

A transporting method and its system based on mobile robots for intelligent manufacturing

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Background

“INFOINVENT” International Specialized Exhibition

Global manufacturing transformation: Intelligent Manufacturing

Industry 4.0 In Germany

Proposed in 2013 by acatech

Cyber-Physical Systems
Wireless Sensing
Artificial Intelligence
Cloud Computing

Made in China 2025 In China

Proposed in 2015 by the
state council of China

Information Technology
High-end Equipment
Industrial Foundations

Society 5.0 In Japan

Proposed in 2016 by the
Japanese Cabinet

Internet of Things
Robotics
Artificial Intelligence
Big data

Background

Mobile robots in intelligent manufacturing are widely used in handling, loading and unloading, which can save human resources, optimize work processes, and improve production efficiency.

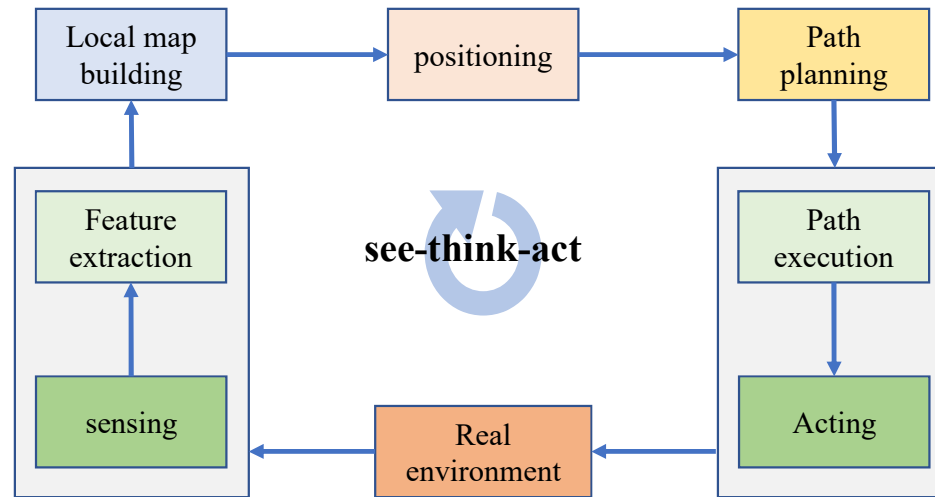


Key technologies of mobile robots

- Environment perception
- Positioning
- Path planning

Background

Human-machine collaboration is the pursuit in intelligent manufacturing, and for mobile robots, that is **Autonomous Mobile Robots (AMR)**.

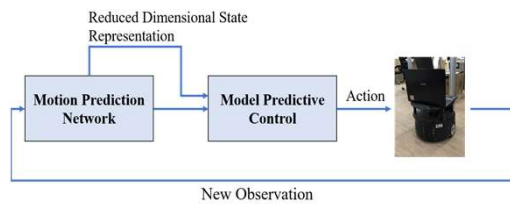
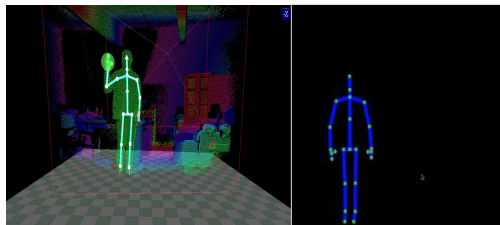


Autonomous mobile robots can be operated in a dynamic environment and work together with humans.

Novelty of project

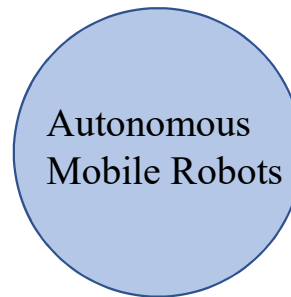
The project achieve a transporting method and its system based on mobile robots, which can realize the **human-machine cooperation** and **integration of decision-making and control** of robot group.

- Human-machine interaction based on face and gesture recognition with sensitivity parameter



