



KONERU LAKSHMAIAH EDUCATION FOUNDATION

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Green Fields, Guntur District, A.P., India – 522502

Department of Electronics and Communication Engineering

(DST - FIST Sponsored Department)



FACULTY DEVELOPMENT PROGRAMME - REPORT

Ref. No: KLEF/RO/ECE/FDP/2025-26

Date: 23.06.2026

Name of the department : Electronics and Communication Engineering
Title of the FDP : "Emerging Frontiers in VLSI Design: Semiconductor Devices, Smart Sensors and Quantum Technologies"
Organized dates : From **29.06.2026** To **09.07.2026**
Mode : Virtual mode (Online)
Level National/International : International
Name of the Coordinator(s) :

Chair Persons	Co-ordinators
Dr. I. Govardhani, HoD, ECE, KLEF	Dr. Chella Santhosh Dr. Y. Shantikumar Singh

No. of Participants : In-house: **24** Outside: **20**

**Ten-Day Online FDP on
EMERGING FRONTIERS IN VLSI DESIGN: SEMICONDUCTOR DEVICES, SMART
SENSORS, AND QUANTUM TECHNOLOGIES**

Organized by June 29th June to July 09th 2026
Koneru Lakshmaiah Education Foundation, Dept. of Electronics & Communication Engg.

In association with
Electronics & ICT Academy, NIT Warangal

SUMMARY OF TECHNICAL REPORT

A One-week Faculty Development Program (FDP) on " Emerging Frontiers in VLSI Design: Semiconductor Devices, Smart Sensors and Quantum Technologies " Organized by E&ICT (NITW) in association with Nanotechnology (NTRG), Department of ECE, KLEF.

As per the calendar of events for this Academic year, an international level FDP program has been organized from 29th June 2026 to 09th July 2026 under NTRG.

OBJECTIVE: In line with the vision of a self-reliant and Viksit Bharat, this Faculty Development Programme aims to empower faculty members, researchers, and industry professionals with the knowledge, tools, and insights needed to stay at the forefront of the VLSI revolution. The FDP delved deep into the advanced landscape of VLSI design methodologies, exploring the latest developments in semiconductor device physics, fabrication technologies, and design architectures that are redefining the boundaries of integrated circuit engineering. Participants gained comprehensive insights into smart sensor technologies, including MEMS, biosensors, IoT-integrated sensing platforms, and AI-driven signal processing, which are increasingly embedded in healthcare, industrial automation, and consumer electronics. The programme further ventured into the realm of quantum technologies, introducing participants to quantum computing principles, quantum communication, and their potential impact on future VLSI and semiconductor paradigms. It is expected that this course will be suitable for engineering professionals from academia, R&D organizations, and industries alike.

CONTENT COVERED

- Semiconductor Fabrication Technologies: Current Trends and Future Directions
- Reliability, Failure Analysis, and Characterization Techniques of Semiconductor Devices
- System-on-Chip (SoC) Architecture and Design Strategies
- Low Power VLSI Design Techniques: Clock Gating, Power Gating, and DVFS

- Fundamentals of Smart Sensors and Transducer Technologies
- MEMS Design, Fabrication, and Applications
- Biosensors and Lab-on-Chip Technologies for Healthcare Applications
- Fundamentals of Quantum Mechanics for Engineers; Quantum Computing: Qubits, Quantum Gates, and Quantum Circuits
- Industry 4.0 and the Role of VLSI, Sensors, and Quantum Technologies

SCOPE OF THE PROGRAM

Modern electronics is increasingly dependent on advanced semiconductor devices, intelligent sensing systems, and quantum-enabled technologies. The continuous scaling of VLSI design, the emergence of smart sensor ecosystems (MEMS, biosensors, and IoT-integrated platforms), and the growing relevance of quantum computing and communication are together redefining the boundaries of integrated circuit engineering. This FDP was designed to help participants understand the fundamentals and recent advances in semiconductor device physics, fabrication technologies, low-power and analog VLSI design, smart sensor systems, nanomaterials, and quantum technologies, and their combined role in shaping next-generation electronic systems. The programme highlighted how the integration of these domains is critical to Industry 4.0, autonomous systems, healthcare electronics, and secure quantum communication networks, in line with the vision of a self-reliant and Viksit Bharat.

RESOURCE PERSONS

The sessions were delivered by eminent professors and scientists from IITs (Hyderabad, Dhanbad/ISM), NITs (Warangal, Manipur, Nagaland, Surathkal, Calicut, Rourkela, Andhra Pradesh), IIIT Guwahati, Bennett University, Gauhati University, Berhampur University, Manipur Technical University, DRDO, and Advanced Micro Devices (AMD), Bangalore, covering VLSI design, semiconductor devices, smart sensors, nanomaterials, and quantum technologies.

