Vidyavardhini's College of Engineering & Technology
Affiliated to Mumbai University
NBA & NAAC ACCREDITED
Department of Electronics and Telecommunication Engineering
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Electronics and Telecommunication Engineers Association

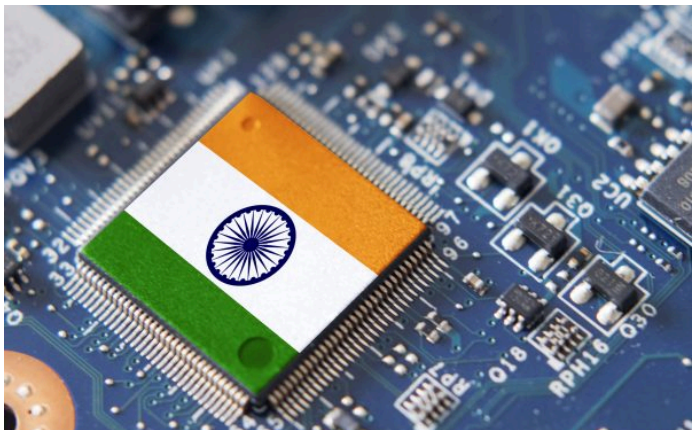
Vision

- To contrive educational and research environment to serve industry and society needs in the field of Electronics and Telecommunication Engineering.

Mission

- To enrich soft skills, ethical values, environmental and societal awareness.
- To develop technical proficiency through projects and laboratory work.
- To encourage students for lifelong learning through interaction with outside world.

GROWTH OF SEMICONDUCTOR TECHNOLOGIES IN INDIA



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The semiconductor industry fuels advancements in AI, healthcare, and automation. With the global market expected to exceed $1 trillion by 2030, India aims to be a key player. The Indian Semiconductor Mission (ISM) focuses on building a domestic ecosystem through chip manufacturing, research, and design. India is reducing import dependence by setting up fabs, supporting startups, and fostering global partnerships. Addressing rising demand and supply chain challenges, India's semiconductor push ensures technological independence and economic growth.

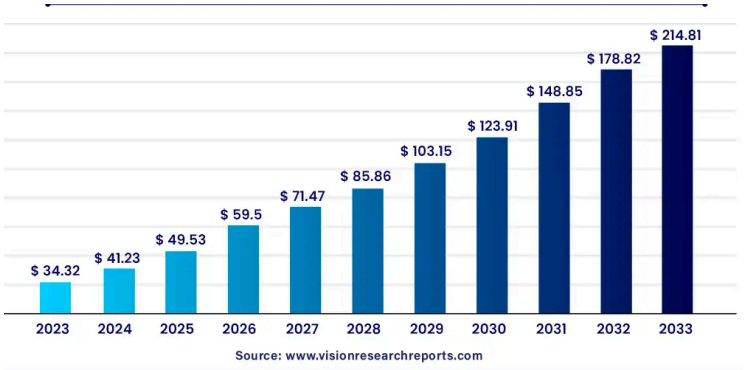

Fig 2. Market Growth

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India's semiconductor market to touch $103 billion by 2030: IESA

The India Electronics and Semiconductor Association (IESA) urges the government to enhance local value addition in electronics manufacturing, targeting 25% by 2025-26 and 40% by 2030. India's semiconductor market is projected to grow from $52 billion in 2024 to $103.4 billion by 2030, driven by mobile handsets, IT, telecom, automotive, aerospace, and defense. These sectors contribute 70% of the industry's revenue. To support growth, the government launched the $10 billion Semicon India Program, promoting domestic chip manufacturing. Increasing R&D investments, global partnerships, and fabless semiconductor startups, along with rising demand for 5G, AI, and IoT, are strengthening India's ecosystem.With strong policies and investments, India is poised to become a key player in the global semiconductor supply chain.

