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ABAD EDITION (CIRCULATED IN VJAYAWADA ALSO)

THINK SMALL



AN UNTAPPED TALENT POOL AND POSITIVE ECO-SYSTEM MAKE INDIA
THE CYNOSURE OF THE GLOBAL CHIP INDUSTRY. **DIPAL GALA** EXPLORES
THE INDUSTRY'S GROWING DEMAND FOR CHIP DESIGNERS

The next time you admire the latest functions in your cell phone, laptop, or play station, or stare in awe at complex medical and manufacturing computers, remember that these devices are run by a tiny silicon wafer, commonly called a chip. Chip designers the world over work to make faster, cheaper, and more innovative chips that can automate part or the entire function of electronic devices.

INDUSTRY TALK

It is now globally recognised that India has built core competence in chip design. Today 19 of the top 25 semiconductor companies in the world have Indian operations, and there are more than 200 Indian small and large semiconductor companies.

In addition to the obvious benefits of joining the global chip design force, an interesting option is the opportunity for a budding chip designer to come up with innovations for the existing medical, automotive and engineering companies. In fact, the trend

of small, high-end design boutiques focusing on one area in chip design might become common place in India.

The India Semiconductor Association (ISA) and IDC India, in their recent report 'India semiconductor and embedded design

service industry (2007-2010)' state that the Indian semiconductor and embedded design services market is expected to cross \$7.37 billion in 2008. To achieve this phase of growth, the industry needs to focus on availability of quality manpower and focus

on value creation through innovation. "With the growing expertise and capabilities in complex end-to-end design, strong IP development, and increasing talent pool, India's growth is nearly 22 per cent, which is three times the global growth rate," says ISA

President Poornima Shenoy. The domestic market is also one of the fastest growing, in Asia as well as globally.

JOB PROFILE

Executive Editor Ron Wilson, who writes a blog on electronic design 'EDN' states that far from being monotonous,

chip design is a very challenging job. "This is how IC design teams actually work, across the globe: they struggle for chip power efficiency and performance, wrestle with (the ever-changing) semiconductor processes and design methodologies, and cope with the challenges of global design teams. To top that, they herd architecture, IP, design and verification into a successful tape-out."

Once the architecture team designs the chip, the logic design team then implements the defined design in a high-level language. The two popular languages being used today are Verilog and VHDL. With the new paradigm of System-On-Chips design, System C and System Verilog are being used for top level design. Engineers write the code with these languages.

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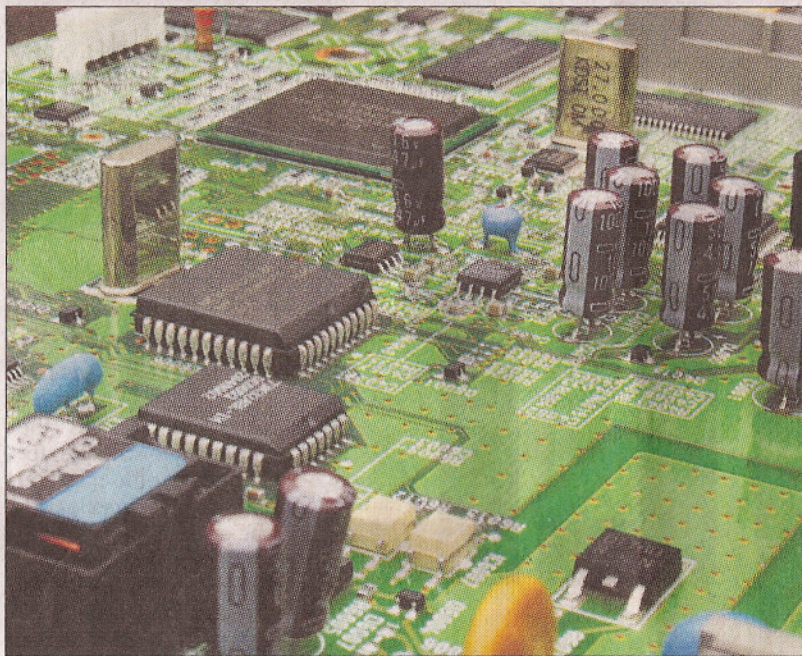
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THE circuit design team synthesises the logic description into a circuit and the physical design team details the layout of the chip. This is followed by the testing and verification stages. Verification is a very elaborate process. Typically, for every two design engineers, there are five verification engineers. Seventy per cent of all the engineers in the industry today are verification engineers, and de-

the design is being ideated upon.

