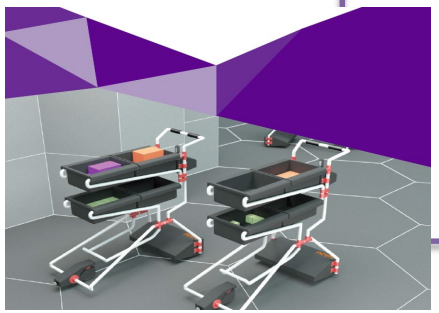
NAJM.　AI Vehicle

Arche Information Inc.

Overview of NAJM.

Self - Running「NAJM.」

Small cart image diagram



Software

- AI is our core product
- Autonomous control with path calculation, collision avoidance, position recognition by AI (artificial intelligence)
- Simultaneous control of multiple carts
- Independent I / F not depended by hardware

Hardware

- Parts is recombined with a small cart shape.
- Self-running format that does not require laying of rails or labels
- Can also be used manually as a normal cart

<Architecture>

1. **Hardware and Software (AI) are independent.**
2. **Parts can be chosen whatever you like according to the environment**
   - **As using SIEMENS's PLC, can use as long as you can connect to it.**
3. **"Cloud" and "Edge" can be handled.**

Software Specification

NAJM. AI Software

In-store map recognition function

*Map Recognition Algorithm

- Based on the signal from the sensor, grasp the position of the obstacle / coordinate transformation to the warehouse map given as the initial value.
- Even when obstacles dynamically increase / decrease, all vehicles share information, and the latest map information can be kept constantly.

Route calculation function

*Route calculation & selection algorithm

- Calculate the shortest distance from the current vehicle position to the specified location.
- The route is selected in consideration of the presence / absence of an obstacle and priority.

Traveling Navigation Function

*Collision avoidance algorithm

- Avoiding collisions while running between multiple carts.
- Control of generation and avoidance/stop of sudden obstacles.

Hardware Specification

NAJM. AI Hard Ware

Control unit

- Control each unit
  -> Assume PLC (programmable logic controller) such as a sequencer.

- Perform communication by wireless LAN.

Drive unit

- Equipment driving the tire of the cart.

- With motor, brake, battery

Sensor/Camera unit

- Sensor for recognizing the space map.

- Detect collision risk with obstacles.

The Key Points of NAJM.

1) Self-driving
(self-avoidance, self-stop, self-recovery, self-judgment)

2) Recalculate the optimal route in real time
even if there is a change.

Market

1. SME
   - Hard to invest large asset such as material handling.
   - It is not suitable for in-house fixed equipment installation.

2. All Companies (Holding Warehouses)
   - Distribution industry, Warehouse industry, Logistics industry, Manufacturing industry etc.

