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## Powering India's Tech Future: Semiconductors Lead the Charge Says Chetan Arvind Patil

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By Parul, Correspondent | Tuesday, 30 April 2024, 02:10:36 PM IST



For the last half a decade, Chetan Arvind Patil (Senior Product Engineer at NXP USA Inc.) has been creating awareness about the semiconductor industry that is to be \$1 Trillion with major emphasis on global semiconductor supply chain, career, all-things new silicon product development and the impact of it has on day to day technology life. In this regard, Chetan has written more than dozens of technical articles focusing on different and critical semiconductor topics and hosted multiple talks on the same while also contributing immensely by sharing with budding students about semiconductor careers via several panel discussions, presentations, and conferences.

Silicon India sat down with Chetan Arvind Patil, to further discuss his work, semiconductor end-to-end design to the manufacturing world, and what the future holds.

**Q1: Tell us about yourself and your role as a Product Engineer.**

**Chetan's Answer:** Since 2018, as a Product Engineer, my semiconductor work, research, and focus have enabled the development of advanced new semiconductor products with a major focus on advancing the semiconductor design, yield, quality, reliability, testing, manufacturing, and assembly of semiconductor products. Primarily the focus is to develop silicon chips using matured CMOS nodes (above 40nm), with several products leveraging advanced CMOS (40nm and below) nodes also. I have mainly worked with WLCSP and QFN packaging. Apart from developing silicon products for existing and emerging markets, I also focus a lot on the Cost of Goods Sold (COGS), which is key to enabling a viable product business strategy. The silicon products I have worked on and working on, eventually enable connected and secure solutions to the mobile, industrial, and automotive domains.

**Q2: You have been very active in the semiconductor community and have been contributing to different aspects like semiconductor-focused research, talks, and presentations. What is that you have learnt from this process and what are the specific gaps in the semiconductor industry?**

**Chetan's Answer:** The main learning from the process of sharing semiconductor knowledge, specifically with students, is that there is really a lot of excitement and curiosity to know more about what the semiconductor industry is about, how the products are developed, and ways to start/enhance semiconductor careers. The main reason for this increasing excitement about semiconductors is the realization of how critical silicon chips are to almost all of the technological progress. Whether it is wireless solutions, space exploration, automotive, and so on.

-33%

The major gap is how students mainly can leverage their skills and bridge them to be part of the semiconductor industry. The reason for such a gap is the educational curriculum, which is still catching up with the advanced semiconductor manufacturing domain, which not only requires theoretical knowledge, but also practical experience. And, very few universities globally have the potential to teach both, as the cost of setting up the labs often runs into millions of dollars.

**Q3: Several countries are focusing on setting up end-to-end semiconductor manufacturing facilities (fabrication, assembly, and packaging), what is the major reason for this?**

**Chetan's Answer:** Majorly there are two areas to be focused on setting up successful semiconductor manufacturing facilities.

First is the dependency on the global semiconductor supply chain. During COVID, governments globally realized how critical semiconductor components (chips) are, and not having access to in-country semiconductor manufacturing houses is going to derail economic plans including impacting negatively on the trade, as importing all of the semiconductor components doesn't go well with product manufacturing dreams of any country.

Second is the ever-increasing reliance on silicon chips that are part of all types of product development including AI applications (which demand specialized silicon chips). Not having even a basic (matured technology) end-to-end semiconductor manufacturing makes countries very dependent on other countries. While semiconductors are always going to be a global industry (meaning, no single country can dominate 100% semiconductor design to manufacturing), there is still a need to ensure that critical and future technology development is not derailed by developing some, if not all, of the semiconductor manufacturing chain.

**Q4: What are the key skills needed to thrive as a semiconductor engineer?**

**Chetan's Answer:** Skills needed vary a lot from the target semiconductor career domain (and there are many paths to choose from). By default, all semiconductor engineers should have a basic know-how of design and manufacturing flows. Data skills are also critical, as many times the goal is to look at the silicon data and then make a decision based on it.

**Q5: What are some of the most promising semiconductor-focused technologies that will come out in the near future?**

**Chetan's Answer:** Below are the two that will take semiconductor product development to a new era:

**Chiplets Based Fabrication And Packaging:** Due to the die area constraints on the silicon chips, many silicon products will adopt heterogeneous integration, whereby the die area can be split into many smaller areas (chiplets) before getting assembled using advanced packaging techniques. While today, this is limited to CPUs and GPUs only. Slowly, several analog chips with high transistors and block count will start leveraging chiplets irrespective of the node types.

**Application Of AI In Semiconductor Manufacturing:** Manufacturing of semiconductor products has always had automation as part of it. Lately, with the advent of AI solutions, the development and yield management/improvement of 2nm and smaller will become more AI-driven. This will mean leveraging computational lithography and similar techniques for mask generation, and then also predicting the defects, and then capturing them early in the fabrication cycle.

