ATR Visual Navigation at the CASE Lab

Background
Autonomous Transport Robots (ATRs) are designed to move items, e.g., tools, kitting material, components, etc., from one location in the factory to another. An ATR should deliver the items at the right time and place to meet the production deadlines. These special robots will be deployed in a factory and will collaborate and share spaces with human co-workers, vehicles, e.g., forklifts and other ATRs, and dynamic obstacles. In order to satisfy the time and place requirements, the ATR should have robust navigation control allowing it to negotiate the different obstacles in its path. AB Volvo and Chalmers are developing ATRs for the next generation of material deliveries in factories and warehouses. This problem has been studied through different projects and deployed in a Volvo Pilot plan. To continue this research, an ATR scenario is being built at the CASE Lab, where several modules will be tested. An important element is the Visual navigation for the ATRs. This means the robot navigates from point A to point B using visual information from cameras mounted on the ceiling.

Problem and goal
This project will be based on previous work, and aims to develop and implement a navigation system based on visual information at the CASE Lab. Concretely, this project has the following objectives:

- Implement a modular control unit on the ATR. This control unit will use as SBC a raspberry pi 3 with a Ubuntu OS. The communication will be handled using ROS2.
- Install and implement a communication system to acquire visual information from multiple cameras.
- Use the visual information to control the position and velocity of the ATRs to navigate the CASE Lab.

For this project, the students will use the ATRs (Husqvarna HRP [1]) located at the CASE Lab. An important part of the project is to implement the perception and control systems with the help of ROS (Robot Operating System [2]).

Målgrupp: TKAUT, TKDAT, TKTFY, TKELT, TKTEM, TKMAS, TKITE
Gruppstorlek: 3–6 studenter
Antal grupper: 1
Förkunskapskrav: Basics on Computer Programming, basic knowledge on Control.

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[1] https://github.com/HusqvarnaResearch/hrp