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Digitalization and labor shortages are accelerating logistics automation in Chinese manufacturing. Automated guided vehicles (AGVs), autonomous mobile robots (AMRs), driverless logistics vehicles, and humanoid robots are increasingly being explored or deployed in this transformation. UQI Technology Co., Ltd. (hereafter UQI Robotics) seeks to go beyond supplying individual pieces of factory transport equipment. Its ambition is to integrate the automation of successive logistics operations, from indoor movement to outdoor transport and the “last ten meters” of material handling.

UQI Robotics was established in September 2020 as a joint venture between UBTECH and Miracle Automation Engineering Co., Ltd. (hereafter Miracle Automation). On November 27, 2025, the authors visited UQI Robotics’ headquarters in Wuxi, Jiangsu Province, and interviewed its Chairman and CEO, Li Bei, and sales manager Wang Qiufeng. This case examines how UQI Robotics, an autonomous logistics solution provider, drew on the automotive manufacturing experience, industry knowledge, and technical foundations contributed by its shareholders while building its own capabilities in R&D, solution design, system integration, and project delivery. Through repeated customer trials, the company developed end-to-end autonomous logistics solutions for automotive manufacturing sites. Unless otherwise indicated, descriptions of the company’s operations, technical limitations, and plans refer to the time of that interview.

A Venture at the Intersection of Automotive Manufacturing and Robotics

Before UQI Robotics was formed, Miracle Automation and UBTECH had developed complementary capabilities in different industries. Founded in 1984, Miracle Automation became one of China’s leading providers of automotive production lines. In 2010, it established Wuxi Tianjie to develop logistics operations for automotive factories. UBTECH, founded in 2012, accumulated AI and robotics capabilities centered on humanoid robots and established a logistics equipment business in 2020. The joint venture brought together Miracle Automation’s automotive manufacturing experience and industry knowledge with UBTECH’s AI and robotics technologies. These contributions provided a foundation on which UQI Robotics built its own autonomous logistics solutions.

One source of industry knowledge was Miracle Automation’s experience in automotive manufacturing. Miracle Automation supplied production lines and automation systems combining material handling equipment, charging facilities, and robotic arms. Through these projects, it accumulated detailed knowledge of production flows, equipment interfaces, and reliability in automotive factories. This experience informed UQI Robotics’ understanding of customer operations, while UQI Robotics itself developed the R&D, solution design, system integration, and project delivery capabilities needed to implement autonomous logistics projects.

The second technological foundation came from UBTECH's AI and robotics expertise. Its capabilities included humanoid robotics, vision guidance, speech recognition, motion control, navigation, and large language models. For UQI Robotics, "AI plus robotics" meant applying the technical foundations contributed by its shareholders through the company's own product development and system integration, translating them into products and solutions that could function in automotive logistics environments.

Chairman and CEO Li Bei connected these two bodies of expertise. After graduating from the University of Science and Technology of China, one of the country's leading science and engineering universities, Li joined BYD and spent many years in automotive manufacturing equipment before subsequently working at UBTECH. His understanding of both automakers' production and logistics problems and the possibilities offered by robotics shaped UQI Robotics' product development and market choices. Having worked in both industries, he helped integrate their different knowledge and technologies into a single business.



Figure 1. Li Bei, Chairman and CEO of UQI Robotics

UQI Robotics consequently began with automotive logistics. An automotive factory encompasses diverse stages, from receiving raw materials through stamping, welding, painting, and final assembly to the dispatch of finished vehicles. Each stage imposes different requirements for load dimensions, load configurations, weight, operating conditions, and safety. No single type of logistics equipment can address all of them. Yet experience gained by introducing a product in one operation can be transferred to other processes or factories. Rather than attempting to automate an entire factory at once, UQI Robotics built implementation experience in selected operations through its own solution design and project delivery and then extended the resulting knowledge to other processes and factories. The automotive manufacturing experience contributed by Miracle Automation helped the company identify site requirements, but customer development, solution design, and project execution were undertaken by UQI Robotics.

Building on these foundations, UQI Robotics placed anticipatory development at the center of its product strategy: investing in technologies expected to become important before customers articulated specific requirements.

Anticipatory Development: Moving Ahead of Customer Specifications

UQI Robotics' approach to product development went beyond responding to immediate customer requests. According to the company, conventional AGV development commonly followed a demand-driven pattern: customers specified requirements, such as magnetic-tape guidance or two-dimensional-code navigation, and manufacturers developed equipment accordingly. UQI Robotics, by contrast, continued to invest in technologies regarded as strategically important even when those investments were not directly tied to an existing project.

