nodes, and must handle multiple competing events
Limited support for networking:	each node has limited processing, storage and communication capabilities, and limited energy supply and bandwidth
Limited support for software development:	the network is peer-to-peer , with a mesh topology and dynamic, mobile and unreliable connectivity

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Topic: Localization and Tracking

1. Localizing and tracking moving objects is an essential capability for a sensor network in many practical applications (true/false)_____

2. A central problem for CSIP is to dynamically define and form sensor groups based on

_____=

(task requirements/resource availability/both)

3. A sensor network can be defined as an abstract tuple G=<V, E, Pv, Pe. where

__specifies nodes,_specifies link connectivity,_is a set of functions that characterizes the properties of each node and specifies properties of eachlink

4. DOA stands for_____

5. _____is a distributed physical quantity such as temperature, pressure or optical flow across a region of space (area/field)

6. A tracking task can be formulated as a constrained optimization problem <G, T, W, Q, J, C. where is the sensor network ,_____ is a set of targets,_____is a signal model for how target signals propagate and attenuate in the physical medium, denotes a set of user queries, specifies an objective function defined by task requirements and specifies a set of constraints

7. In wireless sensor networks, some of the information defining the objective function and constraints is available only at_____(compile time/run time)

8. The position estimation may be accomplished by a: triangulation computation

b: least square computation

9. Bayesian estimation can be used for position estimation (true/false)_____

10. When the two targets move close to a target track,_____problem has to be addressed (data relationship/data association)

Topic: Networking Sensors

1. Networking allows geographical distribution of the sensor nodes and their placement close to signal sources (true/false)_____

2. Radio communication is the most expensive operation a node performs in terms of energy usage, and thus it must be used sparingly and only as dictated by the task requirements (true/false)

3. Sensor networks are typically deployed in an adhoc manner (true/false) _____

4. Wireless communication between nodes utilizes radio links (true/false)_____

5. Within the coverage range, communication is by_____(multicast/broadcast)

6. UDG stands for_____

7. Nodes operate unethered and have limited power resources(true/false)_____

8. For communication, the main consideration is that communication paths consists of many short hops can be_____energy efficient than paths using a few long hops (less/more)

9. Networking involves multiple layers in the protocol stack (true/false)_____

10. _____sub-layer manages access to the physical network medium, and its fundamental goal is to reduce or avoid packet collisions in the medium (MAC/LLC)

11. Following characteristics of wireless sensor networks point to the need for a specialized MAC protocol

a: the issues of fairness of the node level are much less important than overall application performance

b: most sensor nodes are idle much of the time

c: In-network processing can greatly improve bandwidth utilization

d: the assumed lack of mobility and therefore the relatively fixed neighborhood of each node can be exploited in medium access protocol design

e: issues of energy efficiency, scalability and robustness remain paramount

12. Following MAC protocols have been developed for wireless voice and data communication networks

a: TDMA b: FDMA c: CDMA d: CSMA e: WLAN

13. The main goal of the_____is to reduce energy waste caused by idle listening, collisions, overhearing and control overhead (S-MAC protocol/IEEE802.15.4 standard)

14. The S-MAC protocol includes following major components

a: periodic listen and sleep

b: collision avoidance c: overheating avoidance d: message passing

Topic: Infrastructure Establishment

1. The problem of_____for a sensor network is how to set the radio range for each node so as to minimize energy usage, while still ensuring that the communication graph of the nodes remains connected and satisfies other desirable communication properties (topology control/traffic monitoring)
2. CTR stands for_____
3. _____problem states "compute the minimum common transmitting range r such that the network is connected" (topology control/critical transmitting range)
4. The probabilistic theory best suited to the analysis of CTR is the theory of (GRG/GLS)_____
5. GRG stands for_____
6. In_____setting, n points are distributed into a region according to some distribution, and then some aspect of the node placement is investigated (GRG/GLS)
7. If n points are randomly and uniformly distributed in the unit square, then the critical transmission range is, with high probability

a: r=c.sqrt (n/logn) b: r=c.sqrt (logn/n)

8. One should choose_____ranges in areas of high node density and _____ranges in regions of low density (short/long)
9. The range assignment problem has been shown to be NP complete for dimensions & above (1/2)_____
10. _____MST based algorithms can be expensive to implement on typical sensor nodes (homogeneous/non-homogeneous/either)

Topic: Sensor Tasking and Control

1. _____sensor can be tasked to look for animals of a particular size and color.