- Autonomous obstacle avoidance based on motion prediction

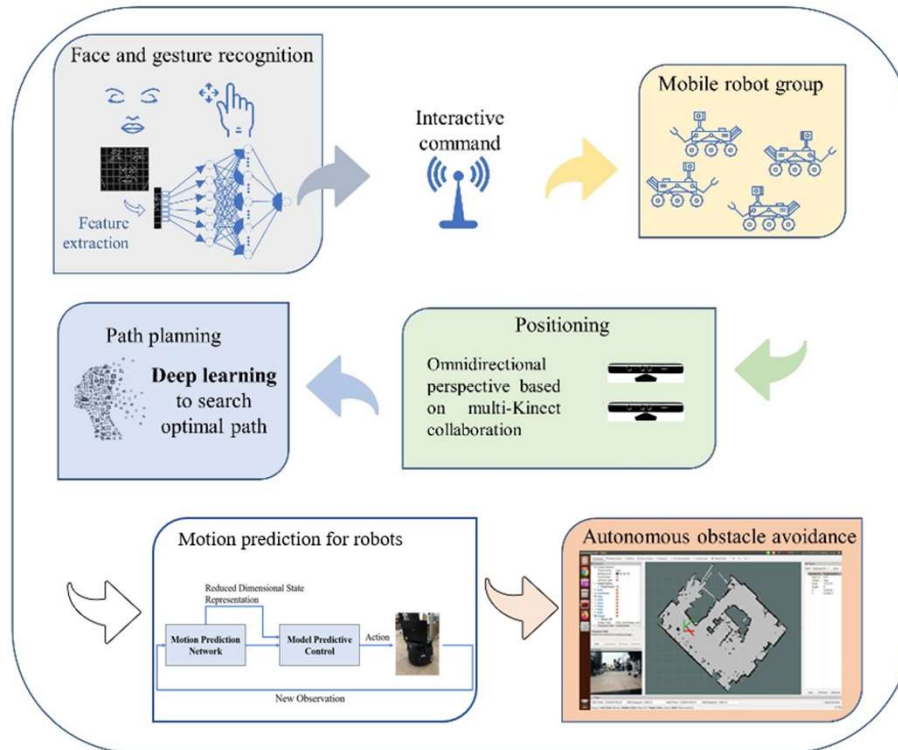
- Path planning based on deep learning



- Digital twin platform for robot transporting environment

Project

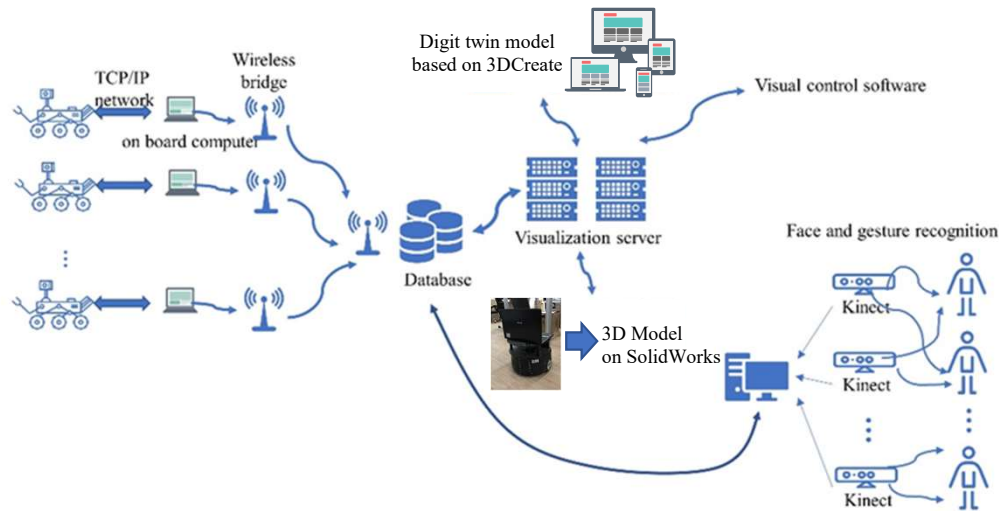
The project presents a transporting method and its system based on mobile robots, which can realize the **human-machine interaction** and **autonomous intelligent operations** of mobile robots in intelligent manufacturing.



Interactive commands are recognized based on face and gesture features, and autonomous path planning and obstacle avoidance of the robot are completed based on deep learning and motion prediction.

Project

The digital twin platform of mobile robots transporting system



The robot working environment is virtualized in the 3DCreate to build a digital twin platform for robot transporting environment in intelligent manufacturing, and real-time monitoring and remote interactive control can be realized.

Project

The technology of this project has been authorized **12 Chinese invention patents**, which breaks through the reliability and coordination problems of existing robots in complex environments.

List of the Chinese invention patents	
ZL 201610825132.7	A correction and prediction method of actual measured coordinates for robot onboard navigation device
ZL 201610230290.8	Face turning recognition method based on neural network and sensitivity parameters
ZL 201610230028.3	Face orientation recognition method based on sensitivity parameter
ZL 201610230284.2	Human-computer interaction control method of mobile robot based on face recognition
ZL 201610743319.2	A Virtual visual control method and system of virtual visualization for robot transportation
ZL 201610231601.2	Judgment method of mobile robot command safety feasibility
ZL 201610230027.9	Human-machine control system of mobile robot based on face position and sensitivity parameters
ZL 201610654716.2	A full-view recognition device and its control system and method based on multi-Kinect cooperation for indoor mobile robots
ZL 201711364995.X	A robot manipulator control method based on multiple Leapmotion virtual gesture fusion
ZL 201710640558.X	A control and planning method based on deep learning for robot motion path in intelligent environment
ZL 201810063041.3	A computational intelligence driving transporting method and system for mobile robots in intelligent manufacturing
ZL 201810068243.7	A Group Intelligent Calculation Method for Robotic Arm Motion Planning

Project

Certificates of 12 Chinese invention patents.





Contribution and outlooks

A **new mode** of intelligent manufacturing is built by the project, which has solved the predicament of traditional manufacturing development, helped the industry upgrade, and empowered the industry to be **digitalized** and **intelligent**.

The technologies can realize an efficient **human-machine collaborative production** mode. The **intelligent process automation solution** proposed in the project has a huge application market and development potential.