How Toshiba is using Cyber Physical Systems to benefit society

By Brand Studio | Posted: 26 Aug 2019

Harnessing data across multiple industry sectors helps create value-added services for smart living.

Cyber Physical Systems integrate data from a variety of systems and can form the basis of smart, predictive services that can help improve the lives of people. Photo: Shutterstock

In Japan, there exists a traditional business philosophy called “sanpoyoshi”, which means being beneficial to the buyer, the seller and society at large. Businesses strive toward operating with this principle in mind, and Toshiba is no exception.

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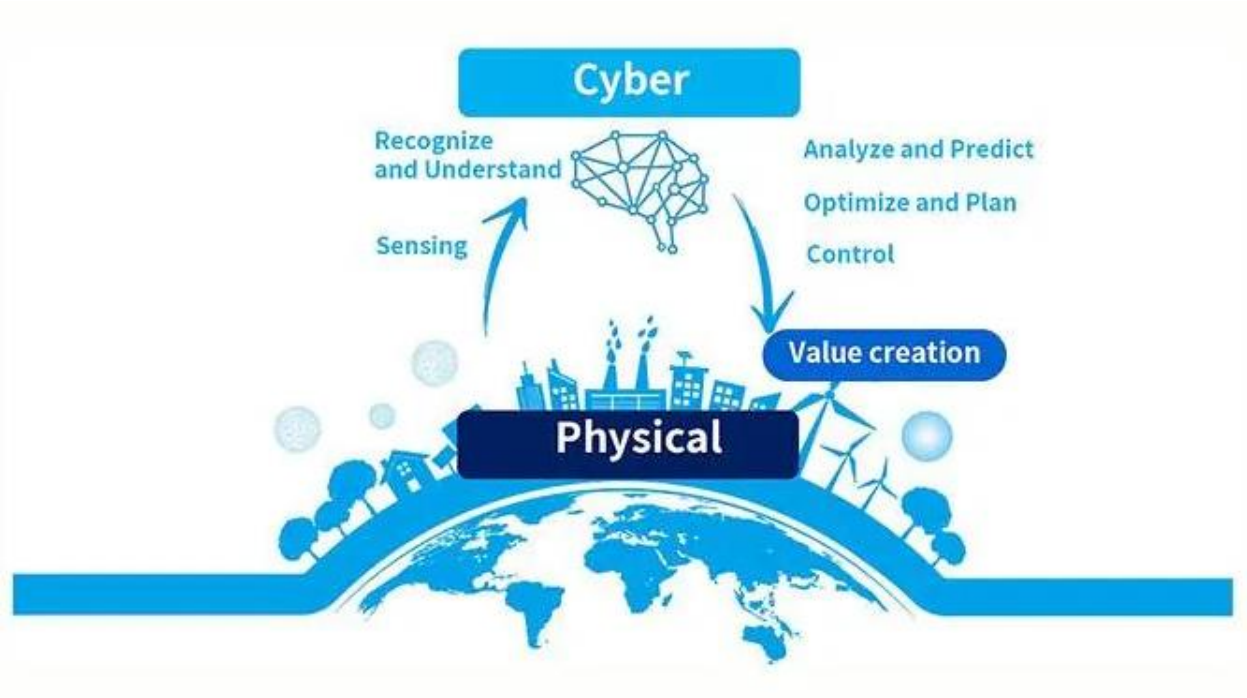
Toshiba's aim is to ensure all facets of society benefit, operating with Cyber Physical Systems (CPS) at its core.



Infographic: Toshiba

Toshiba's definition of CPS follows that of the National Institute of Standard and Technology (NIST), which states that CPS comprise interacting digital, analogue, physical and human components engineered for function through integrated physicals and logic. Such systems aim to provide the foundation of our critical infrastructure, form the basis of emerging and future smart services and improve quality of life in many areas.

In November last year, Toshiba announced its goal of becoming a leading CPS technology company, and the "Toshiba Next Plan" as the initial five-year transformation plan to secure core earning power. At the same time, CPS technology will help ensure profitability for Toshiba due to the company's expertise in a variety of industries,

