IOWA STATE UNIVERSITY
Department of Electrical and Computer Engineering

Senior Design Project Proposal Form

Client/Company/Organization: Akhilesh Tyagi/Diane Rover/Iowa State University

Submitter Name: Akhilesh Tyagi   **Email:** tyagi@iastate.edu

Project Contact: Akhilesh Tyagi   **Email:** tyagi@iastate.edu

Project Title:

Dancing Swarm of iCreate/Roomba Robots v2.0

Project Abstract:

Bird swarms are postulated to have the property that the one leader sets the pace and direction (global navigation) for the swarm. Other birds in the swarm only maintain some local properties - distance from a few neighboring birds within some margin band. That is what forms a triangular (airplane wing) like swarm shape.

This project is to develop such a swarm navigation system (leader, follower) for CPRE 288 iCreate Roomba platforms. A swarm of 3 will suffice with 1 leader and 2 followers.
Many control theory and distributed systems models of swarms exist with corresponding heuristics/algorithms/systems.

A team has built such a system with WeBots environment in Aug 2020-May 2021 timme-frame. This team can enhance the control algorithms and migrate the swarm from WeBots to a physical platform.

Expected Deliverables:

The end goal is a demo where a swarm of 3 or more Roombas is dancing to some pop track (track is only available to the leader).

Specialized Resources Provided by Client:

Anticipated Cost: _____   **Financial Resources Provided by Client:** _____

Preferred Students for the Project:

☐ Electrical Engineering
☑ Computer Engineering
☑ Software Engineering
☐ Cyber Security Engineering
☐ Other:

Other Special Skills: Embedded systems, algorithms

Anticipated Client Interaction (estimate):

☑ 1 meeting per week
   ☐ In person, ☐ Over the phone, ☑ Web / video conferencing
☐ 1 meeting per month
   ☐ In person, ☐ Over the phone, ☐ Web / video conferencing

☐ 2 or more meetings per month
　　☐ In person, ☐ Over the phone, ☐ Web / video conferencing
☐ 1 meeting per semester
　　☐ In person, ☐ Over the phone, ☐ Web / video conferencing

Meeting ABET Criteria

Please rate the following statements as they relate to your proposed project:

0 – Not at all	1 – A Little	2 – Somewhat	3 – A Lot	4 – Completely

	0	1	2	3	4
On this project, students will need to apply knowledge of mathematics, science, and engineering	☐	☐	☐	☑	☐
This project gives students an opportunity to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	☐	☐	☐	☐	☑
This project involves students from a variety of programs, i.e., CprE, EE, and SE	☐	☐	☑	☐	☐
This project requires students to identify, formulate, and solve engineering problems	☐	☐	☐	☑	☐
This project gives students an opportunity to use the techniques, skills, and modern engineering tools necessary for engineering practice	☐	☐	☐	☐	☑

Project Approval – *for use by ECpE Senior Design Committee*

☑　Approved: _____

☑　Project Assigned:　sdmay22-02

☑　Advisor(s) Assigned:　Akhilesh Tyagi (tyagi@iastate.edu)

　　　　　　　　　　　　　Diane Rover (drover@iastate.edu)