

Roomba Swarm

Team: sdmay22-02

Problem Statement

Implement a design so that a collection of Roombas will follow a lead Roomba based on certain specifications.



Project Requirements and Constraints

Functional Requirements:

- Roombas must be able to exhibit swarm-like behavior
- Follower roombas must follow behind a lead roomba at a specified distance and angle within 10% error
- The follower roombas should not receive any controls and should rely only on their own sensor data
- The leader roomba will receive movement directions from a base computer
- Components must be able to be powered by Roomba battery

Economical Requirements:

- Components purchased for the Roomba will cost no more than \$500



Engineering Standards

- IEEE 802.11 - Wireless Networking
 - Allows easy connection between devices
- IEEE 754 - Floating point arithmetic specifications
 - Floating point allows for more precise measurements
- IEEE 1588 - Precision Time Protocol
 - Synchronize clocks across roombas
- IEEE 1801 - Unified Power Format
 - Track power consumption of the Roomba, to maintain an acceptable charge life.



Users and Uses

Users:

- Iowa State University Computer Engineering 288 Students and Faculty

Use Cases:

- Create a swarm of n Roombas.
- Control the lead Roomba, and the swarm follows.
- Play music for the lead Roomba and it moves the swarm, making the swarm “dance”.

