



# AUO AMR Robots Collaborating Directly with Each Other!

How AUO Joined Hands with ADLINK and Intel  
to Promote the Overall Evolution of the  
Manufacturing Industry



Introduction

Challenges

Solutions

Insights



## Introduction

### AUO(AU Optronics)

Industry: Optoelectronics

Headquarters: Hsinchu, Taiwan

Global Employee: 40,000+

Website: <https://www.auo.com/>

**AUO has demonstrated outstanding innovation capabilities based on its profound display R&D and manufacturing experience with a full range of display products. In the age of digital transformation, AUO integrates software, hardware, cloud and service platforms to enter the diverse application market of the field economy. Seeing the potential of AMR development, AU Optronics (AUO), which has been a panel manufacturing company for more than a decade, has taken the leap to become a smart manufacturing solution provider and considers AMR as one of its main products.**



Chen Wen-Chieh, Director of AUO's Commercial Solutions R&D Division, pointed out that the global AMR market will continue to expand at a compound annual growth rate of 15.2% between 2020 and 2025, and the market size is expected to reach US\$646 million by 2025. Out of which, warehousing and manufacturing production line applications will be the most important force driving the growth of AMR market. With years of experience and expertise in the manufacturing field, AUO is not only able to respond to customers' needs quickly, but can also replicate them to various industries.





## Challenges



When AUO first entered the AMR market, the in-house development team was responsible for everything from vehicle design, operating system integration, SLAM algorithms, and system function development. In order to speed up the product development, the in-house team unanimously decided to use ROS, a robotics operating system, because it is an open source platform that has accumulated a huge amount of resources in AMR applications, including SLAM, obstacle avoidance, and navigation, which is helpful for product development.

However, Wang Yung-Ti, Manager of AUO's Commercial Solutions Business Division, revealed that in the past, it took at least 4-6 months to develop a product using a general industrial PC as the controller and integrating the ROS operating system by themselves.



# Reducing Development Time by At Least One-Third, Making ADLINK the best Product Upgrade Partner for AUO

During the product upgrade process, AUO observed that ADLINK has been involved in the development of ROS 2 for a long time. In addition to integrating the robot controller ROScube with the ROS environment, ADLINK can also provide the related ROS software development kit NeuronSDK and professional technical assistance, making it AUO’s best partner.

Thanks to the integrated environment of ROScube and the NeuronSDK, the development time of the new generation of products has been effectively shortened by 2 months by eliminating the need for AUO to carry out the hardware and software integration.

AMR Architecture					
Software	SLAM	Motion Control	Image Processing	Fleet Management	Object Recognition
Environment	ROS/ROS2				
OS	RTOS		Linux		
Hardware	Real-time Robotic Controller ADLINK® ROScube™			Motor Control System	
	3D Cameras Intel® RealSense™	Sensors	Sensors		



AUO is actively upgrading its products by introducing the ROScube-I, a ROS 2 controller from industrial computer maker ADLINK and Intel, to speed up the AMR time-to-market.