At the time of the interview, UQI Robotics had 435 employees, approximately 39 percent of whom worked in research and development. Rather than assigning all R&D personnel to customer projects, the company dedicated some staff to exploring advanced technologies independently of specific customer orders. It likened this effort to "prophecy": anticipating future technological needs and pursuing development before customers had formulated concrete requirements.

A modular R&D architecture combining hardware and software supported this approach. Although UQI Robotics' products differed in appearance and application, they shared hardware components and proprietary software modules for navigation, perception, motion control, and fleet management. The company described this as a "building-block" approach, assembling the components and technology modules required for each application. It enabled existing capabilities to be reused across products without starting from scratch each time. UPilot, UQI Robotics' robot operating system, provided the common software foundation through which these capabilities were incorporated into individual products. It also enabled different types of robots to work together.

UQI Robotics could also transfer technologies developed by UBTECH for humanoid robots to logistics equipment. For example, the F3000 autonomous forklift, designed to carry loads of three metric tons indoors and outdoors, could adjust the inclination of its chassis in response to surface conditions to maintain stability while traveling. This function drew on motion-control technology used to maintain a humanoid robot's posture. Developing advanced robotics capabilities first and then transferring their constituent technologies to autonomous forklifts and driverless logistics vehicles offered a way to raise technical performance more quickly than developing each product independently.

The use of AI nevertheless varied by product. At the time of the interview, large AI models were used mainly in humanoid robots and driverless logistics vehicles. Conventional AGVs relied primarily on technologies such as simultaneous localization and mapping (SLAM), because their onboard controllers lacked sufficient computing capacity to run large models. UQI Robotics envisaged increasing the computing capabilities of its AGVs and AMRs so that they could identify different types of obstacles and select an appropriate response, such as stopping, issuing a warning, or taking a detour.

Anticipatory development therefore involved more than pursuing novel technologies. It required sustained investment in prospective capabilities and an organizational and product architecture that allowed the results to be transferred across applications. Turning those capabilities into workable logistics solutions, however, also required judgments about which technologies belonged in which operations. Here, knowledge of automotive factory logistics again became essential.

From Isolated Applications to Integrated Factory Logistics

Automotive logistics cannot be automated by introducing a single type of robot. Stamping, welding, painting, and final assembly differ in the components handled, their dimensions and weight, transport methods, and operating conditions. UQI Robotics addressed these differences through three product families: WALI industrial mobile robots, CHITU autonomous logistics vehicles, and WALKER humanoid robots. Different models were assigned to the tasks for which they were suited.

Each family contained multiple models. WALI included the U series of uplifting mobile robots (U50, U600, U1000, and U1500); the H series of Omni-D heavy-duty mobile robots (H3000S and H3000L); the T series of towing mobile robots (T1000, T3000, and T8000); the F series of forklift mobile robots (F1200S, F1200L, and F3000); and the C series of stacker crane mobile robots, including mini-load applications (C50L, C1200S, C1200L, C3000, and other models). CHITU comprised CHITU α and the smaller CHITU α mini, used for transport within factory sites and between buildings as well as urban delivery. WALKER models included S1 and S2, intended for tasks requiring flexible, human-like movements, such as picking and sorting parts and loading or unloading production equipment and assembly lines.

Table 1. UQI Robotics' Main Product Families and Representative Models

Product family	Category	Representative models	Main applications
WALI	U series: Uplifting Mobile Robot	U50	Case transport, storage, and retrieval
WALI	U series: Uplifting Mobile Robot	U600, U1000, U1500	Lifting loads from below; transport in stamping, welding, and final assembly
WALI	H series: Omni-D Heavy-Duty Mobile Robot	H3000S, H3000L	Omnidirectional movement of heavy loads, including stamped parts and vehicle bodies
WALI	T series: Towing Mobile Robot	T1000, T3000, T8000	Cart towing; assembly line supply and outdoor transport within factory sites
WALI	F series: Forklift Mobile Robot	F1200S, F1200L, F3000	Pallet transport and stacking; truck loading and unloading
WALI	C series: Stacker Crane Mobile Robot	C50L, C1200S, C1200L, C3000	Automated storage and retrieval of cases, stamped parts, and vehicle bodies
CHITU	Autonomous Logistics Vehicle	CHITU α , CHITU α mini	Outdoor transport within sites and between buildings; urban delivery
WALKER	Industrial humanoid robots	WALKER S1, WALKER S2	Parts picking and sorting; loading and unloading production lines

Source: Product information in the Japanese case manuscript. Model designations are retained as supplied.

