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Monthly Updates

The Bulletin

A Newsletter from

Electronics & Communication Engineering Department.

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BUILDING THE FUTURE: MY VLSI DESIGN ADVENTURES

VLSI Adventures: From Codes to Chips “AI is certainly the most important technology of our time, and potentially of all times” says Jensen Huang , CEO of Nvidia and for advancement of AI , it needs to be powered by Semiconductors. As a VLSI specialization student, I’m immersed in integrated circuits, my focus is on front end design, where chip functionality is defined and verified. VLSI design involves creating high-performance electronic systems, typically through front-end and back-end design phases. Front-end design focuses on the system’s architecture and functionality, while back-end design focuses on the physical implementation and optimization. Effective collaboration between these teams is crucial for a successful design process. One of my projects involved designing a traffic light controller using Verilog, reinforcing my understanding of finite state machines, sequential logic, and translating real-world problems into synthesizable HDL (Hardware Description Language) code. Another project focused on a basic UART (Universal Asynchronous Receiver/Transmitter) implementation in Verilog, teaching me about data serialization and asynchronous communication. Transitioning to System Verilog, I verified a FIFO (First-In, First-Out) buffer. This project introduced me to constrained random stimulus generation, functional coverage, and assertions, demonstrating System Verilog’s power for robust verification. I created a testbench to thoroughly test the design, ensuring correct operation under various conditions. These experiences have solidified my understanding of HDLs like Verilog and System Verilog. I am becoming proficient in writing synthesizable RTL (Register Transfer Level) code, performing simulations, and using industry-standard tools. My foundation in digital design fundamentals, including Boolean algebra and state machines, is crucial for creating efficient circuits. Shifters and counters are now key components in my designs, with barrel shifters enabling data shifts without sequential logic and counters serving as essential building blocks. “The great thing about VLSI is that it allows you to design complex systems that can be manufactured at a very low cost.” – David A. Electronics and Communication Engineering is where the digital revolution happens, with VLSI at the heart of every electronic device. This field constantly pushes the boundaries of innovation, demanding creativity and problem-solving skills. Specializing in VLSI allows you to design the chips that power the future.



Article By:

Shubhi Garg

B. Tech. - EC(VLSI), 2nd Year

ADVANCEMENTS IN ANALOG DESIGN AND SEMICONDUCTOR TECHNOLOGY

Introduction: The field of electronics and semiconductor technology is undergoing rapid advancements, driven by innovations in analog design, circuit-based projects, and integrated circuit development. These technological breakthroughs are shaping the future of communication, healthcare, and industrial applications, setting new benchmarks in performance, efficiency, and reliability.

Trends in Analog Design and Semiconductor Technology

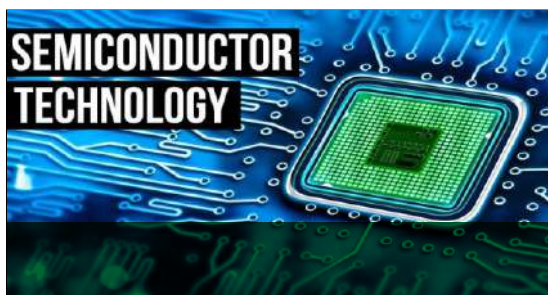
Modern circuit design is witnessing a shift towards highly efficient and low-power solutions. Analog design plays a crucial role in various domains, including wireless communication, medical electronics, and industrial automation. Cutting-edge research is focusing on improving signal processing capabilities, enhancing noise performance, and developing robust semiconductor architectures.

With the increasing demand for high-speed and low-noise amplification, advancements in Low Noise Amplifier (LNA) design have gained significant attention. Recent developments have led to optimized circuits achieving higher S21 parameters and lower noise figures, making them ideal for RF communication applications.

Innovations in Integrated Circuit Layouts

Integrated circuit layouts form the backbone of modern electronic devices. The development of advanced circuit layouts, such as current mirror circuits, inverters, and NOR gates, has significantly improved power efficiency and logical operations. These designs are essential in semiconductor technology, enabling efficient current regulation, signal processing, and computational functionalities.

