Guest Lecture Report
Topic: Latest Trends in System-on-Chip (SoC)
Speaker: Dr. E. Laksmi Prasad
Date: 03.12.2022
Time: 10 AM - 5 PM

Introduction

On 3rd December 2022, the Department of Electronics and Communication Engineering organized a guest lecture session on the topic "Latest Trends in System-on-Chip (SoC)" delivered by the eminent speaker Dr. E. Laksmi Prasad. The session was attended by faculty members and students from various years of the ECE program.

About the Speaker

Dr. E. Laksmi Prasad is a renowned expert in the field of System-on-Chip design and VLSI technology. He has over 25 years of experience in academia and industry, having worked for several leading semiconductor companies. Currently, he serves as a Professor in the Department of Electronics and Communication Engineering at a prestigious institute. His research interests include SoC architecture, low-power design, and advanced CMOS technologies.

Session Highlights

The session commenced with an introduction to System-on-Chip (SoC) design, its evolution, and its significance in modern electronic systems. Dr. Prasad explained the concept of integrating multiple functional components, such as processors, memory, peripherals, and interfaces, onto a single integrated circuit, enabling compact and efficient system design.

He then delved into the latest trends and challenges in SoC design, including:

1. Advanced Process Technologies: The speaker discussed the transition from traditional planar CMOS to Fin FET and emerging technologies like Gate-All-Around FET (GAAFET) and 2D materials. He highlighted the challenges and opportunities associated with scaling and power management.

2. Heterogeneous Computing: Dr. Prasad emphasized the importance of incorporating specialized accelerators, such as GPUs, DSPs, and AI/ML engines, into SoCs to address the computational demands of modern applications like multimedia, autonomous systems, and artificial intelligence.

3. Interconnect Fabrics: The lecture covered advanced on-chip interconnect architectures, including Network-on-Chip (NoC) and chiplet-based designs, to address the communication bottlenecks and enable modularity and scalability in SoCs.

4. Security and Trust: With the increasing complexity of SoCs and their applications in critical domains, the speaker stressed the need for robust security measures, such as hardware-based root of trust, secure boot, and side-channel attack mitigation techniques.

5. Low-Power Design Techniques: Energy efficiency remains a crucial aspect of SoC design, and Dr. Prasad discussed various low-power techniques, including power gating, clock gating, dynamic voltage and frequency scaling (DVFS), and near-threshold computing.

6. Design Automation and Verification: The speaker highlighted the challenges in SoC design automation and verification due to the increasing complexity of designs. He discussed the latest advancements in electronic design automation (EDA) tools, hardware-software co-design methodologies, and formal verification techniques.

Throughout the session, Dr. Prasad provided real-world examples and case studies to illustrate the practical applications of the discussed trends and challenges. He also shared insights into the future roadmap of SoC design, emphasizing the roles of emerging technologies, such as quantum computing, neuromorphic computing, and in-memory computing.

Interactive Session

The lecture was followed by an interactive question-and-answer session, where attendees had the opportunity to clarify their doubts and seek guidance from the expert speaker. The discussions covered a wide range of topics, including career prospects in SoC design, industry-academia collaborations, and the future of semiconductor technology.

Dr. Prasad's engaging and informative delivery, coupled with his vast experience, made the session highly insightful and valuable for both faculty members and students alike.

Conclusion

The guest lecture session on "Latest Trends in System-on-Chip (SoC)" by Dr. E. Laksmi Prasad provided a comprehensive overview of the current and emerging technologies, challenges, and design methodologies in the field of SoC design. The session served as an excellent platform for knowledge sharing and fostered a deeper understanding of the cutting-edge developments in this domain.

The attendees gained valuable insights into the latest trends and innovative solutions addressing the challenges of SoC design, enabling them to stay up-to-date with the rapidly evolving technological landscape. The interactive session further enriched the learning experience, providing an opportunity for direct engagement with the expert speaker.

Overall, the guest lecture session was a resounding success, contributing significantly to the academic and professional development of the participants.

Acknowledgments

We express our sincere gratitude to Dr. E. Laksmi Prasad for graciously accepting our invitation and delivering an insightful and thought-provoking lecture. His expertise and willingness to share his knowledge have greatly benefited our faculty members and students.

We would also like to extend our appreciation to the Department of Electronics and Communication Engineering for organizing this valuable guest lecture session and providing a platform for enriching academic discourse.

Finally, we thank all the attendees for their active participation and engagement, which contributed to the success of the event.