

Autonomous Mobile Parking Robot

The autonomous mobile parking robots transport vehicles to designated parking spots and retrieve them as needed. They enhance parking efficiency and offer greater convenience to drivers.

With these robots, drivers no longer need to roam around searching for parking spaces, and the likelihood of accidents between vehicles and pedestrians is reduced. Since dedicated pathways for vehicle movement are unnecessary, the overall parking space can be utilized more effectively.



▲ An autonomous mobile parking robot is positioning a vehicle into an available parking spot.

Issues to Tackle

- ☑ It is essential to minimize the time drivers spend searching for available parking spaces and traveling from their parked vehicles to their destinations.
- ☑ Reducing the risk of people-to-vehicle and vehicle-to-vehicle collisions within parking lots is critical.

Expected Benefits

- ☑ The overall parking capacity can be optimized by eliminating the need for aisle space.
* Space utilization improves by 30%.
- ☑ Lower infrastructure costs.
Unlike mechanical parking systems, this solution does not require additional components such as steel frameworks or rails.

💡 Key Services

- The driver leaves the vehicle at the entrance of the parking facility. A parking robot identifies the license plate, lifts the car, and autonomously assigns it to an available parking spot. The vehicle's location is automatically recorded in the management system.
- At the exit, the driver inputs the license plate number into the system, prompting the parking robot to retrieve the car and prepare it for departure.
- Autonomous vehicle relocation to facilitate vehicle entry/departure within parking lots.

⚙️ Use Cases

- Bucheon-si, Gyeonggi-do: In 2020, a parking robot, Narca, was introduced to a parking lot beneath the Gyeonam overpass, which was operated as a smart parking lot for three years.
- Bupyeong-gu, Incheon Metropolitan City: In 2024, the establishment of a robot-assisted public parking lot with 35 spaces was approved in the basement of Gulpo Food Town in Galsan-dong, and the use of robots is planned to expand to minimize long wait times.
- Hyundai WIA successfully introduced mobile parking robots at the Hyundai Motor Group Innovation Center Singapore (HMGICS) in 2023 and at Factorial Seongsu in 2024.

Key Components

Configuration

An autonomous mobile parking robot



Dimensions Length 1890 mm, Width 1142 mm, Height 110 mm
Operating speed 1.2 m/s
Operating system Locates vehicles by using QR codes on the parking lot floor.
Control capacity Up to 50 parking robots simultaneously.

A parking robot goes under a vehicle to lift it up and move it



Technology

1. Level-4 Autonomous Driving

- The robot autonomously navigates its environment by identifying obstacles, vacant spaces, and pathways. It assesses the vehicle's wheel alignment and center of mass to lift and move it efficiently.

2. LiDAR

- Using laser beams and analyzing the reflected signals, it maps the surrounding area and detects any obstacles in its vicinity.

3. Sensors

- Sensors gather data on the surrounding environment and calculate an optimized route for movement.

4. Simultaneous Management of Parking Robots

- The system uses QR codes on the parking lot surface to pinpoint vehicle locations and manages up to 50 parking robots at the same time.



Charging Station

The parking robot's charge level is tracked in real-time, and when it falls below a predefined threshold, the robot autonomously navigates to the charging station for recharging.

Standby for charging



Automatic charging



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