In stamping operations, processed parts must be placed in containers, stored, and transported to welding. Company materials illustrated a configuration in which the H3000S moved loaded containers, while the F3000 autonomous forklift and C3000 stacker robot handled storage and retrieval. The F3000 served floor-storage areas, whereas the C3000 supported storage that utilized vertical space. The choice depended on the available floor area and storage configuration.

Welding operations require the delivery of large components to production lines and the removal of empty containers. U1500 under-load lifting robots and H3000S omnidirectional heavy-load robots served these tasks. Harsh temperature conditions and changing light levels placed demanding requirements on SLAM navigation. The U series could use several navigation methods, including SLAM, depending on site requirements. UQI Robotics also described configurations in which WALKER recognized and loaded or unloaded small sheet-metal parts while working with the robotic arms of production equipment.

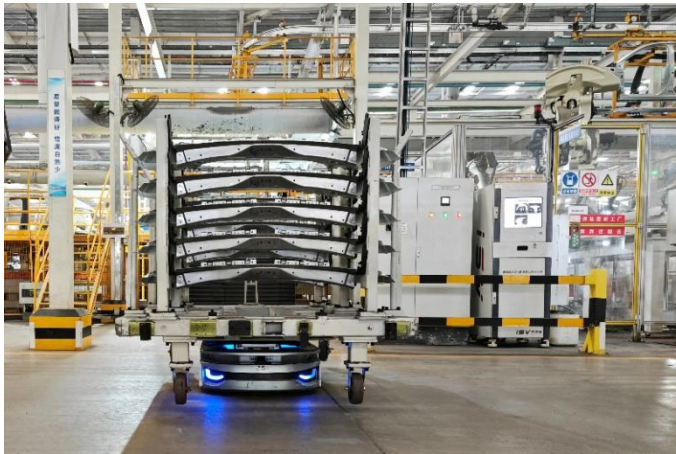


Figure 2. A U1000 deployed at BYD's Xi'an plant

In painting operations, body storage areas act as buffers between adjacent production stages, temporarily holding welded bodies-in-white or painted bodies. Because equipment downtime can disrupt both upstream and downstream processes, reliable operation is as important as throughput. UQI Robotics combined the C3000 with a warehouse management system (WMS) to automate body storage and retrieval. The WMS managed storage locations and the sequence of inbound and outbound movements, while the C3000 placed bodies in, and retrieved them from, the designated positions.

Final assembly involves a wide variety of parts and successive activities extending from transport between buildings to receiving, storage, and line-side delivery. T8000 robots and CHITU vehicles handled outdoor transport within factory sites and between buildings. F1200 and F3000 autonomous forklifts served receiving and warehouse transport operations. U600 and U1500 robots delivered palletized parts to assembly lines, while T3000 towing robots supplied parts carried on carts. The combination of equipment reflected differences in transport distance, load weight, and load configuration.



Figure 3. A T8000 deployed at BYD's Xi'an plant

In SPS logistics, where the parts required for one vehicle are assembled into a kit before delivery to the production line, UQI Robotics had also implemented a configuration combining WALKER with the T1000 towing robot. WALKER sorted the required parts and placed them on an SPS cart, which the T1000 towed to the line. After delivery, the T1000 automatically coupled to the empty cart and returned it to the parts-sorting, or SPS, area. Here again, the assignment of different robots reflected the requirements of each handling and transport task.



Figure 4. A T1000 deployed at BYD's Jinan plant

Each application represented an individual point of automation. Yet independently managed equipment could not produce factory-wide logistics automation without sharing information across operations. Even an automated transport process remained disconnected if manual instructions or transfers were still required immediately before or after it. UPilot linked these individual applications by managing route planning, task allocation, coordinated movement, and operating-status monitoring across multiple robots. Connections to the WMS, which managed inventory and storage locations, and the customer's manufacturing execution system (MES), which managed production plans and execution, allowed robot operations to follow production progress.

According to company materials, BYD's Changsha plant combined WALKER S1 for parts picking with the WALI T3000 towing robot and CHITU for indoor and outdoor transport. Together, they linked picking,

transport, and delivery. WALKER undertook tasks that conventional dedicated equipment had difficulty handling, while WALI and CHITU managed the associated material flows. This illustrated UQI Robotics' ambition to connect individual points of automation into an integrated system spanning indoor and outdoor logistics.



