

# GOLE ROBOTICS, INC.

ACCELERATING THE DEVELOPMENT OF AUTONOMOUS CONSTRUCTION ROBOTS WITH SOLIDWORKS AND 3DEXPERIENCE WORKS SOLUTIONS

## Case Study



With SOLIDWORKS and 3DEXPERIENCE Works modeling, design, data management, simulation, collaboration, planning, and communication solutions, Gole Robotics developed its first autonomous construction robot, which won an Innovation Award at the 2024 CES Show, in just 2 ½ months.

### Challenge:

Accelerate the development of autonomous construction robots for use in delivering construction materials and completing construction tasks by facilitating design collaboration among hardware, software, and electrical engineering teams.

### Solution:

Implement SOLIDWORKS Premium 3D product development software in conjunction with modeling, design, data management, simulation, collaboration, planning, and communication solutions from the 3DEXPERIENCE Works portfolio, which operate on the cloud-based 3DEXPERIENCE platform—including 3D Creator, 3D Sculptor, 3DEXPERIENCE SOLIDWORKS Premium, 3DEXPERIENCE SOLIDWORKS Simulation Designer, Collaborative Designer for SOLIDWORKS, Collaborative Industry Innovator, Project Planner, Social Business Analyst, and 3DSwymer roles—as part of the 3DEXPERIENCE Works for Startups Program.

### Results:

- Won CES 2024 Innovation Award
- Designed autonomous construction robot in just 2 ½ months
- Reduced robot weight by 20 percent with simulation
- Cut development costs by more than 10 percent

Partners Dongmin Lee and Hosik Chae founded Gole Robotics in 2023 to develop smart construction technologies, which many companies and governments have embraced. These include the South Korean government, which has the ultimate goal of implementing a fully automated construction system by 2030. Smart construction technology relies heavily on integrating cutting-edge robotics and modern technologies. CEO Lee, a former construction engineer with a major Korean construction company, and CTO Chae, who earned a Ph.D. from a world-renowned robotics research lab, established startup company Gole Robotics to take advantage of growing interest in leveraging robotics for construction purposes.

Just three months after the company was incorporated, Gole's first robotic module—which



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— Dongmin Lee, CEO

is part of an innovative robotic lifting scaffolding device for automating material transport—won an Innovation Award at the 2024 Consumer Electronics Show (CES) in Las Vegas, Nevada. Gole's flagship product is designed to tackle the labor-intensive challenges commonly encountered on construction sites. This groundbreaking innovation automates lifting heavy materials, eliminating the physical strain on workers, optimizing productivity, and expediting project completion.

Gole's founders realized that fast development was imperative for the startup company's success, which is why the company chose the combination of SOLIDWORKS® Premium product development software and 3DEXPERIENCE® Works solutions, which CTO Chae had used at a leading research lab. "While there are many 3D design platforms, 3DEXPERIENCE is the most actively used in the field of robotics," Lee notes. "Our CTO, especially, extensively used the 3DEXPERIENCE platform in the research lab, where he became familiar with the platform's powerful cloud-based collaboration capabilities, so there were no doubts when choosing what platform to use."



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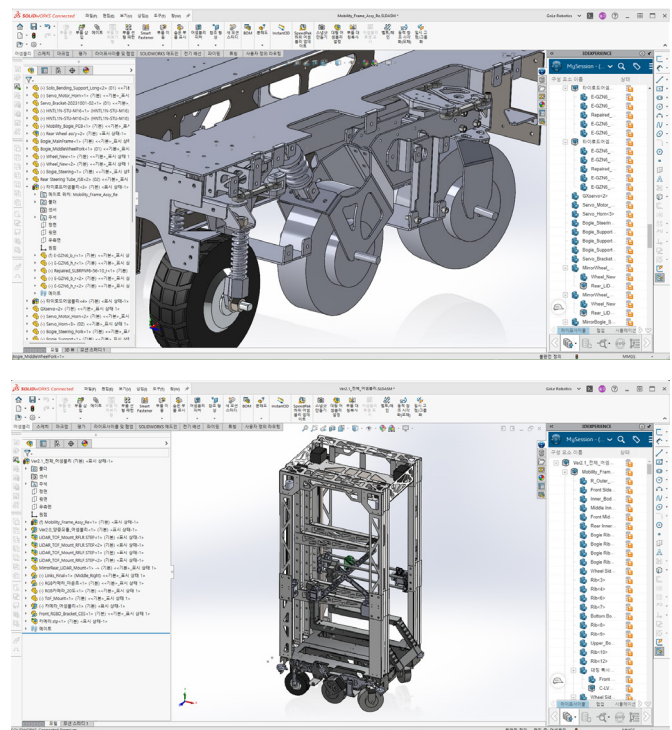
## FAST COLLABORATION SPEEDS DESIGN PROCESS

