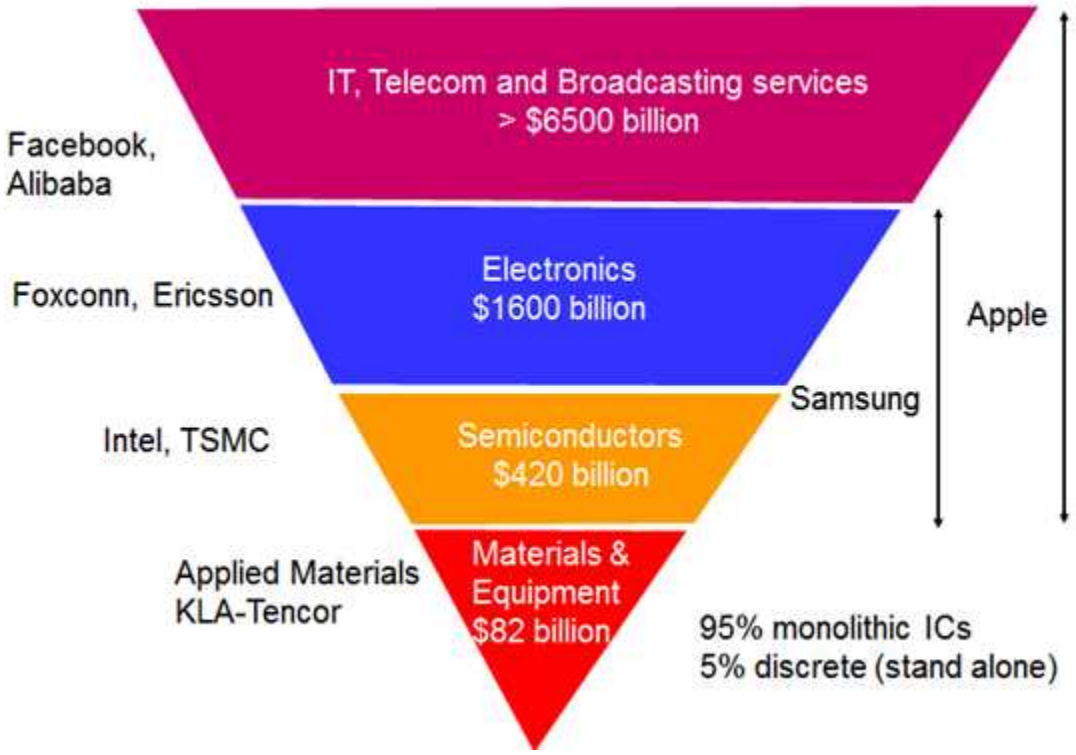
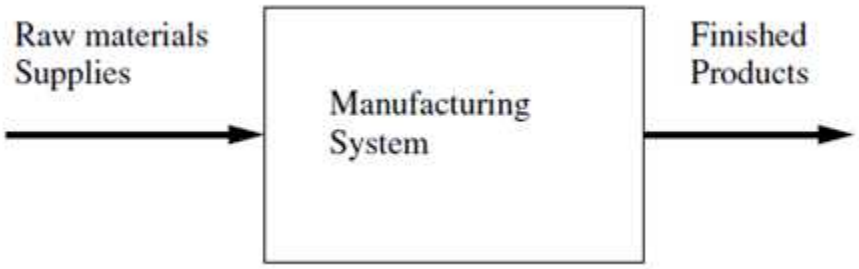
**Microelectronics and VLSI Design (EE3)**

The goal of any technology is to create a useful product which is not readily available in nature by means of complex processing of material, information etc. Microelectronics is the science and technology of making very small electronic components and systems. In the last 60 years, microelectronic devices served as the foundation of the digital revolution which has affected all aspects of our modern life. Semiconductors can be considered as the brains of modern electronics, enabling advances in communications, computing, health care, defence, transportation, clean energy, and emerging technologies such as artificial intelligence (AI), virtual reality (VR), and the Internet of Things (IoT).




Global semiconductor industry is worth around $420 billion (2017 figure). Integrated circuits (ICs) are sophisticated semiconductor products that often contain billions of transistors and perform high-level functions, while discrete devices often contain fewer transistors and perform simpler functions. 95% (by revenue) of all semiconductor products are sold in the form of integrated circuits.




The technology to fabricate these devices require a close collaboration of specialists from different disciplines and can be considered as a modern day alchemy which converts sand and other raw materials to a useful product like a microchip. These semiconductor products are used later by electronics market which is worth around $1.6 trillion. Viewed from a systems-level perspective, semiconductor manufacturing intersects with nearly all IC process technologies, design, fabrication, integration, assembly, and reliability. The end result is an electronic component or system that meets all specified performance, quality, cost, reliability, and environmental requirements.

Although in the past, personal computer market was the driver for semiconductor industry, the areas which have higher growth rates now are ICs for smartphones, ICs for autonomous and electric vehicles, sensors and actuators to enable IoT/ AI, solid state lighting and CMOS image sensors.

**What we offer / What you learn**

The M.Tech programme in Microelectronics and VLSI design is aimed at training students in design, simulation, modeling, fabrication and testing of very small electronic components and systems. Students are expected to undergo a broad set of core courses which cover the basics of all aspects of Microelectronics, VLSI design and MEMS and then given an opportunity to dive deep into any area by choosing suitable electives.

**Core courses**

EE5310 Analog Electronic Circuits
EE5311 Digital IC Design
EE5312 VLSI Technology
EE5313 Semiconductor Device Modeling

**Elective courses**

| **Materials and Devices** | **Circuits and Systems** |
|---|---|
| EE5340 Microelectromechanical Systems | EE5130 Digital Signal Processing |
| EE5341 MOS Device modeling & Characterization | EE5320 Analog IC Design |
| EE5342 Compound Semiconductors | EE5323 Advanced Electrical Networks |
| EE5343 Solar Cell Device Physics and Material Tech | EE5325 VLSI Power Management Circuits |
| EE5345 Semiconductor Power Devices | EE5350 Linear Algebra for data analysis |
| EE5347 Electronic and Photonic Nano Devices | EE6320 RF Integrated Circuits |
| EE6346 Advanced CMOS devices & technology | EE6321 VLSI Data Conversion circuits |
| EE6500 Integrated Optoelectronic Devices | EE6322 VLSI Broadband Communication Circuits |
| EE5311 Introduction to Plastic Electronics | EE6361 Advanced topics in VLSI |
| EE6362 Advanced Topics in Microelectronics and MEMS | EE5331 DSP Architectures and Embedded Systems |
| EE6341 Compact Modeling of Devices for Integrated Circuit Design | EE5332 Mapping Signal Processing Algorithms to DSP Architectures |
| EE6341 Advanced Memory Technology | EE6324 Phase Locked Loops |
| | EE6350 Analysis of Noise in Systems |
| | CS6330 Digital System Testing and Testable Design |
| | CS6230 CAD for VLSI |

Students who join this program will have the opportunity to carry out their project work in labs that are equipped with the state-of-the-art design, simulation, fabrication and testing tools.

**Placement:** Some of the companies in which our students were placed are: Analog Devices, ARM, Cypress Semiconductor, GlobalFoundries, IBM, Intel, Micron, Texas Instruments, TSMC etc**.**