The Inaugural Function was held on 29th June 2026 from 10:00 AM to 11:00 AM through the Google Meet virtual platform. The function commenced with a formal prayer song, followed by the traditional Lighting of Kuthuvilakku by the dignitaries. Dr. Usha Devi, Associate Professor, ECE, KLEF delivered the hosting speech, and Dr. I. Govardhani, HoD, ECE, KLEF, extended the welcome address to all the dignitaries and participants. The inaugural addresses were delivered by Dr. V. Rajesh, Principal, KLEF; Dr. B.T.P. Madhav, Dean (R&D), KLEF; Dr. Santosh Kumar, NTRG Group Head, KLEF; Dr. Aravindhyan Alagarsamy, ECE, KLEF; the FDP In-charge from NIT Warangal; and Dr. B. Balaji, ECE, KLEF. The dignitaries highlighted the growing importance of VLSI design, semiconductor devices, smart sensors, and quantum technologies in shaping the future of electronics, and encouraged the participating faculty members and researchers to actively engage with the resource persons throughout the ten-day programme. The inaugural session concluded with a formal vote of thanks proposed by Dr. Chella Santhosh and Dr. Y. Shanti Kumar Singh, FDP Co-ordinators, ECE, KLEF.

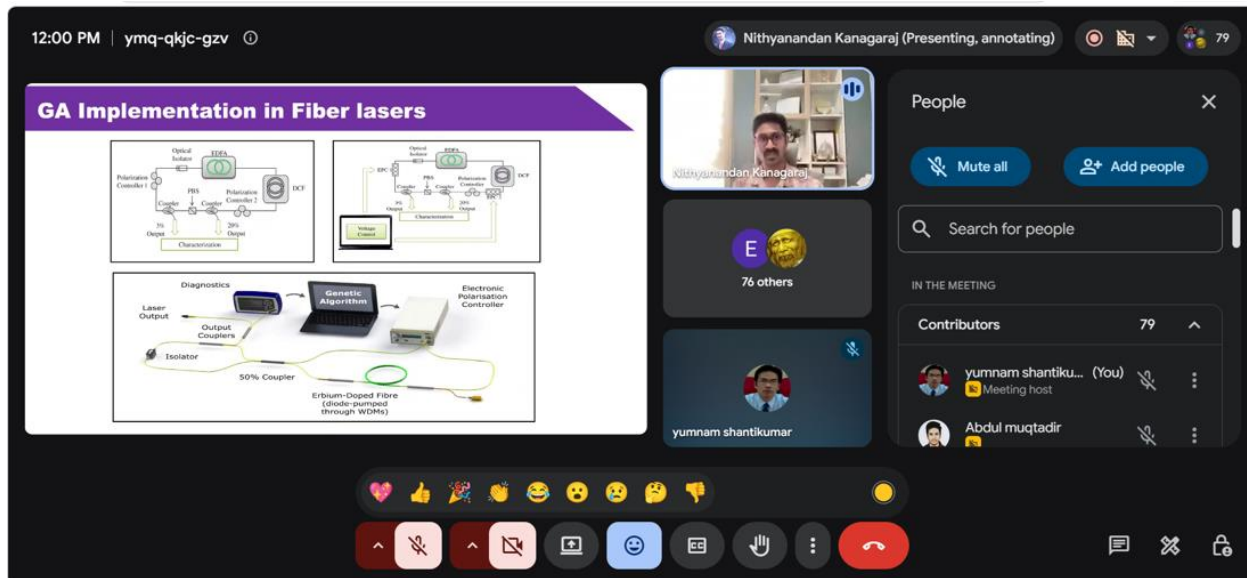
DAY-WISE SCHEDULE OF SESSIONS:

The ten-day FDP covered twenty-one technical sessions spread across ten days, in addition to the Inaugural Function, a Quiz-Test & Feedback session, and the Valedictory Function, as summarized below:

Day	Date	Topic	Resource Person
Day 1	29.06.2026	Photonics for the Future: Bridging Communication, Defence and Space Applications	Dr. Nithyanandan Kanagaraj, IIT Hyderabad
		The Memristor Revolution: From Concept to Circuit Realization	Dr. Rajeev Kumar Ranjan, IIT (ISM) Dhanbad
Day 2	30.06.2026	Current-Mode Circuit Design: From Basic Principles to Modern Analog VLSI Architectures	Dr. Mourina Ghosh, IIIT Guwahati
		Active Filter Design Employing Active Building Blocks	Dr. Ashish Ranjan, NIT Manipur
Day 3	01.07.2026	Microwave Photonics for Quantum Technology	Prof. Sanjeev Kumar Raghuwanshi, IIT (ISM) Dhanbad
		Advanced Nanomaterial Fabrication and Characterization for Optoelectronic and Sensing Applications	Dr. Biraj Shougaijam, Manipur Technical University
Day 4	02.07.2026	Engineering Intermediate Bands in Nanostructured Solar Cells: Physics, Design Strategies, and Efficiency Enhancement	Dr. Ahna Sharan, NIT Andhra Pradesh
		Photodetectors in Quantum Communications	Dr. Suryansh Dongre, NIT Andhra Pradesh
Day 5	03.07.2026	Smart Sensors in Autonomous Vehicles	Dr. Vyoma Singh, KLEF
		Edge AI-Enabled Smart Sensor Systems for Next-Generation IoT	Dr. Ajay Yadav, Bennett University
Day 6	04.07.2026	Graphene Nanoribbon RTDs: Bridging Quantum Physics and Nanoelectronics Innovation	Dr. Narayan Sahoo, Berhampur University
		Triboelectric and Piezoelectric Nanogenerators for Energy Harvesting, Human-Machine Interfaces, and Self-Powered Sensors	Dr. Huidrom Hemojit Singh, Gauhati University
Day 7	06.07.2026	Modeling Approaches of Field-Effect Transistors for Circuit Simulation in the Era of Artificial Intelligence	Dr. Sumit Saha, NIT Rourkela
		From Light Detection to Memory: Tungsten Oxide Nanostructures for Next-Generation Electronics	Dr. Rajshree Rajkumari, NIT Surathkal
Day 8	07.07.2026	Advances in Metal Oxide Nanostructures for Next-Generation Electronic Devices	Dr. Naorem Khelchand Singh, NIT Nagaland
		Recent Progress and Developments in Flexible Electronics for Next-Generation Technology	Dr. Sourabh Pandey, IIT Patna
Day 9	08.07.2026	Advanced Design Strategies for Circuit Analysis & Design Challenges in Sub-5nm Technologies for Advanced Analog Designs	Dr. Subrahmanyam Perumalla & Dr. Shruti Konwar, AMD, Bangalore
Day 10	09.07.2026	Semiconductor Devices for the Next Generation	Dr. Stacy A. Lynrah, NIT Calicut
		Integration of Semiconductor and Quantum Technologies	Dr. Nalini Vidhyulatha, Scientist 'F', RCI, DRDO Hyderabad