Gole Robotics uses SOLIDWORKS in conjunction with **3DEXPERIENCE** Works solutions. This approach facilitates hardware designing and manufacturing for robots, and streamlines order placement and procurement through basic structural calculations and bill of materials (BOM) creation. It also fosters collaboration among Gole's hardware, software, and electrical engineering teams by connecting them organically via the cloud, which is how the company successfully designed and manufactured its autonomous driving robot module in just 2 ½ months.

"SOLIDWORKS is considered the 'language' for Gole Robotics, and the **3DEXPERIENCE** platform is the meeting place where all decision-making, including design and structure, is carried out," Lee points out. "Creating a robot involves a fusion of various technological elements, such as mechanical dynamics, design, software, electrical engineering, control, and more. Collaboration is crucial, as the result is a product that integrates various technical components. Therefore, a platform optimized for collaboration, like the **3DEXPERIENCE** platform, was essential to saving time and accelerating development ... leading to a dramatic reduction in development time."

## IMPROVING ROBOT PERFORMANCE

Using **3DEXPERIENCE** Works and SOLIDWORKS simulation tools, Gole was able to not only produce



The combination of SOLIDWORKS and **3DEXPERIENCE** Works solutions fostered collaboration among Gole's hardware, software, and electrical engineering teams by connecting them organically via the cloud, and provided the simulation capabilities that the hardware team used to improve robot performance, reducing development time and costs in the process.

a robot with no errors or failures during testing but also cut robot weight by 20 percent and production costs by more than 10 percent. "It was especially convenient to easily simulate the mechanical logics and robot performance," Lee recounts.

"In the process of manufacturing a robot for handling heavy loads, we determined that minimizing its own weight is a crucial factor in reducing the production cost of the robot," Lee continues. "To avoid exceeding the target production cost, we utilized SOLIDWORKS structural analysis to streamline the structure, and, through activities such as weight reduction, successfully achieved a 20 percent reduction in overall weight. As a result, we were able to decrease the output of the drive system components, including motors and drivers, leading to reduction in the robot's production cost of more than 10 percent."

## UNIFYING DECISION-MAKING ON 3DEXPERIENCE PLATFORM

Robots are complex assemblies of hundreds or thousands of components that require the collaboration of mechanical, software, and electrical engineering specialists. Gole benefitted from having all development take place on the cloud-based **3DEXPERIENCE** platform because it unified and shortened the decision-making process. "Robots embody the pinnacle of integrated engineering, involving diverse individuals working towards a common goal. However, this collaborative nature often leads to delayed decision-making," Lee says.

"Our goal is to swiftly produce a robot that can be commercially applied in construction sites within a very short time frame, prioritizing speed as our primary challenge," Lee adds. "Therefore, the remarkable collaboration tools within SOLIDWORKS and **3DEXPERIENCE** Works solutions are deemed essential for our needs because our organization believes that decision-making should be consolidated on a single platform, so we decided to unify decision-making through the **3DEXPERIENCE** Works transparent data management capabilities. Our decisions and judgments, and both failures and successes, were meticulously managed through revision control. This aided in making informed decisions and allowed for streamlined decision-making processes."

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