The **O**n-site **D**elivery **I**ntelligence **N**etwork (**ODIN**) Project for mobile collaborative robots

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Interreg — EUROPEAN UNION — France (Channel Manche) England
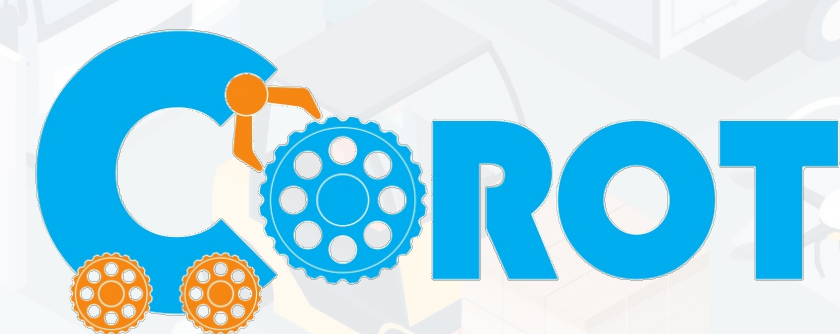
BAE SYSTEMS

Aims and Objectives

The aim of this project is to create safety protocols which drive the behaviour of in house mobile transport robots in densely populated and enclosed spaces.

Objectives include but are not limited to:

- An in-depth study of BAE Systems current transportation methods to analyse the frequency and duration of onsite deliveries

- Formalise what trolley operators do in a call for building evacuation (chemical leak, fire alarm, power outage)

- Complete an analysis of foot traffic using sensors present in the building management system

- Produce a predictive algorithm that estimates the location of operators based on sensor data

- Produce emergency protocols that can be used to guide the robot away from operators during a building evacuation event.

Project Bio

This project is funded by BAE Systems and the University of Greenwich as part of the Interreg project, 'CoRoT'. BAE Systems commitment to the 'factory of the future' has made robotic automation in manufacturing feasible and is the ideal testing ground. We are also contributing to CoRoT aim to provide small to medium enterprises access to affordable technology that meets the industry 4.0 ethos by using retroactive solutions.

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CoRoT

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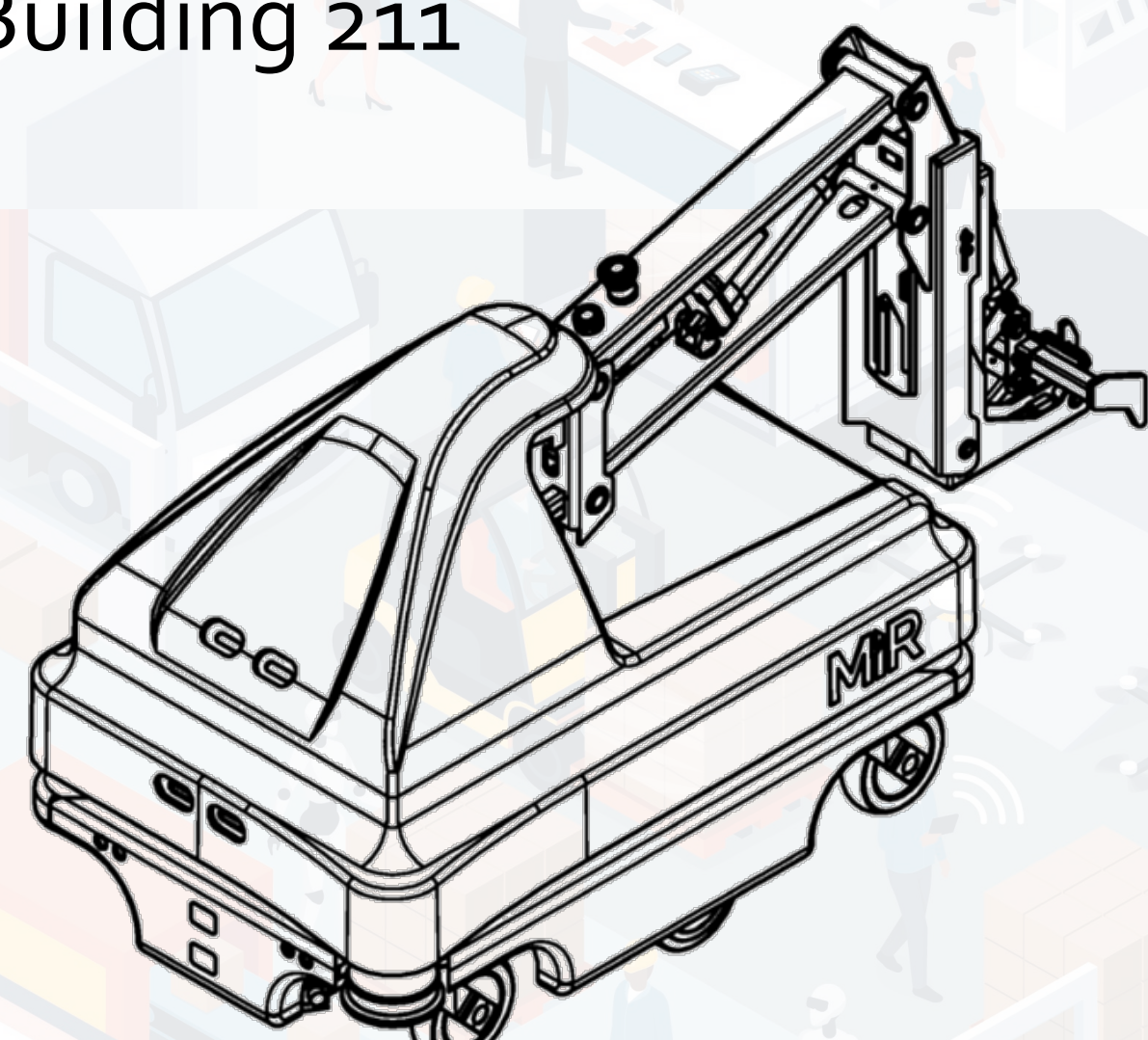UoG, Medway, Pembroke Building 211

