

Introduction

This project utilizes a Stretch RE1 robot made by Hello Robot. The robot was made for the intent of being a service robot. This robot can navigate to waypoints and avoid obstacles to reach its destination. To gain experience working with robots and ROS, turtlebots were used for practice before working with the Stretch robot.

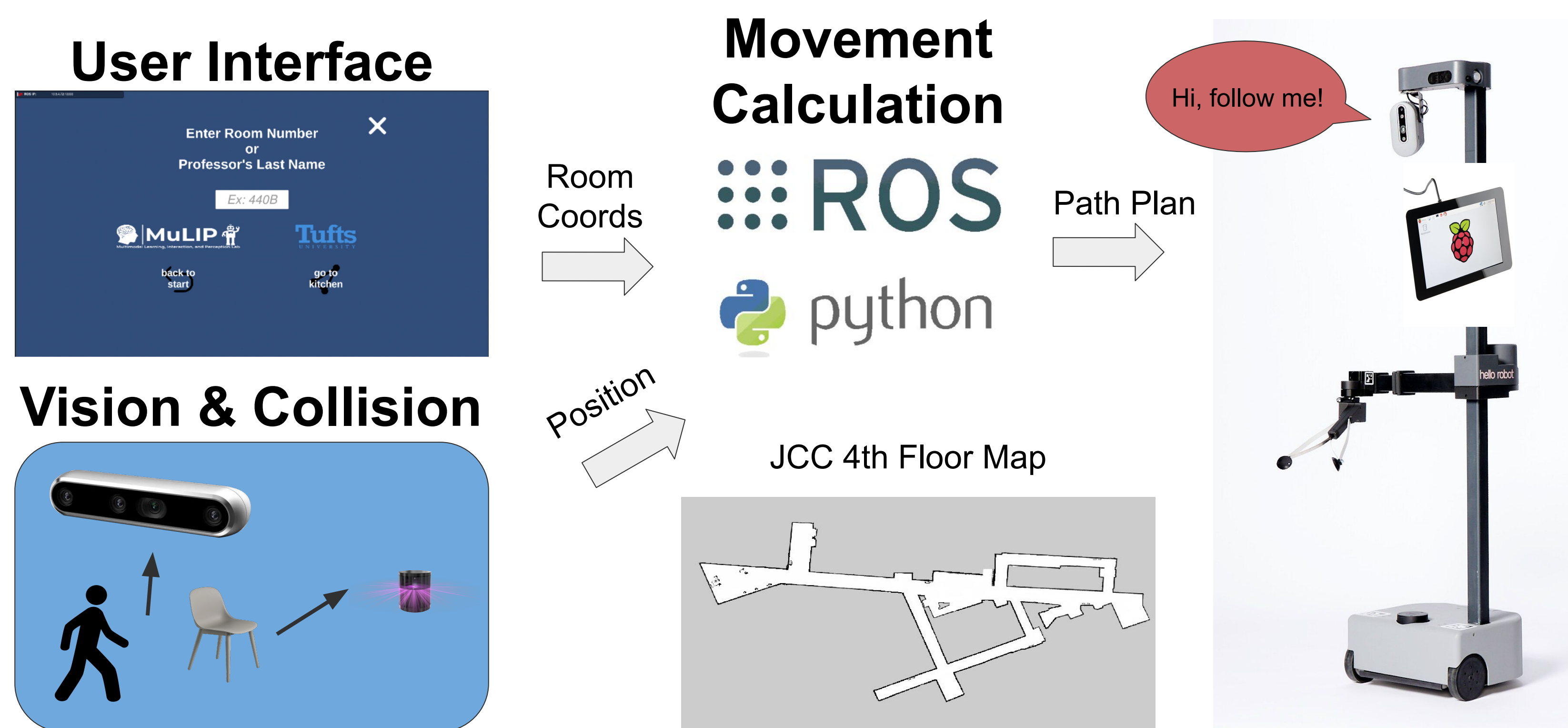
Motivation

JCC fourth floor has many professors' offices which can be difficult to find. Most of the offices are located in back hallways that many students may not be aware of. This robot solves the problem of locating any room on the fourth floor and guiding students to their destination.

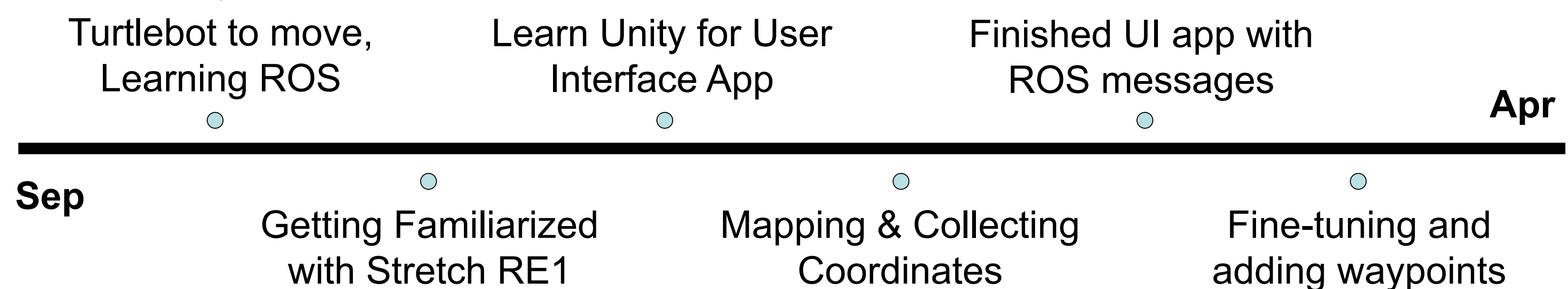
This robot is intended to serve any visitors to the fourth floor who are confused where they are supposed to go to find a room.

Project Design

The robot is equipped with a Raspberry Pi tablet with a user interface for inputting the professor the user is trying to reach. The user interface was programmed using Unity and is able to send message to the robot using ROS. The UI converts the provided room into a set of (x, y) coordinates for the robot to navigate to. Once the robot has a goal set, it will navigate to the room using a map of the floor while avoiding any obstacles on the way. Once the robot reaches the destination, it returns to a designated home location and awaits a new user. The diagram below shows how each part of the design is connected.



Timeline



Results

Able to get the robot to navigate to classrooms and professors rooms by stopping at checkpoints on the JCC fourth floor using the tablet interface. After reaching its destination, the robot returns to a central location to wait for a new task.

Future Work

One way to improve on this robot is to implement better collision detection through dynamic 3D mapping. User experience can also be improved through using WEBXR as well as audio prompts using a better speaker. PDDL could be used for navigation as it will solve issues with open doors, obstacles, etc.

Acknowledgements

Many thanks to Professor Jivko Sinapov, Andre Cleaver, Bharat Kesari, and Brennan Miller-Klugman.