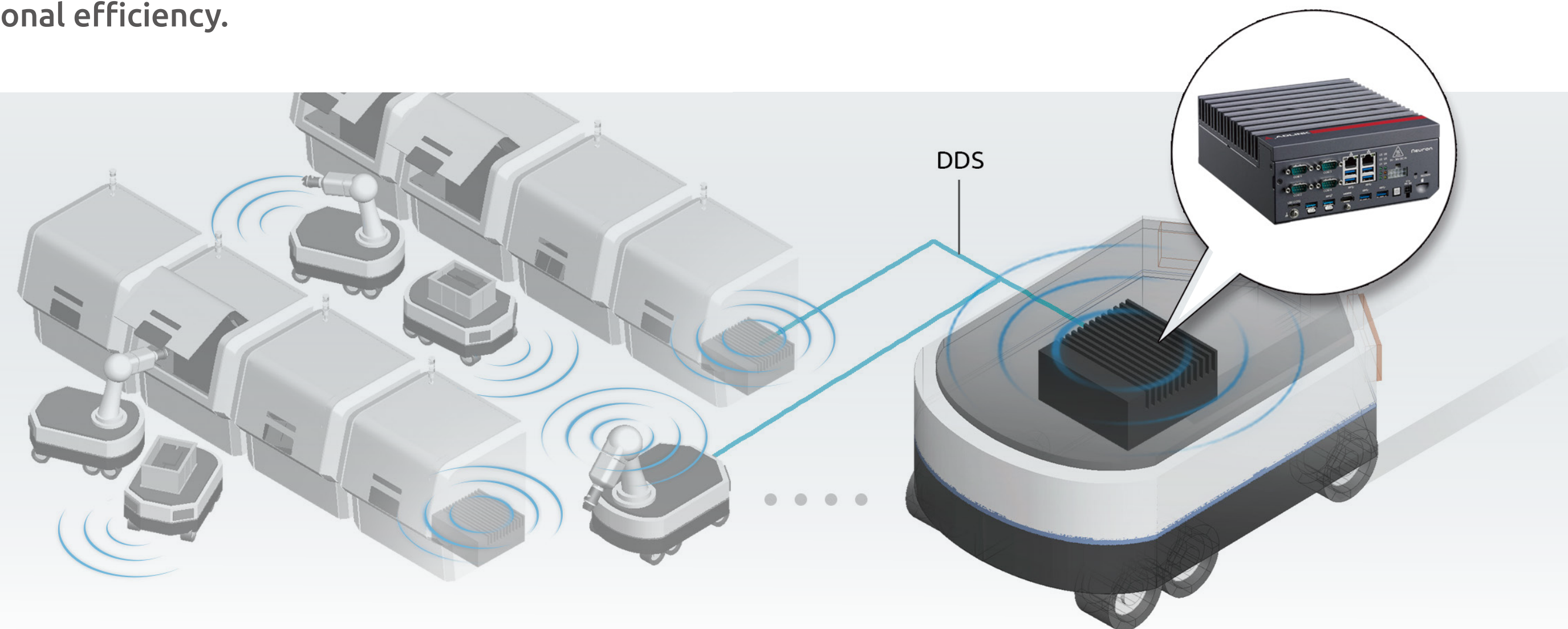
## Super Evolution from ROS 1 to ROS 2! AUO's AMR Fleet Can Carry Out Group Collaboration and Greatly Improve Efficiency

However, the communication method used in ROS 1 can only carry out fleet management through the upper-level system. But if two AMRs meet in the middle of a task, which one should go first? Or which vehicle can support other tasks in an emergency? All these AMRs have to be dispatched by the upper-level system, which is a relatively inefficient system structure when the plant area is large and there are a large number of AMRs.

The key core technology of ROS 2, Data Distribution Service (DDS), has improved the shortcomings of the centralized communication structure of ROS 1, allowing AMRs to communicate vehicle-to-vehicle, or even to collaborate in a decentralized manner without the need to go through the upper-level fleet management system, which naturally improves operational efficiency.