GLIMPSES OF THE PROGRAMME

A few glimpses of the Inaugural Function, technical sessions, and Valedictory Function conducted during the ten-day FDP are presented below:



Inaugural Function invite – 29th June 2026



Day 1 technical session in progress – Dr. Nithyanandan Kanagaraj, IIT Hyderabad



A technical session in progress during the FDP



Valedictory Function – 9th July 2026

VALEDICTORY SESSION:

The Valedictory Function was held on 9th July 2026 from 3:30 PM to 4:00 PM, following the Quiz-Test & Feedback session conducted earlier that afternoon from 2:00 PM to 3:20 PM. Dr. I. Govardhani, HoD, ECE, KLEF, delivered the welcome speech and summarised the highlights of the ten-day programme covering VLSI design, semiconductor devices, smart sensors, and quantum technologies. The valedictory addresses were delivered by Dr. M. Siva Ganga Prasad, Alternate HoD, ECE, KLEF; Dr. Chella Santhosh, FDP Co-ordinator, ECE, KLEF; and Dr. Y. Shanti Kumar Singh, FDP Co-ordinator, KLEF. The dignitaries appreciated the quality of technical content delivered by the resource persons and encouraged the participants to carry forward the knowledge gained into their teaching, research, and collaborative activities. This was followed by feedback from the participants and distribution of e-certificates. The valedictory function concluded with a formal vote of thanks proposed by Dr. Chella Santhosh, Co-ordinator of the FDP, KLEF. This Faculty Development Programme fulfils its prime objective of bringing faculty members from Electronics, Electrical, and allied engineering

disciplines onto a common platform to update themselves with the latest advances in VLSI design, semiconductor devices, smart sensor technologies, and quantum computing and communication. Participants were enlightened on state-of-the-art design tools, fabrication techniques, and emerging research directions in these domains, which will help strengthen research activity, curriculum development, and industry-academia collaboration.

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Feedback & Summary –A GLANCE

The great success of A Ten-Day Online Faculty Development Programme (FDP) on "Emerging Frontiers in VLSI Design: Semiconductor Devices, Smart Sensors, and Quantum Technologies" was reflected through the feedback given by the speakers and delegates. Following are the some of the comments received: | Well organized, all sections are useful and informative. Thank you to all Resource persons and Organizers committee | Resource person's knowledge and presentation | Resource persons from various industry and academia | It was all good Thanks to team and their efforts appreciated | Every concept explained keeping future aspects in research | Overall selection of speakers and the management | Perfection & time keep up, | The selective resources and arrangement of sessions in sequence. | Talks covered a broad spectrum of the FDP theme | New technology, Informative talk and thank you for all organizers | we need more like this type of FDPS | Time schedule was excellent. Really appreciated. | It's always interactive and engaging, learnt a lot from subject matter experts please share the videos for the future review it will be very helpful | Gained knowledge which would be helpful for me in my final year project | The detailed explanation of O&M is an eye opener for employment opportunities to be provided for a smart city. | Scheduling, way of intimation, nice resource persons selection- everything good | Learned a lot on current solar scenario and it's a privilege to attend the lectures. | Excellent session with present day energy wastages and the importance of conservation of energy. | Topics selected and practical implemented concepts | It was very informative and in synchronization with current trends. | Passionate dissemination of knowledge especially in electronics and mechanical-inter disciplinary way | Practical knowledge shared session is very interesting | Concepts explained with simulation results helped gain more knowledge on the topics covered | Very well presentation of the basic concepts and design procedures were good.

Co-Ordinators

HOD - ECE