

# How Electric Vehicle Users Enjoy Convenient and Smart Travel with Efficient Battery Charging and Swapping Stations

## Challenge

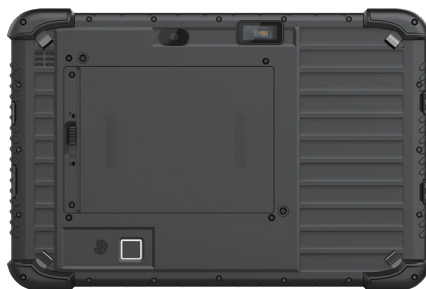
With the rapid popularization of electric vehicles, the demand for convenient charging solutions is rising. Traditional charging methods are often slow, and during peak hours, drivers may face long wait times. Prolonged use of traditional charging methods can also lead to reduced decreased battery lifespan and impact vehicle range, causing significant inconvenience for drivers and hindering the development of electric vehicles. Enhancing charging efficiency through smart devices has become a key challenge for improving user experience and boosting brand competitiveness.

## Solution

A certain electric vehicle battery charging and swapping station has introduced Emdoor's EM-Q16 rugged tablet PC and a proprietary smart management software to establish a brand-new battery charging and swapping management system. The EM-Q16 tablet serves as the operational terminal, enabling real-time monitoring and data recording of the battery swapping process through its connection with the station's equipment. The EM-Q16 supports real-time device status viewing and provides manual intervention capabilities during malfunctions, ensuring a smooth and safe battery charging and swapping process.

## Benefits

The EM-Q16 rugged tablet PC, integrated with the battery charging and swapping station's smart management software, optimizes the charging and swapping processes, reducing charging wait times and offering electric vehicle users a much more convenient charging experience. Additionally, faster fault response and improved smart data recording and management provide more reliable service, enhancing user satisfaction and smart travel experience. This integration also boosts the overall operational efficiency of the electric vehicle company.



**EM-Q16**  
Rugged Tablet PC

## Challenge

Amid the global push for sustainability, new energy electric vehicles (EVs) have emerged as a key direction for the future of the automotive industry. As EV adoption increases, the efficiency and reliability of charging infrastructure have become critical to the user experience. Particularly during long-distance travel, drivers need to plan their charging stops in advance to avoid running out of power. However, traditional charging stations offer low power output, meaning the charging process can take several hours. During peak times, drivers may also need to wait in line, further extending their overall travel time and causing significant inconvenience. Additionally, traditional charging methods lack intelligent management, which can result in imprecise charging, leading to battery degradation, reduced capacity, and ultimately diminished vehicle range — problems that are detrimental to both drivers and EV manufacturers.

As a leading electric vehicle manufacturer in China, the client has faced these challenges while promoting the widespread adoption of EVs. To address these issues, the client introduced a battery swapping model, establishing a network of charging and swapping stations to provide quick and convenient battery replacement services, thus alleviating users' range anxiety. Today, the client has deployed an extensive charging and swapping network across multiple cities domestically and internationally. Although these stations are highly automated, they still lack rapid intervention mechanisms in the event of unexpected malfunctions. Given the high usage intensity of these stations, the stability of the equipment and the precision of operations are often the key factors determining the charging efficiency. To further ensure the smoothness and safety of the swapping process, the client also needs to introduce an intelligent operational terminal to monitor and record the process data at the charging and swapping stations.

## Solution

Given that battery charging and swapping stations are often located in open or semi-enclosed environments, dust and pollutants can easily infiltrate the equipment. The continuous operation of the stations also generates significant heat. These environmental challenges necessitate the use of more durable and reliable equipment in station operations. In response, the client has equipped each station with Emdoor's EM-Q16 rugged tablet as a dedicated control terminal. This tablet, with its IP65 rating, ensures stable performance even in harsh conditions. Additionally, the tablet is integrated with a management platform specifically developed for the charging and swapping stations, seamlessly interfacing with the station's equipment to create an intelligent and efficient management system.

### Solution of EM-Q16

The EM-Q16 is typically placed on its dedicated DC82 docking charger, where it remains connected to both power and network cables, and is stored in a cabinet next to the battery swap slot. Through the RJ45 port on the docking charger, the EM-Q16 is connected to the equipment within the battery charging and swapping station and the management system. It operates continuously, automatically monitoring and logging the current operational status of the equipment and the station's log information, which is then uploaded in real-time to the system's backend for staff to review and assess the equipment's condition at any time. The station staff can carry the EM-Q16 tablet to the operation module, connect the network cable, and visually monitor the operation area to ensure millimeter-level precision during manual tasks.

The EM-Q16's manual intervention interface

significantly reduces response time in the event of a malfunction. Additionally, its portability allows staff to operate from anywhere, greatly enhancing operational flexibility and precision. This ensures a seamless battery charging and swapping processes, minimizing operational downtime to the greatest extent possible.



## Benefits

### Enhanced Charging Convenience

The integration of the EM-Q16 rugged tablet with the battery charging and swapping station management system has dramatically enhanced the convenience of electric vehicle charging. The entire battery charging process takes only three minutes, minimizing time wasted on charging. The fully automated process allows users to stay in their vehicles, making it even more convenient than refueling. Additionally, the system performs checks during each swap, ensuring that both the vehicle and the battery are always in optimal condition.

### Stable and Reliable Charging Service

The EM-Q16 tablet ensures that users consistently receive reliable battery charging and swapping services, regardless of the circumstances. The EM-Q16 can monitor equipment

status in real-time, enabling on-site personnel to quickly respond to any issues by manually troubleshooting with the tablet. Additionally, the intelligent management platform's fault warning system allows staff to perform preventive maintenance before problems arise, reducing the frequency of malfunctions. This rapid response mechanism minimizes equipment downtime and significantly enhances the reliability of the charging and swapping stations.

## Data-Driven Decision-Making

The EM-Q16 tablet goes beyond its role as an operational tool by serving as a critical data recording terminal within the battery charging and swapping station. It continuously logs real-time equipment status and

historical performance data, which are then stored and analyzed via the management platform. This wealth of information supports both daily operations and long-term strategic planning for the station. By providing detailed insights and trend predictions, the EM-Q16 enables operators to make more informed management decisions, optimizing maintenance schedules and enhancing the overall efficiency of the station. As a result, users benefit from a smarter, more reliable service experience.

## Reduced Maintenance Costs

The high durability and low failure rate of the EM-Q16 tablet significantly reduce the maintenance costs for stations. Its long lifespan also results in fewer replacements and a lower total cost of ownership. By integrating

this intelligent management system, the EV company not only boosts operational efficiency but also realizes substantial economic benefits.

## Enhanced User Satisfaction

A more convenient charging experience, quicker fault response, and optimized operational management have all contributed to delivering higher-quality services to electric vehicle users. The reliability and efficiency experienced during the charging process have strengthened users' trust and reliance on EV battery-swapping services. This improvement not only enhances the overall driving experience and boosts the competitiveness of EV brands but also drives the modernization of EV charging infrastructure.