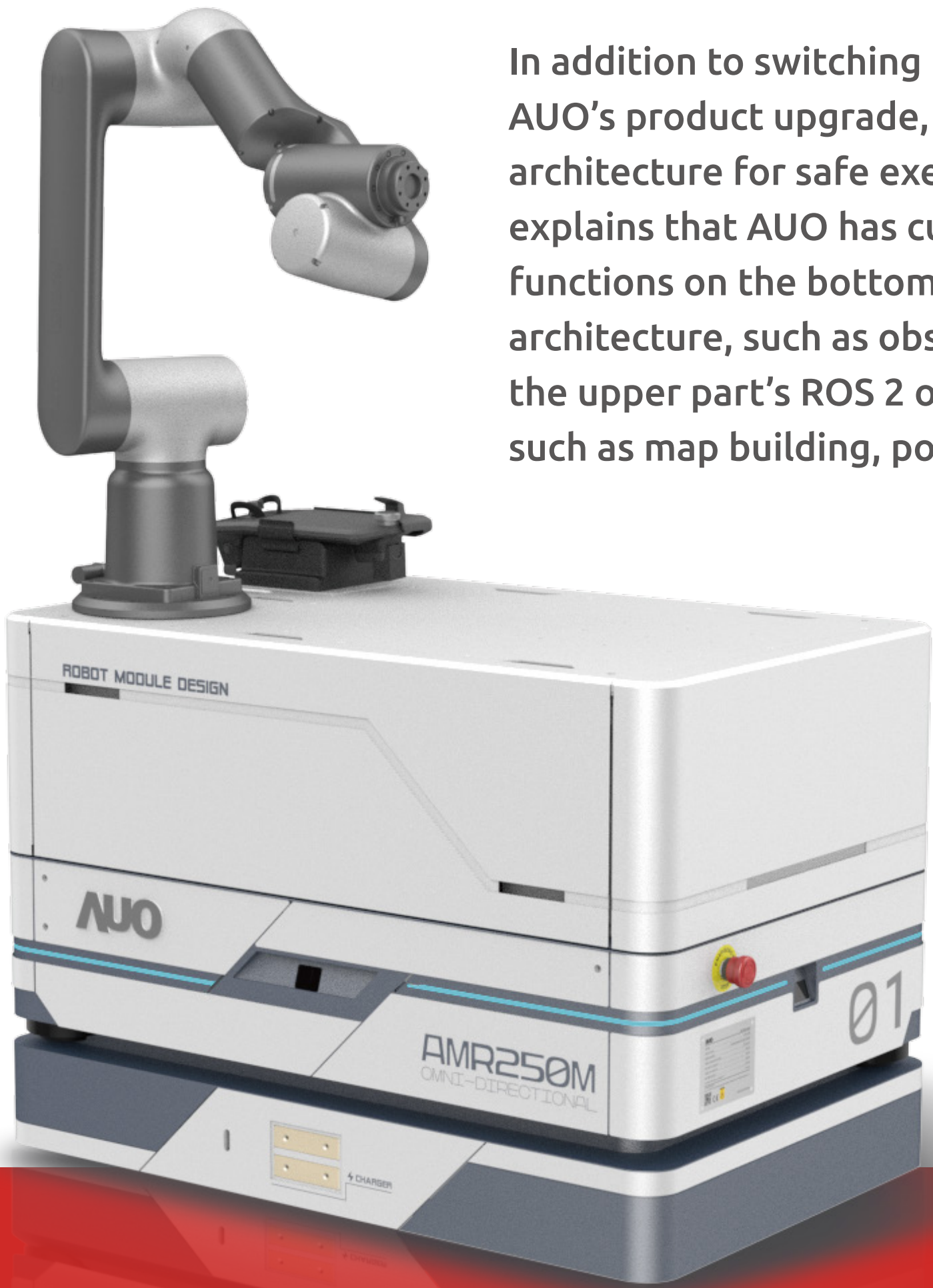


"ROS 2 is the next phase of AUO's AMR product development focus", said Chen Wen-Chieh with confidence. ADLINK has a dedicated team focusing on ROS 2 for AMR applications, which can help AUO's AMR development team solve problems quickly. "When we first started to work with ROS 2, our in-house team was not yet very familiar with DDS technology, so ADLINK provided a lot of assistance to help us get familiar with this technology in a short period of time."