3. Other
   - Airports, Hospitals

Current Prototype Specification

- Maximum load weight
  60kg

- Driving speed
  At maximum load capacity, 5 km / h

- Vehicle size
  Size that can pass each other
  through a 90 cm passage

- Localization
  - SLAM

- Control Device
  - SIEMENS's PLC

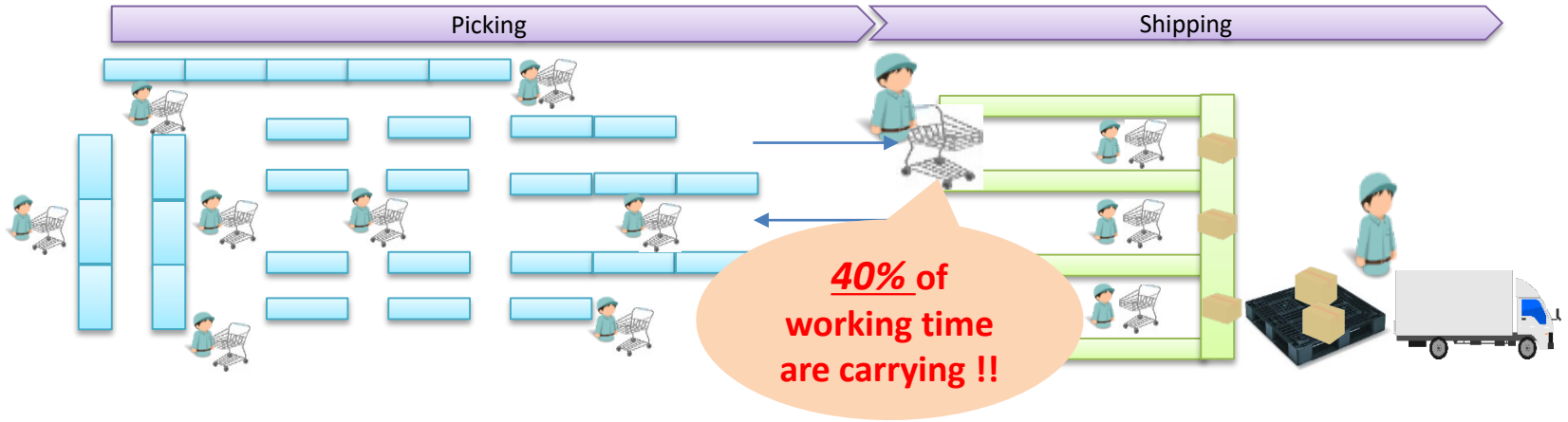
- Detecting the obstacles
  -Sensor and Camera

- AI can connect with any hardware

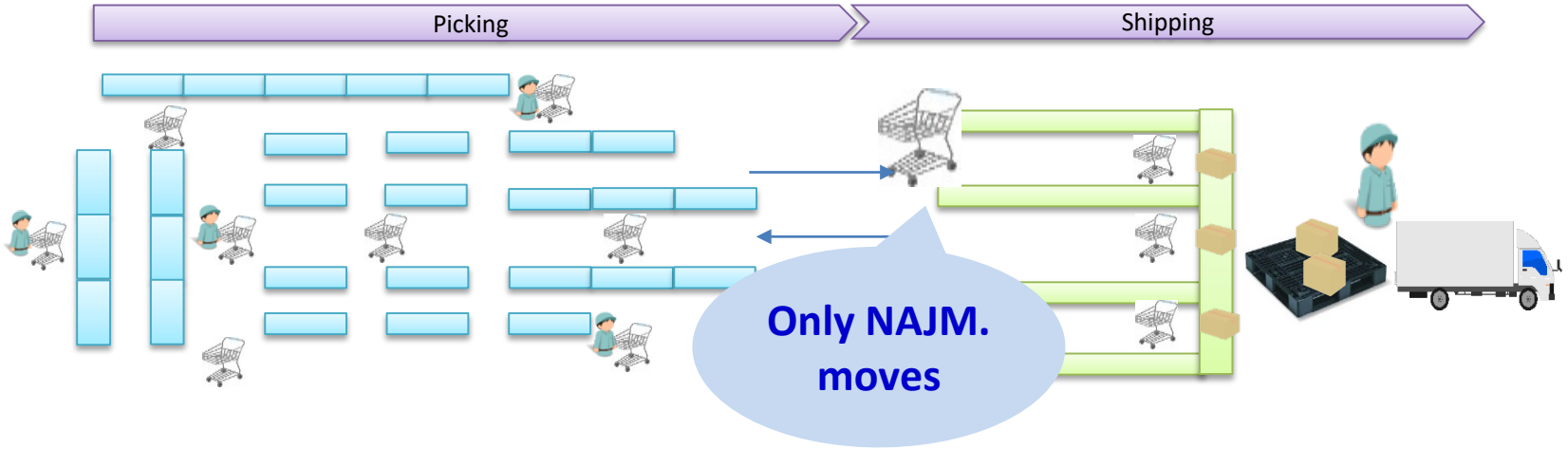
- Other Parts (car body, motor, battery ,etc.)

Apply Any Warehouse

Before Workers *carry the cart* to the shipping space back and forth



After Workers *stay on the shelf*, and *only the cart moves* to the shipping space



Also apply for shopping mall, factory, anywhere!!

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