**Q6: What is your take on the future of semiconductors?**

**Chetan's Answer:** The future is full of opportunities. Students will find several options to upskill themselves and be industry-ready due to the major focus on the semiconductor industry, whereby universities are investing a lot in developing new-age curriculums and labs that are focused on enabling students to learn more about the manufacturing aspect of semiconductors.

Apart from this, there will be more opportunities globally, as many countries will take the first steps towards semiconductor manufacturing, thus opening new jobs along with the development of a new semiconductor ecosystem that will enable millions of indirect job creations.

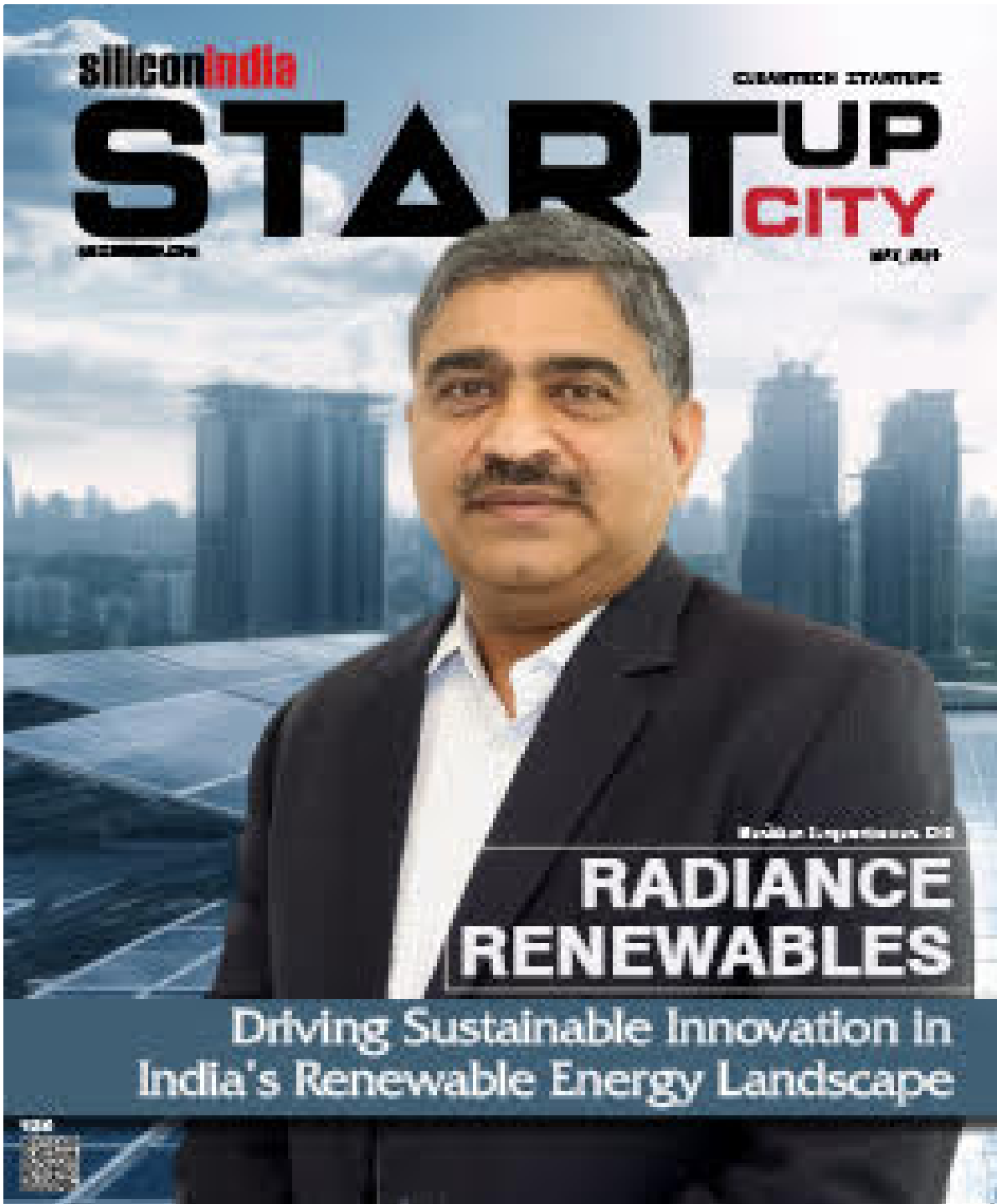
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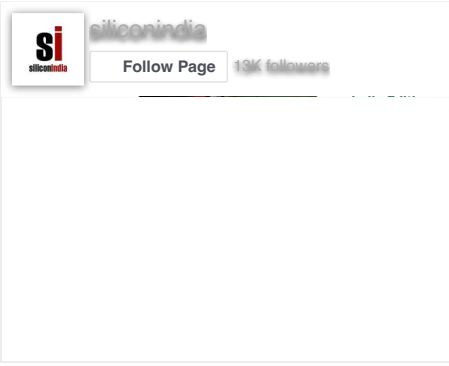
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