NRI: FND: Flying Swarm for Safe Human Interaction in Unstructured Environments

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Objective: We will design and create a swarm of 200 flying robots that are safe to operate around people. They will use only onboard sensing to interact with each other and humans, which can "sculpt" the shape of the conglomerate form.

Technical approach:

Based on a single motor, underactuated flyer, where the spinning body can be used to scan sensors and transmitters for both localization and communication. Power will be maintained by a rapid charging base station. Flyers will continuously rotate in and out of the swarm as they charge and discharge while flying.

Key deliverables:

- Create small autonomous flyer which only uses onboard robot-to-robot sensing and communication
- We will demonstrate 200 robots in a swarm forming shapes controlled by a human closely interacting with the swarm

Progress:

- Autonomous position and trajectory control
- Designs for autonomous charging station
- Prototype for IR based robot-to-robot sensing and communication
- Making strides towards wake design
- Updated of robot design to aid in fast take-off



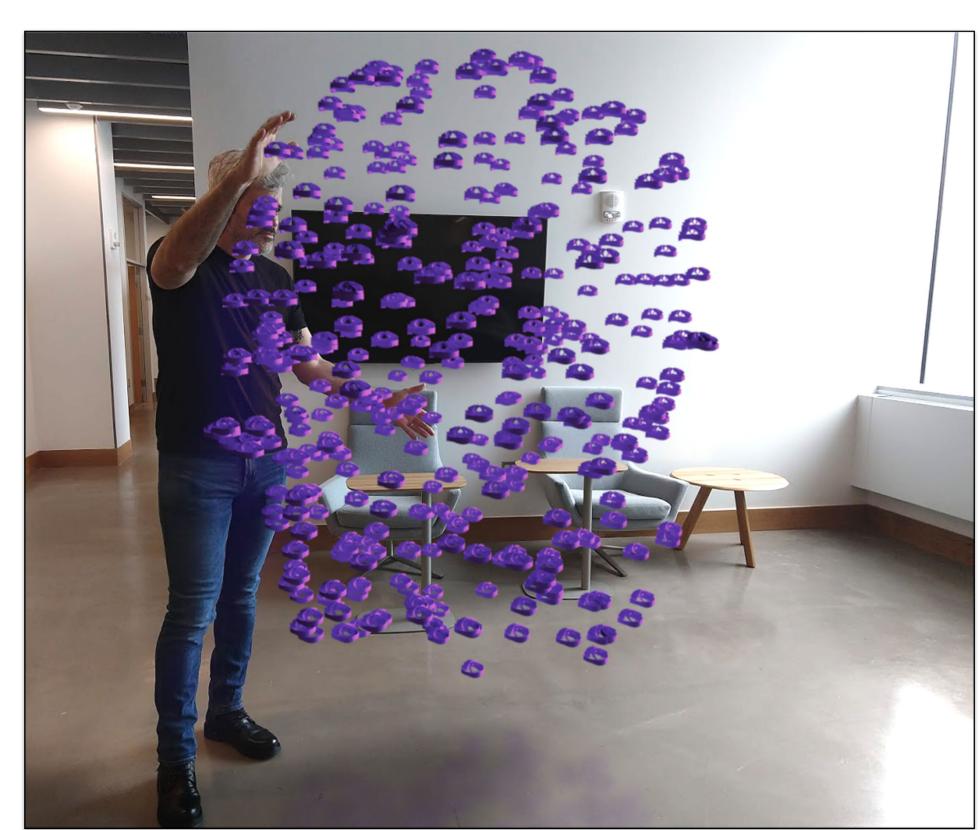


Figure: (Left) isometric view of prototype robot design. (Right) Rendering of human swarm interaction for shape sculpting.

Outreach and Broader Impacts

- Robot design and control will be open source.
- Improve on safe interaction between humans and flying robots
- Research and Education are integrated by incorporating flyers

into classroom activity, public presentations to K 12 and science

fairs.