

CASE STUDY

Smart parking systems

using advanced technologies to create efficiencies



The challenge

Smart cities are now a reality — and a requirement. The overpopulation of urban areas and the accompanying transportation strain requires strategic planning, innovation and advanced technology to keep pace with ever-evolving transit challenges.

Population expansion and the increase of vehicles amplifies the demand for parking infrastructure. Simultaneously, manual management of parking resources creates the under-utilization of space.

This inefficiency leads to increased traffic congestion, wasted time and excess air pollution and waste.

That is why smart parking systems (SPS), which assist drivers in intelligently locating parking spaces, will be part of our collective future.

The solution

With our expertise in [sensors](#) and [connectivity](#), combined with our [Internet of Things \(IoT\)](#) technologies, we were an ideal candidate to create our own SPS.

Our [Plant 5 in Penang, Malaysia](#) recently collaborated on a joint development venture with Universiti Malaysia Perlis (UniMAP). Within three months, we designed and implemented a high-performance system, with additional emphasis on data reliability, security, privacy and other critical connectivity factors.

The following components were intelligently designed and implemented:

- Parking lot utilization detection by cameras
- Car recognition technology
- Radio-frequency identification (RFID) access capability as a backup subsystem
- Parking lots divided into zones for employees, customers, disabled and more
- Ability to block individual lots or zones as needed by security
- Three dashboard panels showing all zones and lot vacancies

- All data shared immediately to the IR4.0 database
- All data and communication controlled by four layers of XANDER CS (our FPGA solution) cybersecurity
- Auto-generated reports to authorized personnel for review

Our SPS features cameras with deep learning algorithm capabilities. Real-time data are sent to a centralized hub to continuously update parking allocations. Drivers then use their heads-up display to find the most efficient spot without expending extra time, effort or fuel.

All data encrypted is powered by our proprietary XANDER CS “brain” that is 100 percent designed and implemented at our Penang Plant 5.

The results

We pride ourselves on applying new ideas like the smart parking system, while creating solutions that are economically and environmentally beneficial for our partners.

Refining and evolving data acquisition technology is at the crux of future SPS benefits. Our continued innovations in wireless communication, data analytics, induction loops and advanced algorithms will also contribute to creating more adaptable systems in support of our mission to build products that create value and improve people’s lives.

 Cameras atop buildings track occupancy status in the internal parking lot

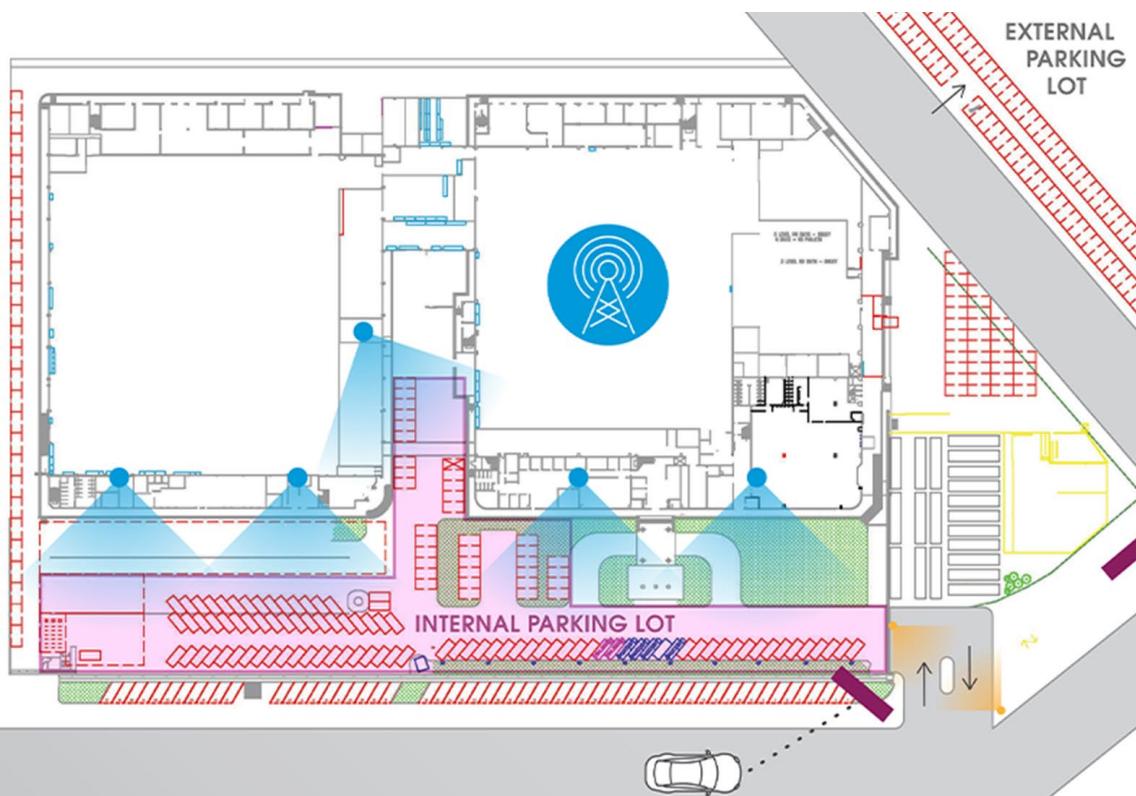
 Control tower consolidates information and pushes data to roadside status displays

 Status displays inform drivers of parking availability to help decide which parking lot to enter

 Driver makes decision to enter internal or external parking lot

 Cameras for parking lot entry and exit uses license plate recognition technology

All data and communication are wirelessly transmitted. The system is protected by **XANDER CS** - a proprietary four-layer cybersecurity system.



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