. sensor can be tasked to detect the presence of a particular type of vehicle (acoustic/camera)

2. IDSQ stands for_____

3. The purpose of a sensor system is to obtain information that is as extensive and detailed as possible about the unknown parts of the world state (true/false)_____

4. When we know the relevant manifest variables defining the world state, then computing the answers to queries about the world state is a_____problem (standard algorithm design/range assignment)

5. The standard algorithm design problem needs to be modified in the sensor network context because

a: the values of the relevant manifest variables are not known but have to be sensed

b: the cost of sensing different variables or relations of the same type can be vastly different

c: frequently the value of a variable or a relationship between variables, may be impossible to determine using the resources available in the sensor network

6. The online nature of sensing requires the use of methods such as_____to account for the fact that the value of sensor readings cannot be known before they are made (competitive analysis/value of information/either)

7. The main idea of information-based sensor tasking is to base sensor selection decisions on information content as well as constraints on resource consumption, latency and other costs (true/false)_____

8. _____formulates the sensor tasking problem as a general distributed constrained optimization that maximizes information gain of sensors while minimizing communication and resource usage (IDSQ/IBST)

9. _____refers to the knowledge about the target state such as position and velocity (belief state/true state)

10. Following approaches can be used for localizing a stationary source and tracking a moving source

a: a leader node might act as a relay station to the user, in which case the belief resides at this node for an extended time interval, and all information has to travel to this leader

b: the belief itself travels through the network, and nodes are dynamically assigned as leaders

Topic: Sensor Network Databases

1. From a data storage point of view ,one may think of a sensor network as a distributed database that

a; collects physical measurements about the environment

b; indexes them

c; serves queries from users and other applications external to or from within the network

2. The advantage of the database approach is that it provides a separation between the logical view of the data held by the sensor network and the actual implementation of these operations on the physical network (true/false)_____

3. In a classical DBMS, data is stored in a_____location (centralized/distributed)

4. The structure and constraints of the data format are called database_____(table/schema) 5. The database scheme is typically defined or modified by a database administrator using _____(DML/DDL)

6. DDL stands for_____

7. Today most databases employ relational schemas and their variants, organizing data into tables whose are record tuples and whose _ are labeled by data attributes rows/columns)

8. _____compiler translates the definitions into metadata which is stored in permanent storage along with the actual data (DML/DDL)

9. _____is a data structure describing the structure of the database data and the constraints they must satisfy (metadata/temporal data)

10. In a typical database system ,the_____directly controls storage devices such as disks and the flow of data between them and main memory (storage & buffer manager/transaction manager)

Topic: Applications and Future Directions

1. The main problem with wired sensor networks is_____in deployment

2. A_____network is more time consuming to construct and deploy, precluding applications where immediate data collection is needed (wired/wireless)

3. The size of wireless sensor system is limited mostly by a: the cost of maintaining communication links

b: the cost of sensor hardware

4. Following are application areas of wireless sensor network a: asset and warehouse management

b: automotive c: building monitoring and control d: environmental monitoring

5. Following are application areas of wireless sensor networks a: health care

b: industrial process control

c: military battlefield awareness d: security and surveillance

6. DSRC stands for_____

7. NHTSA stands for_____

8. Sensors may be used

a: to monitor and track assets such as trucks or other equipment

b: to manage assets for industries such as oil and gas, utility, and aerospace

9. Sensors can be used

a: to monitor conditions and movements of wild animals or plants in wildlife habitats

b: to monitor air quality and track environmental pollutants, wildfires or other natural or man-made disasters c: to monitor biological or chemical hazards to provide early warnings

d: to monitor earthquake

10. _____sensors instrumented in a building can detect the direction and magnitude of a quake and provide an assessment of the building safety (acoustic/seismic)

11. C3I Stands for_____

12. Ensuring security and privacy is one of the highest priorities for sensor network systems (true/false) ____

13. PKI stands for_____

14. EmSoft Stands for_____

15. _____ framework allows an application developer to write code for a sensor network signal processing and tracking application using a state-centric model of programming (TOSSIM/PIECES)

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♦ SWOT ANALYSIS:

- It promotes student-centered learning and collaboration
- Lessons and Contents are more accessible
- It can more efficient
- It relies on preparation and trust
- There is significant work on the front end.
- This is more about proper planning and includes any iteration required for the purpose of highly building highly scalable software.

♦ BUDGET & ACTUALS: N/A

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