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1947 TO 2047



Institute's Innovation Council
Pt. Ravishankar Shukla University Raipur
IIC-PRSU

Institute Innovation Council

Pt. Ravishankar Shukla University, Raipur
Chhattisgarh – 492010

(Under The Initiative of Ministry of Education's Innovation Cell)

Aishe Code: U-0093

IIC ID: IC201810375

Report

On

Faculty Development Program

On

**Start-up in VLSI Design, Embedded System, and
Computational Intelligence**

During

February 17-22, 2025

Organized By

IIC, Pt. Ravishankar Shukla University, Raipur,

Indian Society for VLSI Education, Ranchi,

&

Electronics and ICT Academy, (Phase II)

**Pt. Dwarka Prasad Mishra Indian Institute of
Information Technology, Design and Manufacturing,
Jabalpur**

***Under the Initiative of: Ministry of Electronics
and Information Technology, Government of
India***



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Poster

Invitation

Institution Innovation Council,
School of Studies in Electronics and Photonics
Pt. Ravishankar Shukla University, Raipur, and
Indian Society for VLSI Education (ISVE), Ranchi
in collaboration with
E&ICT - PDPM HITDM Jabalpur
Cordially invites you to the inaugural of
One Week Faculty Development Program (FDP)
from February 17-22, 2025
on
**"Startup in VLSI Design,
Embedded System and Computational Intelligence"**

Chief Guest
Dr. Vijay Nath
Associate Professor
Department of Electronics and Communication
Birla Institute of Technology (BIT), Mesra

Date : Monday, February 17, 2024 | 09:30 AM Onwards
Venue : Seminar Hall, S.o.S in Electronics & Photonics,
Pt. Ravishankar Shukla University, Raipur

Hon'ble Vice Chancellor
Prof. Sachchidanand Shukla
Pt. Ravishankar Shukla University, Raipur
will preside over the function.

Dr. Shailesh Kumar Patel, Registrar, PRSU | Dr. Kavita Thakur, Program Coordinator, PRSU | Dr. D.K.Yadav, President, SIE Ranchi, EBCT Academy, PDPM HITDM | Dr. Aparajita Ojha, EBCT Academy, PDPM HITDM

Schedule

09:30 AM : Arrival of Chief Guest and Speakers
09:31 AM : Lamp lighting and Saraswati Vandana
09:36 AM : University Kulteet
09:38 AM : Floral Welcome of Guest & Speakers
09:40 AM : Welcome Address by Dr. Kavita Thakur
President IIC-PRSU
09:43 AM : Address by the Chief Guest Dr. Vijay Nath
Associate Professor, Department of ECE, BIT Mesra
09:50 AM : Address by the Patron Prof. Sachchidanand Shukla
Hon'ble Vice-Chancellor, PRSU Raipur
09:57 AM : Vote of Thanks

Technical Session will resume as per the schedule.

End of the Program with Group Photography

Dr. Shailesh Kumar Patel, Registrar, PRSU | Dr. Kavita Thakur, Program Coordinator, PRSU | Dr. D.K.Yadav, President, SIE Ranchi, EBCT Academy, PDPM HITDM | Dr. Aparajita Ojha, EBCT Academy, PDPM HITDM

SCHEDULE
One Week Faculty Development Program (FDP) on
"Startup in VLSI Design, Embedded System and Computational Intelligence"
(17th to 22nd February 2025)

