The IEEE Solid-State Circuits Society organized a technical talk, “Application of FPGA in Modern Day Electronic Systems,” on 11 January 2018 at the Meghnad Saha Institute of Technology (MSIT), Kolkata, West Bengal, India. The talk was given by Dr. Indranil Hatai, School of VLSI Technology, Indian Institute of Engineering Science and Technology, Shibpur, Howrah, India. The event was aimed toward undergraduate students, and a total of 45 students attended.

Abstract
As the market for modern electronic system matures, equipment vendors are under increasing pressure to deliver low-cost solutions to consumers. With today’s complex and rapidly evolving electronic system, the cost of ownership is typically influenced by both initial capital investment and the ongoing cost of upgradation. Solutions based on digital signal processors (DSPs) and field programmable gate arrays (FPGAs) are attractive because they enable upgradation through reconfiguring the same device.

FPGAs offer superior speed—even sophisticated algorithms can operate at sample rates of tens or hundreds of MHz. This kind of processing power makes it possible to use FPGAs for implementing not only conventional low-frequency functionality but also high-speed signal processing that operates at higher frequency. Moreover, FPGAs let engineers optimize fixed-point word lengths and pack multiple channels into a single device, thereby reducing the effective power and cost. Besides their field programmability, speed, and flexibility, FPGAs also lend themselves to rapid design and verification.

Today, platform FPGAs are fabricated in nanometer technologies with multimillion gate densities, consisting of hard/soft macros such as embedded processors, RAMs, multipliers, DSP blocks, analog cells and high speed IOs. In nanometer era; factors such as time-to-market, nonrecurring engineering costs, risk of respins and volatility of emerging standards are favoring FPGA-based system designs instead of application-specific IC (ASIC) design starts, mainly for low-to medium-volume market segments. However the challenge still remains of meeting the high performance of FPGA-based system design comparable to that of an ASIC even targeted to bigger process geometries. For FPGA-based system designs (such as system-on-a-reprogrammable-chip) to be successful, it is very important to meet criterion such as high performance with short development cycles and consistent results with faster turn-around cycles. In the past, FPGAs were selected for lower speed and lower volume designs, but today they are still evolving, which makes them a popular choice for use in a wider range of modern day electronics system design development.

—Abira Sengupta