Project origins

The Thesis titled: Modelling Robot Delivery Systems in Modern Manufacturing Factories using Building Management Technology for Collaborative and Safe Operations, came about through an in-depth analysis into BAE Systems current manufacturing facility. It was noted after interviews with over 20 members of senior management that there was a desire to improve the current manufacturing facility and take advantage of new technologies. It was also noted that a combination of skilled labourers and dedicated staff members were required to transport materials across large distances on site. With many solutions available, but few meeting the realistic budget of the site, it was concluded after the interviews that using mobile robots was a viable option, however safety concerns quickly arose. Through an in-depth knowledge of building regulations and building sensors, the proposal for a mobile robot guided by a network of existing building sensors could increase the safety capabilities of the robot and act as the topic of this PhD.
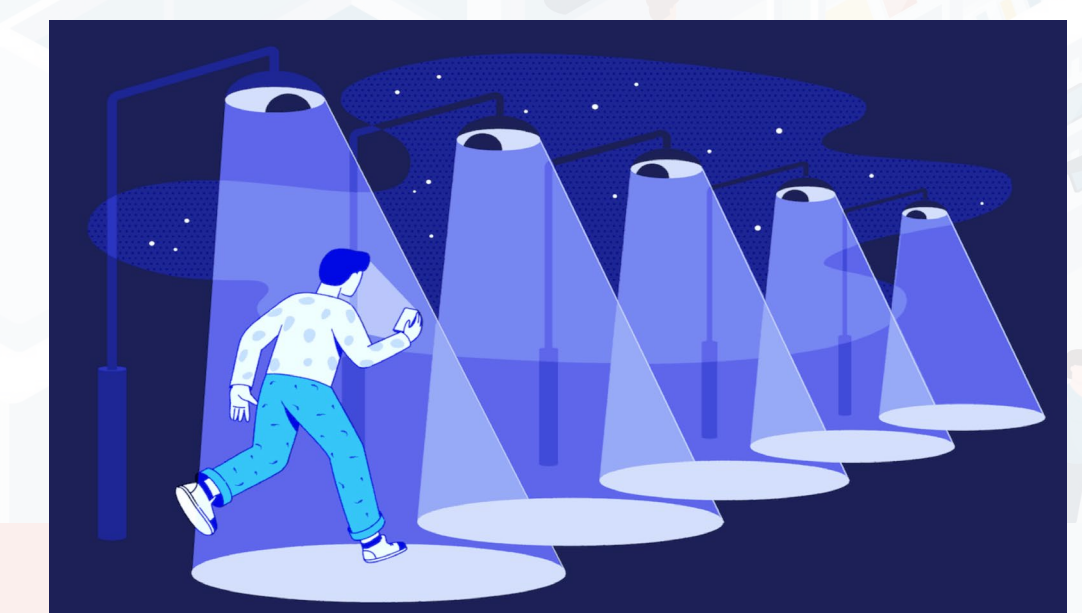
Software

It is intended to use Mir fleet management Software in this project, as this will allow the mapping, localization and guidance through a network of existing sensors throughout the building. Predictive algorithms will also be used to detect the movements of building occupants and prevent potential collisions that may slow down the robot.

