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Digital Twin: Twining Real With Virtual For A Connected World

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Imagine you are the CEO of a manufacturing company. Wouldn't it be great if you could see everything that's happening at your plants in real-time while you're seated at your desk? A decade back, this would have sounded too good to be real. However, Digital Twin technology makes it possible. With this cutting-edge technology, you can create digital replicas of any product or object- they could be factories, cars, massive container ships and even cities.
Luxury carmaker Audi creates digital replicas of its high-end models. Elon Musk controlled Tesla makes digital twin of every car that it rolls out. A virtual clone of any product or person, is digital twin just simulation? Or is there more to explore when you stitch the real with the virtual?

Digital Twin By CSM Technologies

How It Is Beyond Simulation

A simulation replicates what could happen to a product, but a digital twin replicates what is happening to an actual product in the real world. To illustrate, Boeing, which integrated digital twin into production and design, could improve the quality of some parts by 40 per cent. The applications of simulations are primarily limited to design and, at best offline optimization. On the contrary, digital twins are used for the entire design-execute-change-decommission lifecycle in real-time. Using cutting-edge technologies like the Internet of Things (IoT), Virtual Reality (VR) and Augmented Reality (AR), digital twin monitors the object and shares the data dynamically between the virtual and real products.

What's Driving Digital Twin?

The Global Digital Twin Market size is expected to reach $63. 5 billion by 2027, rising at a growth of 41. 7 per cent CAGR over 2020. The digital twin technology is penetrating due to the increasing adoption of Industry 4.0 practices focused on automation to fuel growth. Moreover, the rising adoption of IoT (Internet of Things) with 41 billion+ connected devices to be operational by 2025 is a spur as digital twin enables optimal functioning of IoT devices.

The Use Cases- They Grow Beyond Boundaries…

What you thought to be incredible only a few years back is believable today with digital twining. Nasdaq listed Hexagon has begun offering digital twins of entire cities as off-the-shelf products. It has already captured Munich, Cologne, Vienna, Milan, Amsterdam, Stockholm, Tokyo, Dallas, New York, Stuttgart and Frankfurt. Just ponder how replicating this technology for India's 100-odd Smart Cities can help urban development authorities deliver more efficient citizen service.

But, There Are Challenges To Navigate…

The deployment of any cutting-edge technology has its share of challenges. A critical challenge in building digital twins lies in accurately transforming data from one file format to another. Plus, you have predictable concerns about cost, security, privacy, and integration. As we move on, the digital twin will make it possible to mimic or simulate every object or process. This possibility raises key questions: Do we need to build digital replicas for every system or workflow? Isn't it going for a technology overkill to solve business problems?

Digital Twin By Priyadarshi Nanu Pany, CEO of CSM Technologies

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Still…Benefits Outgrow Concerns.

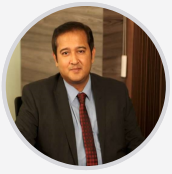
Knowing its disruptive potential, no agile and future-ready enterprise can ignore the digital twin. More so, because of its incontestable benefits:

- Powers strategic decisions through models that predict future use cases based on pre-defined scenarios
- Implementing a digital twin enables permanent monitoring
- Adopting a digital twin needs a common data source, and this spurs companies to reset their data collection and analysis models.
- Decisions can be automated based on insights from digital twins

The Future- Building Cognitive Digital Twins

Digital twins are becoming an essential part of the Industry 4.0 culture, right from Smart City planning to healthcare. Advances in edge computing and pervasive network technologies like 5G, supporting streaming data make it possible to interconnect these twins. A disruptive application for the future could be cognitive digital twins, promising to take us beyond human intuition to design and refine future machines. With this application, machines can be individually customized, ridding us of the one size-fit all model. The moment is now- to take a call on not what we build but for whom we do.

The article was first published on Priyadarshi Nanu Pany's **Medium Handle**.



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