



Application Story

Automated Parking in Hoboken, USA

Unitronics PLCs are being used by a wide variety of businesses in addition to traditional industrial applications and control procedures. For instance, Unitronics PLCs are key components of Unitronics P2 Automated Parking Solutions—garages that can store double or more the number of cars compared with traditional ramp-style garages of the same volume.

You know Unitronics as an international supplier of automation products, but Unitronics also provides complete automated parking and logistics solutions via its Systems Division.

The City of Hoboken, New Jersey chose Unitronics to upgrade its existing automated parking facility — one of the first automated garages in the United States, with a capacity of more than 300 cars. The project included repair of mechanical and electrical systems, and replacement of the control systems and the management software.



About Automated Parking Systems

Automated parking systems include mechanical elements such as shelves (racking system), elevators and shuttle cars, which are guided by control elements (the PLCs) and orchestrated by an Automated Parking Management System (APMS).

Customers simply drive into a friendly entry bay, exit their car and activate the system with the push of a button. Based on advanced algorithms, the automated parking system determines where the car will be stored and moves the car to the storage location. Upon return, the system retrieves the car and quickly delivers it to the driver in a convenient exit-facing position. Drivers enjoy a fast, safe valet-parking experience — without the valet...

While the user experience is cool, the main advantage driving market demand is the ability to fit more parking in less space. Automated parking systems enable high-density storage by eliminating the need for ramps, and stacking cars literally bumper to bumper and door to door. Because cars are parked with their engines off, it significantly reduces exhaust emissions, providing a more environmentally friendly solution.

Unitronics PLCs: Controlling the Automated Parking Garage

Unitronics chose its Vision280™ PLC for the heart of its automated parking control system because of its friendly integrated touch-panel interface and rich feature-set. Key features include remote access and a local database, both of which promote high system availability and reliability.

Facing the Customer

A Vision280™ is installed in the reception area. The controller is responsible for taking the car to an optimized spot within the garage as well as for its return.

Upon exiting their car, customers set the parking process in motion by simply entering their user name and password on the Vision 280™'s clear, bright touch-screen, much like they would use an ATM. Upon return, members enter their user information again to start the retrieval process.



Ensuring High Availability and Reliability

The Vision280™'s well-designed human machine interface (HMI) makes it easy for garage operators and technicians to conduct immediate diagnostics and troubleshoot the system should any deviations from standard performance occur. Using Unitronics' unique *Info Mode*, technicians and operators can check the real-time status of sensors, distance-measurement lasers, and other parameters. For example, if there is a problem with a moving part, the operator can check the PLC located on the part in question and immediately determine whether there is a control problem or a fault with a sensor or motor drive.

However, it is not always feasible or handy to have a technician go to the physical location of the PLC in order to diagnose a problem. The automated garage is a multi-level building, reaching as high as 60 feet. To ensure the safety of the technicians and provide a high level of service, Unitronics makes use of the Vision's Remote Access utility. This utility enables technicians and approved personnel to remotely monitor and access all PLCs via a PC located in the control room situated on the ground floor and from anywhere around the world via the Internet.

Technicians can access the desired PLC from the computer. The view they see on their screen is identical to the user interface display of the PLC itself - except they operate it using a keyboard and mouse.

In standard industrial applications, the Remote Access feature is widely used to enable businesses to operate controllers and systems from anywhere in the world. Connected by Ethernet local networks, GSM/GPRS modems or Internet-enabled networks, Unitronics PLCs can be operated from as close as a floor manager's office and from as far away as a system integrator's PC across the globe.

Topology and Connectivity

Unitronics chose a distributed control topology to provide enhanced efficiency, manageability and reliability. A Vision280™ was installed in each conveying element and all controllers were connected to one main TCP/IP network.

Elements that had static control cabinets (e.g. elevators) were connected by wires. Components with moving control cabinets (e.g. shuttle cars) were connected via a wireless Ethernet - WiFi. The wireless connection eliminates the need to lay cables throughout the site, enables moving parts to be easily networked, and enables technicians to access any PLC from anywhere in the building using a WiFi-enabled PC.

Having a PLC with a friendly graphical HMI installed on each system element enables local handling of single components, problem isolation and manual operation of specific parts.

Local Databases

Information regarding the location of each car (identified by a specific ID) is saved in the Vision280™'s internal database. This means that should a failure of the central computer occur, the garage can continue to function in a semi-automatic or manual mode using the information in data tables to locate cars.

Unitronics uses data tables for similar purposes in the logistics systems and automated warehouses that it designs and builds. In such systems, Vision PLCs keep records of the location and loads they handle (pallets, crates, containers, etc.), enabling semi-automatic operation of the warehouse in case of malfunction.

Optional Advanced Capabilities

Unitronics automated parking system includes support for additional advanced communication features based on the Vision series' existing capabilities. One such option enables the controllers to be connected to a GSM cellular modem. This allows the controller to send SMS messages to technicians in case of system faults, enables technicians to request and receive data from the PLC via their mobile phone and to send commands to the PLC via SMS to quickly modify parameters such as speed and acceleration.

Another available option is integration with a License Plate Recognition (LPR) system to enable automatic recognition of cars entering the bay. This system can be connected to Vision PLCs without requiring a unique protocol thanks to Vision's 'Protocols Function Block'.

In industrial applications, this software feature is used to connect PLCs to a variety of external devices, without need for extra development, such as bar-code readers for use in production lines or automatic warehouses.