Final Built Map of the Environment Trajectory of the Robot
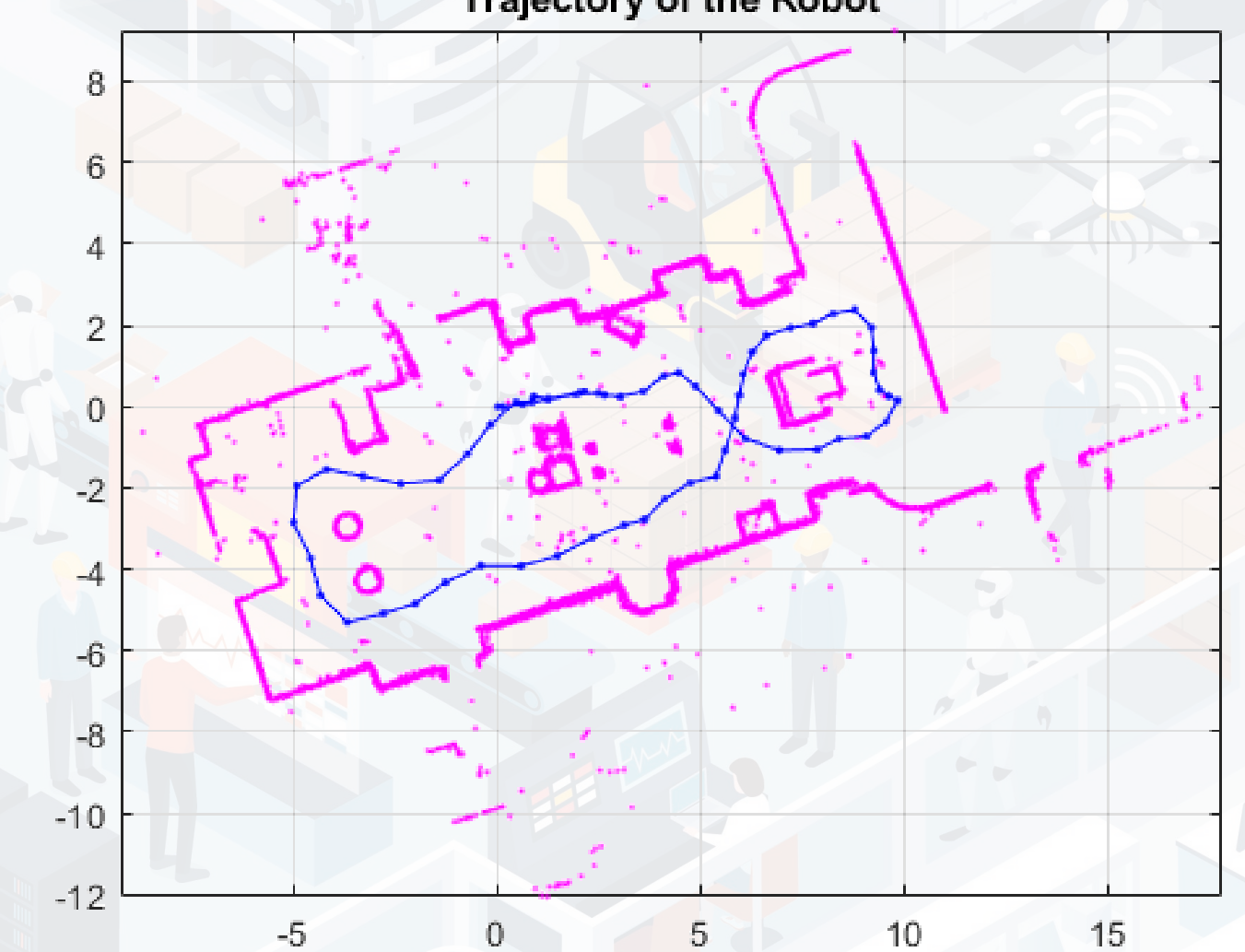
Risks & Challenges

The primary challenges to overcome on this project are due to the current infrastructure and sensors available in the facility, and the security requirements that surround the industry of aerospace and defence.

The risk then becomes one of clearance and approval, as the technology itself has already been commercialized.

Timeline

2019
Start of PhD, concept development

2020
Early testing using academic robots

2021
Continued development in behavioural and emergency protocols

2022
Project completion and business proposal

Case Studies

The BAE Systems Case study will focus on identifying building sensors to track movement throughout the building and to improve the safety and efficiency of mobile robots. This will first be tested with academic equipment to lower the risk to BAE Systems prior to the purchase of commercial robots. There is an intended travel route already established where a proof of concept can be made. Once tested using the Universities MiR 100 mobile robot, this data and the resulting behavioral protocols will be shared with BAE Systems to weigh up the potential benefits of adopting this emerging technology.