Figure 5. A T3000 working with WALKER S1 at BYD's Changsha plant

Implementing Technology through Joint Experimentation with Customers

Laboratory testing alone was insufficient to bring anticipatory development into practical use. Factory layouts, equipment specifications, and work procedures varied, and many problems became apparent only during operation in real environments. UQI Robotics therefore conducted repeated trials with customers and used the findings to improve both its products and on-site operating arrangements.

The introduction of multi-line LiDAR and SLAM provided one example. UQI Robotics adopted these technologies in automotive factories relatively early, but their initial cost was high and many customers questioned whether they would operate reliably. The company repeatedly tested vehicles in working factories to assess localization and obstacle-detection accuracy. Demonstrating stable operation in actual conditions helped persuade customers who had initially been cautious about the new approach.

Customer problems also initiated development. One example was automatic coupling and uncoupling between towing robots and carts. UQI Robotics developed this function in response to customer demand, but long-used factory carts sometimes had deformed hooks. Adding an automatic coupling mechanism to the robot alone could not ensure reliable operation. UQI Robotics had to customize the robot for site conditions, while the customer needed to standardize hook specifications and replace or update them where necessary. Adapting the robot and existing factory equipment together required continuing information exchange and cooperation.

During the early introduction of a new product, UQI Robotics sometimes supplied equipment free of charge and bore the cost of a proof of concept (PoC) at the customer's site. In other cases, including some humanoid robot projects, customers paid part of the trial costs. Arrangements varied by product and project. The automotive manufacturing experience and industry understanding contributed by Miracle Automation helped UQI Robotics communicate with automakers and identify operational requirements. UQI Robotics itself designed and delivered the trials, adapted the solutions to each site, and built trust through project execution and continued feedback.

Product development thus involved more than delivering a finished machine to a customer. New technology had to be adapted to the site, while the site itself sometimes had to be adapted to the technology. Repeated experimentation and trust built over successive projects sustained this process of mutual adjustment. Such relationships became particularly important for humanoid robots, where substantial technical and cost challenges remained.

Developing Immature Technology in Customer Factories

UQI Robotics used WALKER, the humanoid robot developed by UBTECH, in trials with automakers including BYD, Geely, and Chery. These trials focus primarily on picking and sorting components for assembly. Even where factory transport has been automated, many tasks involved in taking required parts from a shelf and handing it over to the next operation still depend on people. WALKER is expected to bridge this “last ten meters” of logistics. At this stage, the projects are principally trials intended to accumulate operating data and improve movement and performance, rather than immediate large-scale deployments.

At the time of the interview, humanoid robots were not yet ready to replace people directly in these tasks. Their movements were slow and their prices high. In automotive factories, where work must be repeated within a specified cycle time, slow execution adversely affects production efficiency. WALKER’s operating speed did not yet reach the level needed for full-scale adoption by automakers. UQI Robotics was proceeding with trials while communicating these technical limitations to customers.

UQI Robotics attributed part of the speed constraint to WALKER’s control architecture. In the company’s comparison, a wheeled mobile manipulator could move its base and robotic arm rapidly but needed to communicate with a higher-level control system for each operation. WALKER instead used cameras to perceive its surroundings and determine the object and task before acting. This offered flexibility across different situations, but the volume of information to process made decision-making and movement time-consuming. Rather than relying directly on a large foundation model, UQI Robotics sought to improve decision-processing efficiency by using industrial operating data for reinforcement learning and developing smaller, application-specific models. It also worked to simplify task motions and increase execution speed.

A sales manager at UQI Robotics compared contemporary humanoid robots to “newborn children.” Even with basic capabilities for moving and grasping objects, they need experience to learn how to perform work. Learning outcomes from individual robots could be accumulated as data and transferred to other units. BYD, Geely, and Chery participated through research, trials, and purchases, with customers contributing to trial costs in some projects. The resulting data supported improvements in robot behavior and subsequent applications.

Widespread adoption requires lower costs as well as better performance. At the November 2025 interview, Li Bei expected the technology to approach a level at which full-scale adoption could be seriously considered in approximately three years. This was a forward-looking assessment, dependent on further gains in operating speed and reliability through repeated trials in customer factories. Experimentation in real production environments is therefore part of the development process through which immature technology could become practically useful.

Building a Supply Chain for Volume Production

Moving from trials to broader deployment required not only better performance but also reliable component sourcing and manufacturing capacity. UQI Robotics had operations in Wuxi and Shenzhen. In Wuxi, it maintained its headquarters and a facility combining production, R&D, and testing. A manager with prior experience at Chery oversaw supply chain and manufacturing operations. At the time of the interview, UQI Robotics was constructing a new Wuxi facility with approximately 55,000 square meters of gross floor area. The plan was to consolidate production of AGVs, humanoid robots, and stacker robots, targeting annual capacity of 30,000 units. Small-batch production of industrial humanoid robots also began in 2025.