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Fig 3. Semicon India 2024

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INDUSTRY & MARKET IN SEMICONDUCTOR

SEMICONDUCTOR MANUFACTURING & FAB UNITS

Rank	Company/Facility	Location	Investment	Focus Area	Status
1	Tata Electronics & PSMC Fab	Dholera, Gujarat	₹91,000 crore ($11B)	Semiconductor Fabrication (up to 50,000 wafers/month)	Expected 2026
2	Micron Technology ATMP Facility	Sanand, Gujarat	$2.75 billion	DRAM & NAND Assembly, Testing, Marking, and Packaging (ATMP)	Phase 1 in 2024
3	Tata Semiconductor Assembly & Test (TSAT)	Morigaon, Assam	₹27,000 crore	Advanced semiconductor packaging (Flip chip, SiP)	Approved
4	Kaynes Technology ATMP Unit	Gujarat	₹3,307 crore	Assembly, Testing, Marking, and Packaging (ATMP)	Under development
5	CG Power & Renesas Electronics	India	$222 million	Semiconductor Assembly & Testing (15M units/day)	In progress
6	ISRO's Semiconductor Laboratory (SCL)	Mohali, Punjab	Government-funded	R&D & semiconductor devices for space applications	Operational
7	SCL Fab	Chandigarh	Government-funded	Semiconductor fabrication for defense & strategic sectors	Operational

Recent Market update in Semiconductor Industry

The Assam government and Tata Group are fast-tracking a ₹270 billion semiconductor unit in Morigaon. On March 13, 2024, PM Modi launched three new semiconductor units, boosting India's chip sector. CG Power, Renesas, and Stars Microelectronics are investing $205 million in Gujarat, while Foxconn plans 4-5 semiconductor lines with TSMC and TMH Group. A UK firm is investing ₹30,000 crore in Odisha, Micron is investing $2.75 billion in Gujarat, and Silicon Power Group is investing $121.73 million in Odisha. AMD is investing $400 million in Bangalore, while Japan and Israel explore semiconductor collaboration. India approved $15.2 billion, including an $11 billion fab in Gujarat.

Startup Ecosystem

India's semiconductor startup ecosystem is burgeoning, with numerous companies driving innovation:

- **Saankhya Labs**: Specializes in software-defined radios and cognitive radio chipsets.
- **Mindgrove Technologies**: Focuses on developing microprocessor cores and related technologies.
- **Agnit Semiconductors:** Engaged in designing and manufacturing semiconductor components.
- **Aura Semiconductor**: Develops high-performance analog and mixed-signal semiconductor products.
- **Incore Semiconductors:** Works on RISC-V based processor designs.

CHALLENGES

Supply Chain Risks: Global dependence makes semiconductors
vulnerable to geopolitical tensions, natural disasters, and pandemics.
High Costs & Complexity: Setting up fabs requires billions in investment, advanced equipment, and continuous R&D.
Talent Shortage: India lacks skilled experts in device physics & process tech, crucial for chip manufacturing.
Global Competition: India faces tough competition from China, Taiwan, and South Korea.
Energy-Intensive: Semiconductor fabs require massive electricity for cleanrooms & fabrication.
Geopolitical & Economic Factors: Trade disputes & policies impact supply chains and industry growth.

GOVERNMENT POLICIES

India Semiconductor Mission (ISM) – ₹76,000 crore initiative to develop a semiconductor and display manufacturing ecosystem.
Compound Semiconductors & Packaging – 30% capital expenditure support for semiconductor packaging and related technologies.
Design Linked Incentive (DLI) Scheme – Financial and infrastructure support for semiconductor design.
SPECS – 25% incentive on capital expenditure for electronic components and semiconductor manufacturing.
PLI Scheme – Incentives (3%–6%) on incremental sales for semiconductor and electronics manufacturers.
State Policies – Gujarat offers major subsidies under its Semiconductor Policy 2022-27, including a 75% land subsidy and lower power tariffs.

JOB OPPORTUNITIES

- **Chip Design & Development**

VLSI Design Engineer – Works on designing ICs and microchips. Analog & Digital Design Engineer – Develops digital/analog circuits.

- **Semiconductor Manufacturing & Fabrication**

Process Engineer – Optimizes semiconductor fabrication steps.
Equipment Engineer – Maintains and improves fab tools.

- **Research & Development (R&D)**

Materials Scientist Works on new semiconductor materials. Quantum Computing Engineer Develops next-gen computing chips.

- **Semiconductor Testing & Quality Assurance**

Test Engineer – Conducts chip testing for defects.
Reliability Engineer–Ensures long-term chip performance.