| Date | Day | 9:30-10:00 | 10:00-12:00 | 12:00-1:00 | 1:00-1:30 | 1:30-3:30 | 3:30-5:30 |
|------------|-----|--|---|--|---|--|---|
| 17/02/2025 | 1 | Inauguration | Session 1 Dr. Vijay Nath "Brief of Chip Design and Combinational Circuit Design using VHDL." | Practical Session Dr. Kavita Thakur & Technical Staff "Combinational Circuit Design, Optimization and simulation with VHDL (Xilinx)" | Lunch Break | Session 2 Dr. Vijay Nath "Sequential Circuit Design using VHDL." | Practical Session Dr. Kavita Thakur & Technical Staff "Sequential Circuit Design, Optimization and simulation with VHDL (Xilinx)" |
| 18/02/2025 | 2 | Session 3 Dr. Vijay Nath "Combinational Circuit Design using Verilog" | Practical Session Dr. Kavita Thakur & Technical Staff "Combinational Circuit Design, Optimization and Simulation with Verilog (Xilinx)" | Lunch Break | Session 4 Dr. Vijay Nath "Sequential Circuit Design using Verilog" | Practical Session Dr. Kavita Thakur & Technical Staff "Sequential Circuit Design, Optimization and Simulation with Verilog (Xilinx)" | |
| 19/02/2025 | 3 | Session 5 Dr. Shreyash Kumar Patel "Introduction to Embedded System Design" | Practical Session Dr. K. Rehman "Implementation of Combinational Circuit on FPGA" | Lunch Break | Session 6 Dr. K. Rehman "Advanced Research in FPGA Based IoT System Design" | Practical Session Dr. K. Rehman & Technical Staff "Implementation of Sequential Circuit on FPGA" | |
| 20/02/2025 | 4 | Session 7 Dr. HDP Tiwari "Fundamental of Chip Design & Entrepreneurship Opportunity" | Session 8 Dr. HDP Tiwari "Startup s on VLSI" | Lunch Break | Session 9 Dr. HDP Tiwari "Startup s in Embedded System" | Practical Session Dr. R. Priyadarshi "Sequential Circuit Design, Optimization and simulation with SPICE" | |
| 21/02/2025 | 5 | Session 10 Dr. D.K. Yadav "Innovative Cyber Security model for Secure Banking" | Practical Session Dr. D.K. Yadav & Technical Staff "Implementation Cyber Security tools" | Lunch Break | Session 11 Dr. Pankaj Sharma "Advanced Device Fabrication Technologies" | Session 12 Dr. Pankaj Sharma & Technical Staff "Advanced Semiconductor Characterization Techniques" | |
| 22/02/2025 | 6 | Session 13 Dr. B. Acharya "FPGA Based System Design and Research Scope" | Practical Session Dr. R. Priyadarshi "Research & Implementation of Computational Intelligence in Embedded System" | Lunch Break | Session 14 Dr. Pankaj Sharma "Nano Sensors for IoT" | 3:30-4:30 Test Session | 4:30-5:30 Valedictory |

FDP Co-ordinators:
Dr. Kavita Thakur, Professor & Head, S.o.S in Electronics and Photonics, PRSU, Raipur, India
Dr. Vijay Nath, Associate Professor, VLSI Design Group, Dept of ECE, BIT Mesra Ranchi, India
Dr. Pankaj Sharma, Assistant Professor, Dept of ECE, HITDM Jabalpur, India

Dr. Kavita Thakur
President IIC

Pt. Ravishankar Shukla University, Raipur, Chhattisgarh- 492010



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Details of Event

| | |
|-------------------------------|--|
| Name of Program Type | Faculty Development Program |
| Name of Program Theme | Startup in VLSI Design, Embedded System, and Computational Intelligence |
| Objective | To provide faculty members with an in-depth understanding of VLSI design, embedded systems, and computational intelligence |
| Benefit | Enhancing the knowledge base of faculty members in VLSI and embedded systems, Providing insights into the latest developments and industrial expectations in semiconductor technology, Equipping participants with hands-on experience in designing and prototyping embedded solutions |
| Duration of Activity | 6 Days |
| Mode of Event | Offline |
| No. of Participants | 54 |
| No. of Resource Person | 12 |
| Expenditure Amount | 3 Lakhs |



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About the Event and Speaker

Under the initiative of Ministry of Electronics and Information Technology, Government of India a Faculty Development Program (FDP) on Startup in VLSI Design, Embedded System, and Computational Intelligence was jointly organized by IIC PRSU, Raipur and Indian Society for VLSI Education, Ranchi in collaboration with the Electronics and ICT Academy, (Phase II) Pandit Dwarka Prasad Mishra Indian Institute of Information Technology, Design and Manufacturing, Jabalpur, as part of its broader vision to strengthen India's semiconductor ecosystem and technological advancements. The Government of India has been actively promoting semiconductor manufacturing, VLSI design, and computational intelligence through initiatives such as the India Semiconductor Mission (ISM). The FDP aligns with this mission by providing faculty members and researchers with the necessary knowledge and skills to contribute to India's growing semiconductor industry. The key objectives of the FDP were to provide faculty members with an in-depth understanding of VLSI design, embedded systems, and computational intelligence, to promote research and startup initiatives in the field of semiconductor technology, and to encourage the development of innovative solutions using embedded and computational intelligence methodologies.

The inaugural session of the program was held at the Seminar Hall of the School of Studies in Electronics and Photonics at PRSU, with Dr. Vijay Nath, Associate Professor at BIT Mesra, as the Chief Guest and Prof. Sachchidanand Shukla, the Vice Chancellor of PRSU, presiding over the ceremony. The event was coordinated by Dr. Kavita Thakur, President IIC PRSU. The inauguration included a ceremonial worship of Goddess Saraswati, followed by the university's anthem. Dr. Vijay Nath delivered an inspiring speech, discussing the importance and the role of VLSI technology in modern advancements. He also outlined the goals and framework of the upcoming six-day program, which will give participants the opportunity to gain in-depth knowledge. Vice Chancellor Prof. Shukla addressed the participants, motivating them to focus on continuous effort and hard work. Dr. Kavita Thakur emphasized the importance of the event, sharing the pride of PRSU being chosen as the center for the FDP.