UQI Robotics combined internal development with external procurement rather than developing and manufacturing everything itself. It developed control technologies such as UPilot internally but purchased robotic arms from outside suppliers. For the C50S, used in storage and handling, it sources an established external supplier's product under an OEM arrangement. Li Bei also noted increasing use of Chinese-made core components, including cameras, servo motors, radar sensors, and gear reducers.

The component supply base is concentrated in the Yangtze River Delta, with additional suppliers in northern China and the Pearl River Delta. Low humanoid robot production volumes, however, made it difficult for component suppliers to support prototyping and realize cost reductions through scale. Component standardization and mass production needed to advance across the supply chain, not only within UQI Robotics. According to Li Bei, supplier selection considered technological capability, quality, and durability alongside price, with an emphasis on long-term relationships.

This supply chain development served more than an increase in output. UQI Robotics' proposed end-to-end autonomous logistics system depended on multiple types of robots and management systems performing different roles. Stable component procurement and continued availability of the different models were therefore essential. A dependable supply chain was also a prerequisite for incorporating the results of trials at one factory into improved, standardized products and extending them to other factories or processes.

UQI Robotics also observed that established Chinese automotive component manufacturers were entering humanoid robot component development. The supply and volume-manufacturing capabilities built in the automotive industry were beginning to extend into robotics. UQI Robotics' supply chain development thus supported its own production scale-up and customers' logistics automation while contributing to new supplier connections between the automotive and robotics industries.

The Continuing Challenge of Connecting Technology with Practice

UQI Robotics was also seeking to expand overseas using the technologies, operating knowledge, and customer relationships developed in China. According to the company, overseas revenue accounted for slightly more than 10 percent of total sales as of November 2025. Much of this business came from existing Chinese automotive customers building factories abroad and introducing UQI Robotics equipment already used at their domestic plants. UQI Robotics began independently developing overseas markets in 2024. By the interview date, it was undertaking projects in Thailand, Vietnam, Cambodia, and Indonesia and had secured teams to provide service in each country.

The company regarded after-sales service as an even greater challenge than winning new customers abroad. Logistics robots require site-specific adjustments and maintenance after delivery. Sending engineers from China whenever a problem occurs makes timely responses difficult. UQI Robotics was therefore working

to establish arrangements with local systems integrators to handle installation, maintenance, and troubleshooting.

Alongside these local partnerships, UQI Robotics sought to maintain direct customer contact. For large accounts, it gathered requirements directly, examined the materials to be moved and the work procedures involved, and proposed solutions. For small and medium-sized customers, or industries in which it had limited experience, it supplied standardized products through local distributors and systems integrators. UQI Robotics retained responsibility for understanding requirements and designing the overall system, while local partners provided routine service. This division of responsibilities was intended to ensure local responsiveness while keeping product development connected to conditions at the installation site.

Starting as a relatively new entrant, UQI Robotics drew on the automotive manufacturing experience and industry knowledge contributed by Miracle Automation and the AI and robotics foundations contributed by UBTECH. Its development, however, rested on more than these shareholders' inputs. It invested in technologies before customers specified a need, incorporated them into actual logistics operations, and refined them through customer trials. By coordinating individual products on a common system, it sought to extend automation from isolated applications to integrated material flows.

Humanoid robots still face constraints in speed and cost, while overseas expansion required a stronger service network. As the product portfolio and geographic reach expanded, aligning technologies with local operating conditions became more complex. UQI Robotics' "last ten meters" originally referred to logistics tasks that conventional equipment struggled to automate. In light of this case, the phrase also captures the distance that remains between advanced technology and practical use. UQI Robotics' next phase of growth will depend on how effectively it can close that distance together with customers and local partners.

Source Note

Based on the authors' interview at UQI Robotics on November 27, 2025, and company materials cited in that manuscript. Company statements and forecasts are presented as such; the case does not treat planned capacity or trial-stage capabilities as established operating results.

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法政大学イノベーション・マネジメント研究センター
The Research Institute for Innovation Management, HOSEI UNIVERSITY

〒102-8160 東京都千代田区富士見 2-17-1
TEL: 03(3264)9420 FAX: 03(3264)4690
URL: <https://riim.ws.hosei.ac.jp>
E-mail: cbir@adm.hosei.ac.jp

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