

Cooperative robot platooning

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Project Goal

This project will wirelessly coordinate multiple kobuki-buckler-robots to perform some tasks such as: letting the robot form a shape.

Project Approach

The project will model the robots' dynamic behaviors as a state machine governed by a combination of sensor inputs. We intend to use BLE to remotely control Kobuki robot for completing some tasks. In order to pin the position of each robot precisely, we need a camera to detect the robots and ultrasonic rangers to avoid crashing.

Resources

In the project, the main challenge is detecting the robots and ranging the distances among the robots. Besides, we are planning to use BLE as a device to control the robots to work collaboratively. After group discussions, we decided to use the following resources:

Hardware:

Grove ultrasonic rangers, Bluetooth Adapter, nRF52 Development Kit, Berkeley Bulker, Kobuki, a camera

Software:

Buckler repo, nRF SDK, OpenCV, TensorFlow

Others:

In order to test the robot movement, we may possibly need a slightly larger room.

Schedule

- October 25: Project charter (this document).
- November 4: Choice of platform finalized after discussion with GSIs.
- November 11: Use ultrasonic sensor to avoid crashing.
- November 18: Use camera to detect the Kobuki.
- November 25: Collect and process position data from the camera.
- December 2: Test BLE remote control, and complete robots shaping tasks.
- December 9: System testing.
- December 13: Demonstration video made, posters and report prepared.
- December 17: Final presentation and demo.
- December 19: Project report and video turned in.

Risk and Feasibility

There are many unknowns. Using camera to detect the Kobuki requiring knowledge of computer vision. BLE Network interfaces may be difficult to control. New sensor will be installed on bulker. We need some time to learn how to handle these challenges.