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This **six-day FDP** aims to enhance the knowledge and skills of the participants in VLSI design, embedded systems, and computational intelligence. Resource persons have been invited from many distinguished academic institutions such as IITDM, Jabalpur, NIT Raipur, Soa University, Bhubaneswar, Odisha, NIT Jamshedpur etc. In this six day FDP following session have been taken by delegate resource persons:

Day 1: On Day 1 of the Faculty Development Program, the first session was led by Dr. Vijay Nath, who introduced the fundamental principles of semiconductor technology. Dr. Nath elaborated on the utility, characteristics, and significance of semiconductors in modern electronic devices. He inspired the participants by sharing the story of Professor Morris, who made significant contributions to the invention of the semiconductor chip.

Dr. Nath also provided an insightful overview of the efforts being made under the Indian government's "Mission Semiconductor" initiative, which aims to establish a semiconductor city in Dholera, thereby making India self-reliant in this sector. He discussed the challenges faced in semiconductor chip design within India and highlighted possible solutions to overcome these obstacles. Furthermore, he encouraged the participants to strive for success based on their skills and talents.

In the second session, Dr. Nath introduced Programmable Logic Devices (PLDs) and explained the process of coding design for various circuits. He emphasized important considerations when designing circuits and stressed the significance of attention to detail in the design process.

Overall, Day 1 was a knowledge-enhancing and motivational experience for the participants. They gained valuable insights into the latest developments and technologies in the fields of electronics and photonics.



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Day 2: On Day 2 of the Faculty Development Program, two insightful sessions were conducted. In the first session, Dr. Vijay Nath presented a detailed lecture on arithmetic circuit design using Verilog, covering both theoretical concepts and practical applications. Key topics included designing arithmetic circuits like adders, subtractors, and multipliers using Verilog, arithmetic assignment statements, multiplication algorithms, array multipliers for unsigned numbers, BCD addition, and arithmetic comparator circuits. The session emphasized Verilog syntax, operator precedence, and the trade-offs between speed, area, and power consumption. The interactive nature of the session allowed participants to deepen their understanding through practical examples. In the second session, Dr. Nath led a hands-on practice on programmable systems and Xilinx software, guiding participants through the design and implementation process. The session provided valuable skills in using Xilinx software for programmable system design, with a focus on step-by-step coding practices. Both sessions were highly engaging and informative, offering participants critical insights into arithmetic circuit design and programmable systems.





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Day 3: On Day 3 of the six-day Faculty Development Program (FDP) at PRSU, Dr. B. Khaleelu Rehman delivered an extensive lecture on VLSI (Very Large Scale Integration) design and FPGA (Field-Programmable Gate Array), blending theoretical knowledge with practical experience. Dr. Rahman emphasized the importance of HDL (Hardware Description Language), particularly focusing on Verilog, and explained its different coding styles, including gate-level, dataflow, and behavioral modeling. He provided a detailed explanation of each step in the VLSI design process and clarified the differences between the front-end (design and simulation) and back-end (implementation and fabrication) stages, highlighting the challenges in each. A brief history of VLSI design was also discussed to help participants understand its evolution. The session's key focus was FPGA, where Dr. Rahman elaborated on its architecture, functionality, and applications, explaining how FPGAs differ from other integrated circuits and their advantages for rapid prototyping and development. He demonstrated an FPGA board, explaining its components and capabilities, and clarified the concept of RTL (Register Transfer Level) systems essential for FPGA-based digital circuit design. He also provided a step-by-step guide on setting up an FPGA, creating designs, and generating bit files, giving participants hands-on experience with FPGA.





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Technology. The hands-on session was particularly valuable, allowing participants to apply their theoretical knowledge to practical projects. Dr. Rahman's lecture proved to be highly beneficial for engineers and researchers interested in VLSI design and FPGA, offering both theoretical insights and practical skills essential for working in electronics and computer engineering.