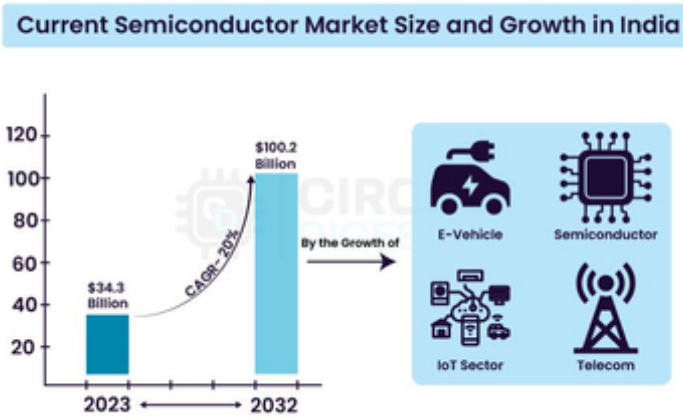

Fig.4: Growth of Semiconductor field in India

Scan the QR to play game

FACT

In 2025, India's semiconductor industry is poised for significant growth, with the first "Made in India" chip expected to begin production, driven by government incentives and investments, aiming to reduce reliance on imported semiconductors and boost the domestic ecosystem.

From Campus to Chip Design: An Alumni's Perspective

SUYOG PATIL

BATCH 2016

Suyog Patil, a 2016 batch graduate from VCET, currently works as a Senior Engineer at Qsilicon Innovative Solutions, specializing in VLSI Engineering with a focus on the DFT domain. With his expertise in VLSI design, Suyog contributes to the development and optimization of testing methodologies, ensuring high-quality and efficient semiconductor designs.

1. **Can you share your journey from graduation to where you are now in your career?**
Ans. I graduated from VCET in 2016, completed my master's in ECE from IIIT-Delhi in 2019, and joined Qualcomm India through campus placements in their "Design for Test (DFT)" team. I focus on inserting test architecture into VLSI chips to detect manufacturing defects. Currently, as a Senior Engineer, I manage subsystem-level DFT activities, optimizing test time while maintaining quality.

2. **What were some of the biggest challenges you faced early in your career and how did you overcome them?**
Ans. In the beginning, I was unaware of delivery deadlines and task expectations. I learned that if I couldn't handle something alone, it was important to inform the lead and seek help. The biggest challenge was understanding my workload capacity and knowing when to delegate based on my skills. This process of managing work effectively is still ongoing.

3. **What are some of the competencies that you think are essential and how did you develop them or improved them?**
Ans. Soft skills and communication are as important as technical skills, even in a technical role. I regularly discussed areas for improvement with my team leads and clarified requirements beforehand, which helped in planning my work. I also found that informal conversations with engineers about blocked tasks were more effective than emails, preventing delays and blame games.

4. **Can you describe a project you worked on during your studies that had a significant impact on your career or skills development?**
Ans. During my master's, I implemented Universal Verification Methodology (UVM) for a design, creating a Verilog testbench to verify use cases. This gave me insight into verification methods and their link to the Design Verification Team's work, enhancing my understanding of the product design cycle.

5. **Could you share a memorable experience where you collaborated with a team of engineers on a complex problem or design?**
Ans. During a silicon test, we found random leakage currents on certain IO-pads due to limitations in the new IO-pad model in Test mode. After collaborating with the pad design team, we updated the DFT patterns to resolve the issue. This was my first experience with the silicon debug process.

6. **What advice would you give current students or new graduates looking to succeed in the semiconductor field?**
Ans. Focus on the basics, like MOSFET and Inverter characteristics, as they are essential for both digital and analog circuits, such as SRAM or ADC/DAC designs. Don't be discouraged by the lack of expensive tools—many free semiconductor tools are available for learning. Online platforms like NPTEL, MIT, and edX offer great courses on the latest trends and industry challenges.

7. **If you had a choice to go back and change anything in your journey, what would you like to change?**
Ans. In the beginning, I considered moving to the Verification Domain, but I realized that staying in DFT allowed me to learn verification concepts as well. I've learned that it's never too late to pursue what you wanted in the past, as long as you're determined and able. You can still make things happen, even now.

8. **How do you stay updated with the latest trends and advancements in the field of semiconductor engineering?**
Ans. For the latest advancements in the DFT domain, I follow the "International Test Conference (ITC)" which happens yearly. Along with it I also go through the White-papers available by the VLSI Tool Vendors (Siemens Tessent, Cadence, Synopsys etc) which provide brief information of newer semiconductor architectures and implementation