

Proposal 4: AMR system for autonomous indoor navigation in unknown environments

Motivation:

The forthcoming industrial environments will require a high level of automation to be flexible and adaptive enough to comply with the increasingly faster and low-cost market demands. Autonomous and collaborative robots will have an ever-greater role in this context. In this view, the CIM4.0's FIXIT project aims at providing an interactive support for the human operator, within an industrial or logistic environment compliant with the industry 4.0 requirements.

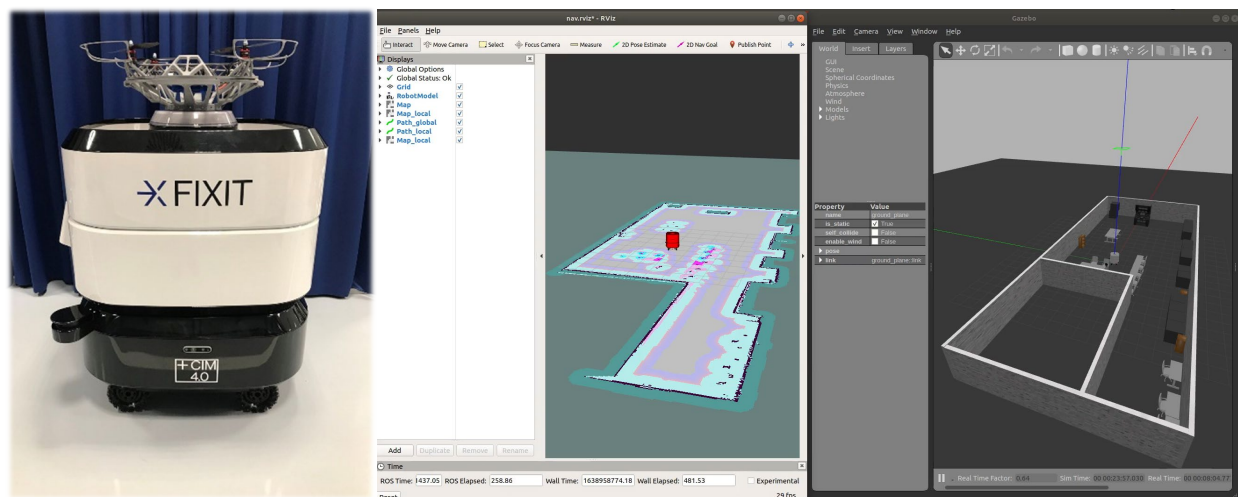
State of the art of the FIXIT project

The FIXIT project began in September 2020 with the conceptualization and planning of the multi-nodal FIXIT vehicle able to commute the capacity of a conventional omni-wheel vehicle with the capabilities of an intelligent flying vehicle. Over 2021, a team composed of aerospace, mechanical and computer science engineers have developed and built the first working prototype of the vehicle. Some basic and more advanced functions have been developed and tested.

Objectives

The objective of the thesis is to develop a customized autopilot suitable for autonomous and remote-controlled indoor navigation. The AMR system is envisioned to navigate through unknown environments so being able to reconstruct its surroundings and sense environmental parameters.

The current system implements a ROS-based solution to navigate autonomously using LIDAR systems and deep cameras. Furthermore, sensors allow the AMR to basic obstacle avoidance exploiting an omni-wheels system. This solution should be enhanced with a sensing system as well as with the capability to navigate in unknown environments. Initially, the solution should be preliminary implemented in a simulator and, consequently, on the real platform to perform experimental tests.



Depending on COVID-19 guidelines, the student should ideally test and implement the algorithms on the FIXIT mobile base at the CIM4.0 digital plant premises, located in Corso Luigi Settembrini 178.

Duration:

6-8 months

Requirements

- Preferably Robotics, Computer Science or Mechatronics background
- Knowledge of embedded systems and C/C++
- Linux OS knowledge will be considered a plus
- ROS/ROS2 knowledge will be considered a plus
- Computer vision libraries knowledge will be considered a plus
- Ability to work in team, proactive mindset and problem-solving oriented

For further info refer to:

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