Day 4: On Day 4 of the six-day Faculty Development Program (FDP) at PRSU, Dr. Honey Durga Prasad Tiwari delivered a lecture on chip design and startup opportunities, covering the importance of chip design, the global semiconductor industry landscape, opportunities in India, government schemes, and challenges. He discussed the evolution of chip design, the semiconductor industry, market size, major companies, VLSI and chip manufacturing processes, and India's role in the industry. Dr. Tiwari emphasized the significance of India's Semiconductor Mission, government support, and business opportunities for chip design, as well as challenges faced by semiconductor startups. He highlighted technical aspects of chip design, including various design methodologies (ASIC, FPGA, SoC), VLSI design processes, EDA tools, and industry applications. He discussed the challenges in chip design, including production costs, complexity, and thermal issues, and the latest trends such as AI chips, neuromorphic computing, and RISC-V. Dr. Tiwari also explored the emerging Indian startups in the field, their need for government support and strategic partnerships, and provided case studies of successful startups like SparkLabs and Sankhya Labs. He explained the types of semiconductor startups, funding sources, incubation support, and how to build a strong team. Further, he discussed alternative business models (fabless, IP licensing, chiplet), patent protection, and the importance of selecting manufacturing partners. Dr. Tiwari also provided insights into establishing fabless semiconductor startups in India, choosing markets and applications (AI, IoT, Automotive, 5G), and leveraging government incentives. In the final session, Dr. R. Priyadarshi and the technical team conducted a practical session on sequential circuit design, SPICE optimization, and simulation, which was beneficial for the participants, especially the students.





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Day 5: On Day 5 of the ongoing six-day Faculty Development Program at Pandit Ravishankar Shukla University, the first session featured a lecture by Dr. Pankaj Sharma on Advanced Devices Fabrication Technology, where each topic was explained in great detail. In the second session, Dr. Priyadarshi conducted a practical session along with his technical team, focusing on sequential circuit design, and optimization with SPICE, and simulation, which proved beneficial for the students. The second lecture of the day was delivered by Dr. D.K. Yadav, who emphasized the importance of e-banking security and elaborated on various security measures. Dr. Yadav discussed the increasing cyber threats such as phishing, ransomware, and malware, and advocated for a multi-layered approach to ensure e-banking security, including strong passwords, data encryption, secure servers, anti-phishing measures, transaction monitoring, and regular security updates. He also provided tips to protect against cyber threats, such as using antivirus software, keeping the operating system updated, and being cautious of phishing emails. Dr. Yadav recommended using personal computers and secure internet connections for e-banking, avoiding public computers and Wi-Fi hotspots, and typing the bank's website URL directly into the browser. This lecture raised awareness about e-banking security and provided crucial information to protect users from cyber threats.





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Day 6: On the 6th day of the ongoing Faculty Development Program at Pandit Ravishankar Shukla University, the first session featured a detailed and dedicated lecture by Professor B. Acharya on "FPGA and Cryptography." In this session, the functioning and applications of FPGA (Field Programmable Gate Array) were explored, particularly its role in advancing cryptography. Professor Acharya explained how FPGA is playing a crucial role in computer networks and cybersecurity, highlighting how this technological approach is enhancing cryptographic methods. The second session saw Dr. Pankaj Sharma delivering an inspiring lecture on "Internet of Things (IoT) and Nanotechnology." Dr. Sharma focused on the development of IoT, its applications, and the synergies with nanotechnology. He discussed how the combination of these technologies could bring revolutionary changes in future smart cities, healthcare, and other industries. The lectures sparked active participation from the audience, with teachers and researchers engaging in deep discussions through questions and ideas. \



The valedictory session of the Faculty Development Program on Day 6 was held with great enthusiasm and grandeur. Dr. Pankaj Sharma was the chief guest, and the event was organized by Professor Namita Brahme. During the ceremony, Dr. Sharma addressed all the participants,



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emphasizing the importance of continuous development for teachers and their contributions to emerging technological fields. He highlighted that such programs significantly contribute to innovation and improvement in the education sector.



Dr. Sharma also presented certificates to all the participants, symbolizing recognition for their contributions and involvement in the program. Professor Namita Brahme expressed her gratitude to all the participants and organizers for the successful execution of the event and assured that similar programs would be conducted in the future in an even more effective manner. After the ceremony, participants expressed their satisfaction and happiness, and all attendees appreciated the success of the program.

Conclusion/Outcomes

The six days Faculty Development Program on Start-up in VLSI Design, Embedded System, and Computational Intelligence was a resounding success. It provided a platform for learning, collaboration, and innovation in the fast-evolving field of semiconductor technology. The event concluded with positive feedback from participants, emphasizing the need for more such initiatives to bridge the gap between academia, research, and industry, in alignment with India's Semiconductor Mission and vision for a self-sustaining electronics ecosystem.

Dr. Kavita Thakur
President IIC

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