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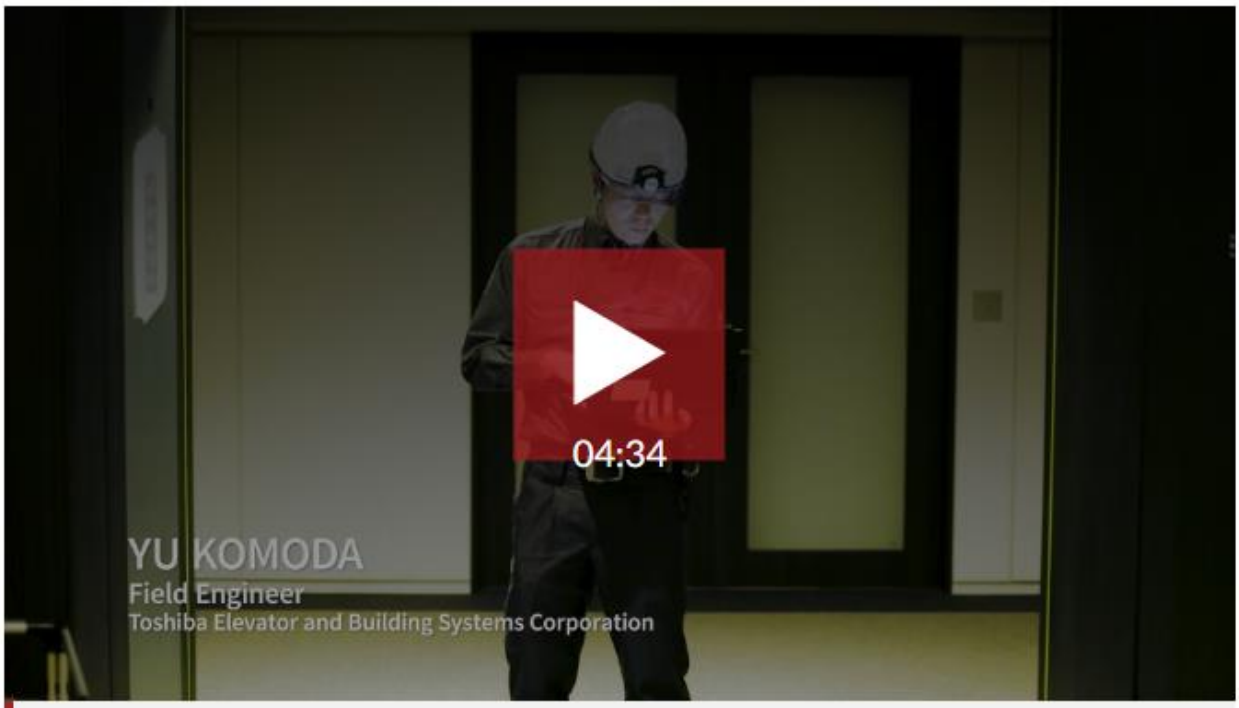
such as infrastructure, energy, storage and electronic devices, industrial ICT solutions and research and development (R&D).

CPS-focused innovation in these industries will result in solutions developed around urbanisation, automation and renewable energy that can address social issues while maximising enterprise value.

HARNESSING DATA



From finding new methods of securely transferring data to developing more efficient energy applications, Toshiba is aiming to transform the way we live, work and play. Video: Toshiba

The drive toward CPS at Toshiba starts from within, said Toshiba's chief digital officer Taro Shimada, adding that data lies at the core of successful CPS strategies.

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“I often say there are two types of data – data created by people or ‘human data’, and data created by physical products and machines or ‘physical data’”, Mr Shimada said.

“At Toshiba, we have a lot of touch points with our customers through the physical products we provide them. And we will begin leveraging the information and data from these physical products in order to deliver more value to them.”

Value creation for customers will be realised when data generated on the cyber front is combined with data from the physical world to derive actionable insights, and Toshiba is in a strategic situation to do so, given the company’s deep involvement in both spheres.

“I believe we can create something unique by combining technologies derived from these two aspects,” said Mr Shimada. “Toshiba will promote Digital Transformation (DX) strategies in order to become a CPS technology company.”

DIGITAL TRANSFORMATION

Data that exists in networks and servers can only become truly meaningful when connected to exist in real life.

Collaboration with other parties is crucial in R&D, said Toshiba’s chief technical officer, Dr Shiro Saito.

Toshiba encourages open innovation and has engaged in R&D projects with both academia and industry parties globally, including spoken language processing technology with the Chinese Academy of Sciences and data analysis technology with the Indian Institute of Science.

Open innovation for a variety of industries such as energy, infrastructure, logistics and manufacturing can be built on top of SPINEX - Toshiba’s IoT Reference Architecture, so the benefits of IoT can be enjoyed not only by Toshiba but its partners, competitors and society.

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REAL-WORLD DEPLOYMENTS

In its efforts to become a global CPS technology company, Toshiba is accelerating its development in key areas like rechargeable batteries, power electronics and virtual power plants. Photo: Shutterstock

Toshiba is accelerating its development in growth fields in the efforts to become a CPS technology company.

One of these key technologies is the SCiB rechargeable battery. The firm uses metal oxides like lithium titanate which help the battery deliver a high level of safety, quick charge and discharge times and a long lifespan. This makes it suitable for automotive and industrial applications.

Said Dr Saito: “We have been mass-producing and shipping the SCiB battery since 2011, but we have yet to record a single accident. The lifespan is also very impressive: Power capacity is maintained at 70 per cent or more even after 20,000 charge-discharge cycles.”

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Toshiba also manufactures power electronics to support uninterruptible power systems and energy management systems for renewable energy applications.

According to Dr Saito, these devices can be used in applications for cars, industrial equipment and power generation systems that can withstand extremely high voltages.

In the energy field, Toshiba's Virtual Power Plants (VPP) can be deployed to coordinate distributed power resources such as solar, wind power and hydrogen power generation sites, rechargeable batteries and electric cars. These resources can be controlled virtually as if they were a single power plant.

Toshiba is researching a number of technologies in the precision medicine field, covering medical procedures, prevention and screening, diagnosis and treatment.

One area of interest is the heavy particle beam cancer treatment equipment. This accelerates a heavy particle beam of carbon ions to about 70 per cent of the speed of light to irradiate cancer cells. Closely related to this is a technology that uses image recognition to precisely identify the position of a tumour via an electron beam that syncs with a patient's respiratory movements. Both technologies are expected to significantly reduce patient stress.

Artificial Intelligence (AI) development at Toshiba is now moving beyond human-assisted AI, which only provides results that have been pre-programmed, to self-learning AI, where advance programming is no longer required.

Toshiba's aim to transform itself into a leading CPS technology company will result in the development of solutions that can benefit the entire ecosystem, from enterprises to end users.

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