AWAITING THE QUANTUM LEAP

There are a few hitches though. Today, Indian engineering colleges train a few hundred very large system integration (VLSI) engineers every year, while the actual requirement is in thousands. A master's in VLSI is generally done as a PG programme after an MTech in Electrical Engineering or Computing. Moreover, the lack of awareness of chip design op-



signing a chip is a job entrusted only to experienced professionals. Typically, freshers are entrusted with the job of testing. At all stages, the design is fine tuned to come up with chips with the following attributes - low power consumption, less noise, less area usage and higher efficiency and also for testability, speed, and yield. Seemingly small factors such as a laptop going into sleep mode when you leave it idle for five minutes, is a major decision taken when

opportunities makes even potential chip design candidates go into software programming, say industry experts. To train manpower in the area of VLSI design and related software at the BE/ BTech, ME/ MTech and PhD levels, the Department of Electronics (DoE), Government of India, is developing manpower and teaching abilities at various institutes in the country using the expertise available in places like the IITs and IISc. Despite these efforts, there is a

basic lack of awareness and chip design does not attract enough of the innovative, resourceful talent needed by the industry. The larger student body does not understand the semi-conductor industry or its sphere of influence in the world, given how young the industry is in India, feel industry insiders. "Even in the West, the best schools are all centered in Silicon Valley or Austin or Boston," says Dasaradha Gude, VP & MD, AMD Hyderabad Research & Development Centre.

Courses in VLSI design and micro-elec-

be lesser than those of the software industry, but in two-three years they easily surpass and often double software salaries. The total workforce employed in the semi-conductor industry in India is estimated at 1,30,000 today, mostly covering jobs in embedded software, VLSI design and hardware.

WANTED: INDUSTRY INTERACTION AND REAL TIME PROJECTS

Indian chip developers must build up their repositories of intellectual property to help the industry ecosystem thrive and that explains why world class education in chip design is essential.

Academic institutions generally are not able to cope with the high level of investment required to keep training current-current in this space. The adaptive System-on-a-Chip (SoC) architecture, for example, provides a unifying theme while allowing the development of distinct and manageable sub-projects. Students are assigned to small groups, and are responsible for specific subsystems of the larger SoC. As a result, the success of the groups is linked (as it would be in real life), forcing all students to think about global issues and system integration. This framework also fosters development of student leadership and initiative. It provides a realistic experience using a review-based evaluation system.

Since the advances in Very Large Scale Integration (VLSI) happen at a rapid pace, the ability to learn quickly and continuously is a must. In terms of specific skills, knowledge in the following areas is required: digital design fundamentals, VHDL/ Verilog, simulation and synthesis tools and computer architecture. Some specialised areas would require additional skills - for example, mixed signal design, which requires analog design skills as well.

If industry predictions are true, India's chip design industry will employ around 7,80,000 people by 2015. This figure in itself is indication enough of the wealth of talent this industry needs, and the profits it can produce.

INSTITUTE WATCH

- IIT Kharagpur
- IIT, Madras,
- IIT, Delhi,
- IIT, Mumbai
- VEDA IIT, Hyderabad (industry-academia institution)
- C-DAC (conducts a diploma in VLSI Design)
- The Indian Institute of Science, Bangalore
- BITS, Pilani.
- IIT Guwahati
- University of Pune
- NIT, Tiruchirappalli
- Manipal Centre for Information Science (offers an MS VLSI CAD course in a tie-up with Synopsys Inc)
- Punjab University, Chandigarh in collaboration with Semiconductor Complex Limited, Mohali (conducts an MTech course in Microelectronics)

(Indicative examples)

tronics are offered in several education institutions in the country as MTech and ME programmes. For all the PG programmes a valid GATE score in the required discipline (electronics/ electronics and communication/ electrical engineering). Students need to spend a number of years on a learning curve in this capital-intensive industry. As there is heavy investment early on in training, initial salaries tend to

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