# IIEST Shibpur's Chip Innovation Presented at SEMICON India 2025

**Shibpur, Sept. 10** — The Indian Institute of Engineering Science and Technology (IIEST), Shibpur, has strengthened its reputation as a frontrunner in India's semiconductor research with its recent contribution to the nation's first "Made-in-India" chips. At **SEMICON India 2025**, IIEST's **Analog Comparator (C2S0007)** was among the selected chips showcased to Prime Minister Narendra Modi, underlining the institute's growing role in India's semiconductor self-reliance mission.

The achievement comes under the ongoing project, *"Design and Development of System-on-Chip (SoC) based Next-Generation IoT System for Industry 4.0 with Functional Safety and Security Features."* Led by Prof. Dr. Hafizur Rahaman at the School of VLSI Technology, the project is focused on building advanced SoCs tailored for Industry 4.0. These chips are being designed with integrated functional safety and security features, making them crucial for the next generation of industrial automation and smart manufacturing.

A Two-Decade Journey in Chip Design: IIEST's engagement with indigenous IC and SoC design began in **2006**, making it one of the earliest Indian academic institutions to build expertise in this domain. Over successive phases of the Government of India's *Special Manpower Development Programme (SMDP)*, the institute has contributed significantly: - **SMDP-I (2007–2014):** Established the foundation for chip design research, and introduced the M.Tech (VLSI Design) programme. The SMDP lab has been established under this programme. **SMDP-II (2008–2013):** Expanded into advanced domains, with notable contributions in **cryptography and secure IC design**. **SMDP-C2SD (2015–2020):** Delivered modules for **seismic sensing** and **power-aware biomedical systems**, marking a strong application-oriented thrust. **SMDP-C2S (2021–present):** Current flagship initiative under which IIEST is developing a **System-on-Chip for Industry 4.0**, with emphasis on functional safety and security.

Contributions from Faculty and Scholars: Alongside *Prof. Dr. Hafizur Rahaman*, several of his students and collaborators have played pivotal roles across different phases of this journey. Notable contributors include *Dr. C. Roy Choudhuri, Dr. Kasturi Ghosh, Dr. Subhajit Das, Dr. Supriyo Srimani, Dr. Subhajit Chatterjee, Dr. Sabir Ali Mondal, Dr. Shovan Barma, and Santasri Giri Tunga*. Their research and dedication across seismic sensing, biomedical applications, cryptography, and SoC design have significantly advanced the institute's semiconductor research output.
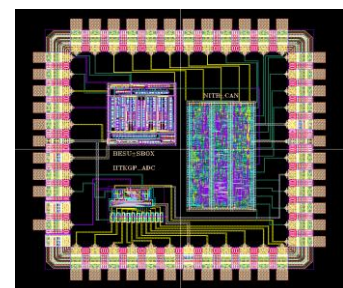
*The different ASIC's designed by IIEST Shibpur which were fabricated from 2008 till date under India Chip Programme*
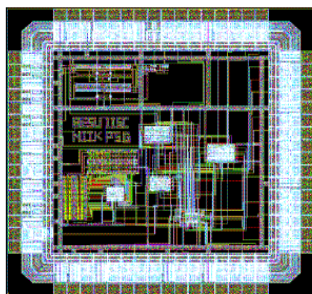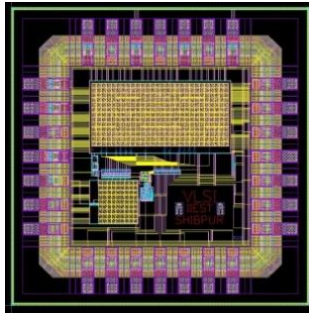


VCO integrated with a buffer for gas sensing applications in mines using UMC 0.18 µm node (2007-2008).
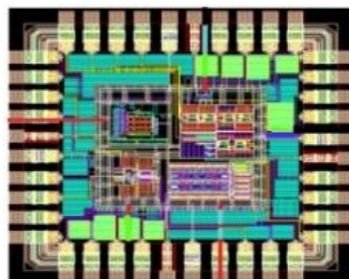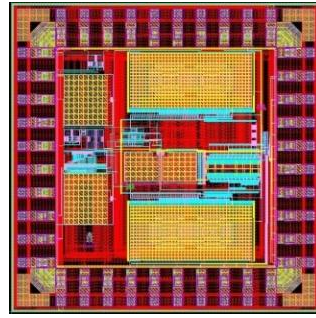


High Slew Rate High Gain Comparator for Low Phase Detection using UMC 0.18 µm node (2009-2010)



Transistor Level S-Box Circuit for Efficient Implementation of AES Algorithm" during (2011-2012).
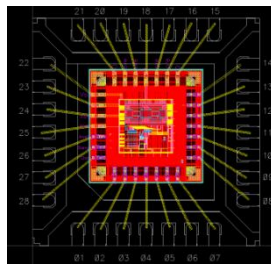
*Data Converter for Seismic Sensor Based Application (EDU0086) using SCL 0.18* μm node (2016-2017).
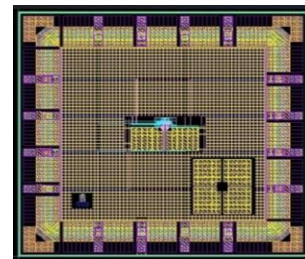


*Single channel Fully Differential 14-bit SAR (EDU0086) using SCL 0.18* μm node (2017-2018).
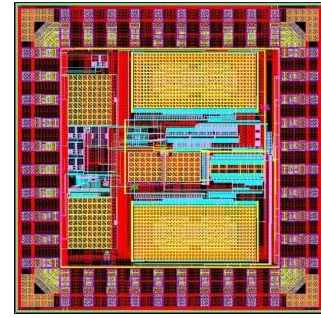


*3-channel Fully Differential 14-bit SAR ADC (EDU0087) (2018-2019)*



Power Aware Reconfigurable Analog to Digital Converter (EDU0029) *using SCL 0.18 μm node (2021-2022).*



*Analog Comparator Chip designed (C2S0007)* using SCL 0.18 μm node (2024-2025).

**Training India's Semiconductor Workforce**: Beyond technology, IIEST has built a strong talent pipeline. Over the years, the School of VLSI Technology has nurtured hundreds of students who now serve in India's growing semiconductor and electronics sectors. Their expertise in IC design, verification, and system integration has significantly bolstered India's manpower strength in this strategic area.

**Aligned with National Priorities:** The ongoing Industry 4.0-focused SoC project is both a technological and national milestone, aligning with the **Make in India** initiative and the vision of a **Viksit Bharat**. It demonstrates how academic research and innovation can directly fuel India's strategic push for semiconductor independence.

**Recognition at the National Stage:** The inclusion of IIEST's **C2S0007 Analog Comparator** in the memento presented to the Prime Minister at SEMICON India highlights the institute's contributions alongside national achievements such as the **32-bit "Vikram" processor** developed by ISRO's Semiconductor Laboratory. This recognition places IIEST Shibpur in the front line of India's indigenous semiconductor ecosystem.



PM Modi and IT Minister A. Vaishnaw at the 'Vikram 3201' launch event.



All 33 Chips fabricated in India at SCL India



Analog Comparator Chip designed by IIEST Shibpur