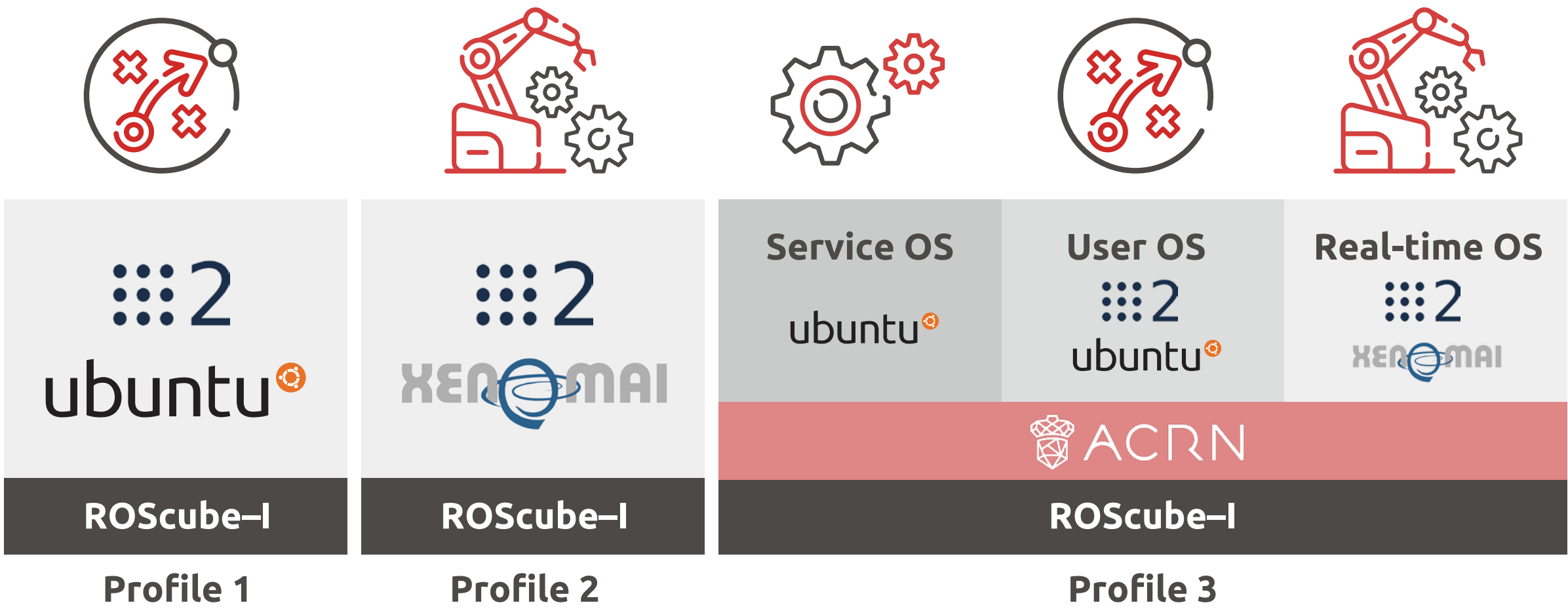


# AUO Plans to Introduce Virtualization Technology Architecture, So the ROS Controller Can Also Command the Robot Arm



In addition to switching to ROS 2, there is another key point to AUO’s product upgrade, which is the introduction of a Hypervisor architecture for safe execution of critical tasks. Chen Wen-Chieh explains that AUO has currently designed safety-related functions on the bottom part of the AMR, using the MCU architecture, such as obstacle avoidance and anti-collision, while the upper part’s ROS 2 operating system is responsible for tasks such as map building, positioning, and navigation.

The ROScube is equipped with a variety of I/O ports and a ruggedized USB to prevent loosening caused by vibration in order to meet the needs of various AMR applications. It also has a high degree of compatibility, allowing the integration of different robotic arms according to customer needs. In addition, with technologies such as Intel processors, Intel Iris display chips, Movidius, and OpenVINO, its computing performance is very powerful, and there are plenty of spare resources to use while performing the aforementioned vehicle control tasks.



AUO plans to implement ACRN virtualization technology architecture such as Intel Edge Control Platform (ECI) and install other real-time operating systems (RTOS) so that the ROScube can also perform operations such as robotic arm pick-and-place operations and AI visual recognition to fully utilize hardware resources.



## Professional specialization to speed up the application of AMR, and promote the overall upgrade of the manufacturing industry

For the manufacturing industry, AMR applications can effectively solve the labor shortage problem and improve the quality and yield of production, and there is a great potential demand from the semiconductor and electronics industries. However, despite the huge market demand, AMR is highly customized due to the diversity of manufacturing sites and application requirements.

Through the cooperation with ADLINK, Chen Wen-Chieh hopes to carry out professional specialization, with ADLINK taking charge of the core ROS computing technology and AUO focusing on the development of AMR products, while its young and energetic R&D and service teams can bring in new technologies and new ideas. After understanding the needs and sites of customers, carry out system integration operations to help customers quickly solve their pain points and provide perfect pre-sales/after-sales services, so as to speed up the application of AMR and promote the comprehensive upgrade of Taiwan's manufacturing industry.



Copyright © 2021 ADLINK Technology Inc. All Rights Reserved. ADLINK, the ADLINK logo and other names are registered trademarks of ADLINK or its subsidiaries. All other trademarks are the property of their respective owners. All trademarks are the property of their respective owners in the U.S. and other countries.

[Learn More ➡](#)

intel  
partner  
Titanium

 **ADLINK**  
LEADING EDGE COMPUTING