Current mirror circuits are widely used in analog ICs for precise current replication, enhancing circuit stability and performance. Similarly, the optimization of inverter layouts contributes to faster switching speeds and reduced power consumption. The NOR gate, a fundamental building block in digital logic, is being enhanced for high-speed and low-power applications.



Participation in Cutting-Edge Research and Conferences

Ongoing participation in prestigious symposiums and short-term courses on semiconductor advancements is accelerating the adoption of new technologies. Recent engagements in events such as the RISC-V Symposium Roadshow and specialized courses on Analog ICs and Semiconductor Technology are providing deep insights into the future of electronics. Research in semiconductor

materials, fabrication techniques, and circuit design methodologies is playing a vital role in next-generation innovations. With continuous improvements in process technology, new semiconductor devices are achieving greater efficiency, higher integration densities, and improved thermal management capabilities.

Future of Semiconductor and Analog Design

The future of semiconductor technology lies in the integration of artificial intelligence (AI), Internet of Things (IoT), and 5G communication. Advances in analog design are paving the way for energy-efficient, high-performance circuits that cater to emerging technological demands. The semiconductor industry is moving towards sub-nanometer process nodes, enabling the development of ultra-compact and powerful electronic devices.

With the rapid pace of innovation, the electronics industry is set to witness groundbreaking advancements that will transform industries and redefine technological capabilities. The continuous push for efficiency, miniaturization, and high-performance electronics is driving the evolution of semiconductor and analog design, making it one of the most dynamic domains in modern engineering.



ALUMNUS VISITS TO THE DEPARTMENT

Today, in the department Saurabh Kumar alumni of batch ECE visited . Saurabh Ji is currently working as an HR at Amber Enterprises and has come to our university for placement. A total of 10 students have been shortlisted. We hope there will be good placements today. We have made a promise to them for jobs for all the



students. We will continue to involve them with our department in the future as well. We have also discussed the possibility of internships at their company. Lastly, many thanks to the respected CEO Sir, whose tireless efforts benefit the students of all departments and earn the respect of the teachers. Also, thanks to the entire placement team, whose efforts have helped the department move toward 100 percent placement.

UPCOMING EVENTS

विद्यया अमृतम् अश्नुते

Knowledge leads to enlightenment.

Education shapes the future, and every small effort toward learning can create a lasting impact. With this vision, Unnati Club, under the Techtronica Society of the Department of Electronics and Communication Engineering, is organizing **"Udaan-Wings of Learning."**

This initiative is dedicated to fostering curiosity, creativity, and hands-on learning among school students. Through interactive sessions and engaging activities, we aim to inspire young minds and make learning an exciting journey.



Event Details

📅 7th March 2025 📍 Upper Primary School, Jait (Classes 1–8)

Organizing Team

• **Society Mentor** : Dr. Manish Kumar • **Techtronica Society President**: Diksha Gupta •

Subject: उद्यानम् ज्ञानस्य दीपः Udaan: Wings of Learning by Unnati Club

QUANTATHON: A TRIUMPH OF ANALYTICAL SKILLS AT TECHNAVYA

The Quantathon was an exciting part of the mega event, Technavya, where 26 teams competed in a series of rounds to test their problem-solving and analytical skills. Each round was designed to challenge their speed, accuracy, and strategic thinking. The competition grew tougher with every stage, pushing participants to think fast and work smart.

With the guidance of faculty coordinators Dr. Manish Kumar and Dr. Prashant Sharma, and under the leadership of Kartikeyan Singh Tomar as the head coordinator, the event was executed smoothly and successfully. After intense rounds, Team Black Hitters claimed victory with their outstanding performance and teamwork. The Quantathon not only brought together bright minds but also encouraged learning, competition, and innovation, making it a standout event in Technavya.





Source
REUTERS

Analog Devices, Tata Group in talks to make semiconductors in India





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☎ +91-9027068068

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EDITORIAL TEAM

Chief Editor : Dr. Manish Kumar, Associate Professor

Editor : Mrs. Sweta, Assistant Professor



MATHURA CAMPUS
☎ +91-9027068068

GR. NOIDA CAMPUS
☎ +91-9027068068

GLAU ONLINE
☎ +91-7617595602