ADLINK
LEADING EDGE COMPUTING



Elevating Urban Life with AI-Driven Smart Parking Meters for a Smarter, Greener Future

Solution Brief

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Overview

Urban areas face growing challenges in traffic management and environmental sustainability, prompting cities to explore smart solutions. To address these issues, smart city initiatives are transforming how essential services, like parking, are managed.

In partnership with ADLINK, Acer ITS has introduced its second-generation smart parking meters that achieve an impressive 99.96% recognition accuracy, powered by ADLINK's DLAP-211-Orin edge AI platform. These smart meters are revolutionizing traditional parking systems by automating processes, reducing traffic congestion, and lowering carbon emissions, ultimately fostering a more efficient and eco-friendly urban experience.

The evolution began in 2019 when Tainan City, Taiwan, introduced the first generation of smart parking meters. These meters were capable of instantly capturing and recognizing license plates, eliminating the need for traditional attendants. Introduced in 2022, the second-generation meters offer enhanced features that significantly advance urban parking management.



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Challenges

Major Hurdles in Developing a Smart Parking Meter

- **Climate Durability:**
  Taiwan's extreme weather presents a serious challenge for smart parking meters. Outdoor temperatures can reach up to 40°C, while inside the meter, temperatures can soar to 60-70°C, posing a significant risk to hardware performance and lifespan. The components inside must support a wide operating temperature range to ensure reliable operation in such harsh conditions.
- **AI Computing Power:**
  Developing a highly reliable 24/7 smart parking system demands substantial AI computing power. This includes real-time data processing for license plate recognition, object detection, automated ticketing, and multiple electronic payment methods. These tasks are particularly challenging in Taiwan's variable weather conditions, where reliability and accuracy are essential.
- **Environmental Considerations:**
  Designing a compact system that can seamlessly fit into urban streets is crucial. It must fit with existing infrastructure integration, such as sidewalks and traffic signs, without disrupting pedestrian or vehicle flow.
- **Data Privacy and Security:**
  Integrating real-time data transmission and diverse payment options into the system raises significant privacy concerns. Protecting sensitive user information is crucial and involves complying with strict data protection laws while defending against cyber threats.
- **Maintenance and Longevity:**
  Smart parking meters are vulnerable to damage from dust, weather, and vandalism. Designing a system that minimizes the need for frequent maintenance while ensuring long-term durability is vital for cost-effective operation and user satisfaction.
- **Scalability and Future Proofing:**
  The system must be scalable and adaptable to future innovations without requiring costly overhauls. The smart parking meter system must accommodate future upgrades, such as EV charging stations and digital signage integration support future sustained advancements.
- **User Adoption and Experience:**
  Encouraging widespread adoption of the system can be difficult, particularly for users accustomed to traditional parking methods. The user interface must be intuitive, and the overall experience must be seamless to ensure the public embraces the technology with confidence.

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Solutions

ADLINK and Acer ITS's Collaborative Success: The Second-Generation Smart Parking Meters

“The challenges we faced were significant, but partnering with ADLINK allowed us to leverage their products and technical support to create an optimized second-generation smart parking meter,” says Chang Tong-Rui, Director at Acer ITS. ADLINK tackled these obstacles by providing the DLAP-211-Orin Series (Deep Learning Acceleration Platform), built on the NVIDIA® Jetson Orin ™ platform, which met the project's demanding requirements.



Throughout the development process, ADLINK's team provided timely and comprehensive consultation. When Acer ITS encountered difficulties during implementation, ADLINK quickly understood the issues and delivered precise solutions. This seamless collaboration not only overcame the hurdles but also significantly accelerated the development timeline, enabling Acer ITS to focus on advancing its software capabilities.

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Key features of ADLINK's DLAP-211-Orin platform:

- **High AI Computing Power:**
  The platform delivers up to 100 TOPS of AI processing power, ensuring efficient real-time operations. This substantial computing capability enables advanced functions such as instant license plate recognition and real-time data analysis.
- **Wide Operating Temperature Range:**
  The system features a fanless design with an operating temperature range of -20°C to 70°C, ensuring reliable function in extreme climates. This durability is crucial for outdoor installations where environmental conditions can be challenging.
- **Compact and Fanless Design:**
  The DLAP-211-Orin boasts a small form factor that allows for seamless integration inside compact smart parking meters. Its fanless construction provides protection against dust and moisture, enhancing durability and significantly reducing maintenance needs.
- **Versatile Connectivity and Scalability:**
  The platform offers multiple I/O interfaces for seamless integration with various sensors and devices. Its modular design with expansion slots enables future upgrades, ensuring adaptability to evolving smart city requirements.



Acer ITS leveraged DLAP-211-Orin platform to create a comprehensive smart parking solution

Acer ITS has developed the second-generation smart parking meters using the DLAP-211-Orin platform, featuring four key AI-powered capabilities: Object Detection, License Plate Recognition, Automatic Ticketing, and Multiple Payment Options. These features ensure 99.96% recognition accuracy, minimizing errors and improving overall parking management efficiency.

The system is designed for user convenience with an intuitive touchscreen interface and support for multiple electronic payment methods, reducing the need for paper tickets. Advanced encryption and secure payment gateways protect user data, while edge computing reduces data transmission for enhanced security.

Built with future scalability, the modular design allows easy upgrades, such as adding EV charging stations or digital signage, without a full system overhaul. AI-driven predictive maintenance further ensures reliable, continuous operation, making it adaptable to evolving urban needs.



"ADLINK provided not just hardware, but a complete solution. Its comprehensive solution greatly improved the recognition accuracy of the smart parking meters. Our partnership with ADLINK has been highly effective, and we look forward to collaborating on more smart city initiatives in the future," says Chang Tong-Rui, Director at Acer ITS.

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Conclusion

Paving the Way for Smarter, Greener Cities

The ADLINK and Acer ITS collaboration has produced a smart parking solution that addresses key urban challenges:

- Reduced traffic congestion and emissions through real-time vacancy information
- Minimized waste via paperless ticketing
- Optimized energy consumption through edge computing
- Enhanced urban planning with comprehensive data analysis
- With 2,000 smart parking spaces in Tainan and 600 planned for Taipei, the solution is rapidly expanding. Future developments include:
- Multifunctional smart poles with EV charging
- AI refinement for improved efficiency and performance
- Adaptive pricing models for optimal space utilization
- Visual data platform for data-driven city management

This initiative demonstrates how targeted AI and IoT applications can significantly benefit urban environments and residents, paving the way for smarter, greener cities.



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