

Integrating Human-Robot Interaction (HRI) with Cooperative Human-aware Navigation for Social Environment

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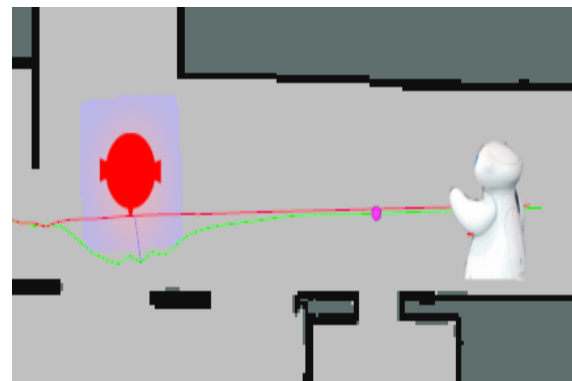
As of today, the integration of robots in human populated environments is a timely topic. In addition to the already developing socially aware navigating robots, this project focuses on adding human robot interactions to the navigation, with the goal of asserting the impact of said interactions on human-robot cooperation performance and on social acceptance of the robots. The work was done on the MOnarCH mbot robotic platform.



Mbot robotic platform, displaying a happy expression

I implemented interactions aiming to increase the human awareness of the robot state and goal, including anticipatory gaze to help the human to predict the robot trajectory, detecting when the robot is stuck, have the robot requesting for help or human displacement via speech when the robot estimates that it would shorten its path.

All of these interactions were implemented respecting the social norms, known as proxemics.



Path comparison, gaze point, estimated human motion (opposed direction) to reduce path length

After this, I tested the navigation, with and without interactions, with human subjects. The scenario was the following :

The robot tries to go from point A to point B, but needs the human's help to clear an obstacle in its path. The performance was measured with the time needed by the robot to reach its goal, and the subject sentiment after the study. Despite the small subject sample, results showed that the interactions, helped the navigation performance, as the human subject understood the robot's problem and cleared the obstacle faster. Social acceptance and trust in the robot also increased with the addition of the interaction