Northwestern

Robotic Shepherding for Flow Control in Uncertain Dynamic Environments

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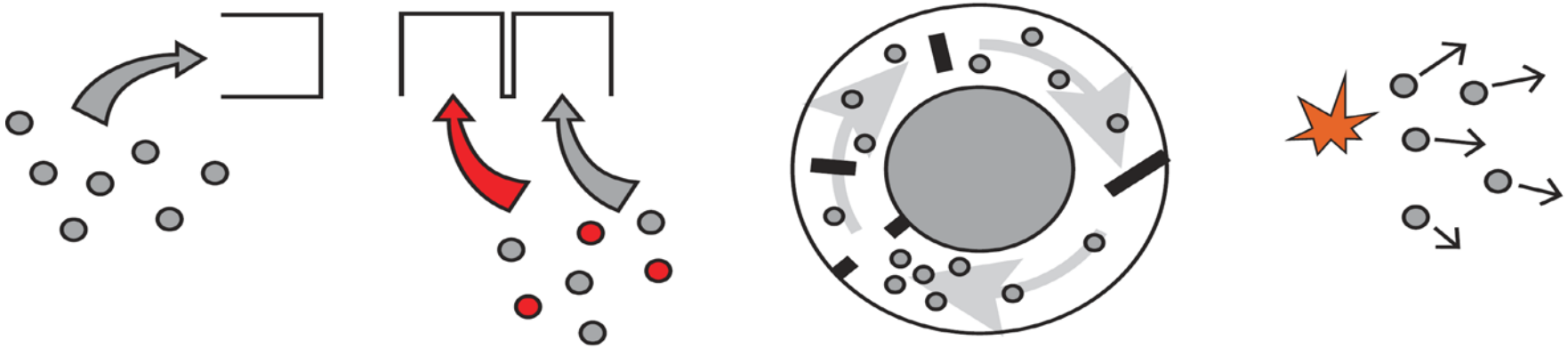
2021 NSF NRI PI Meeting

Multi-agent Robotic Shepherding

- Motivation
  - Disaster evacuation
  - Crowd control
  - Military scenarios (with ARL)

- Agents: Blue: cooperating shepherds; Gray: neutral, sheep; Red: hostile agents



Robotic Hardware

- CoachbotV2.0:
  - Two-wheeled
  - 10cm in diameter
  - 12cm high
  - Raspberry Pi 3B+
  - Economical to build

- Simulation: faithful hardware simulation, parallel processing
- Teleoperation: combination of human teleoperator and autonomous robots

Progress: Shape Formation

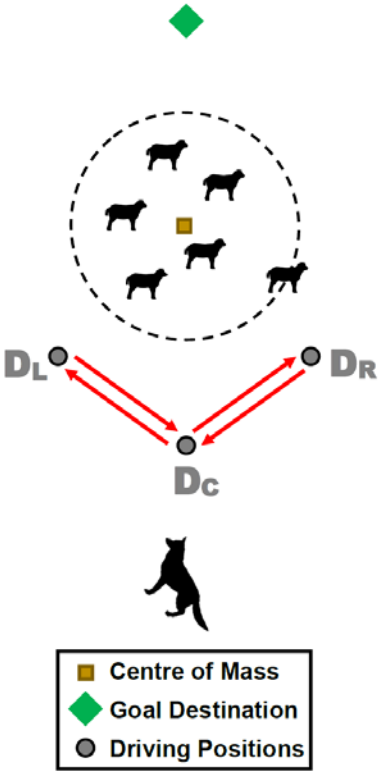
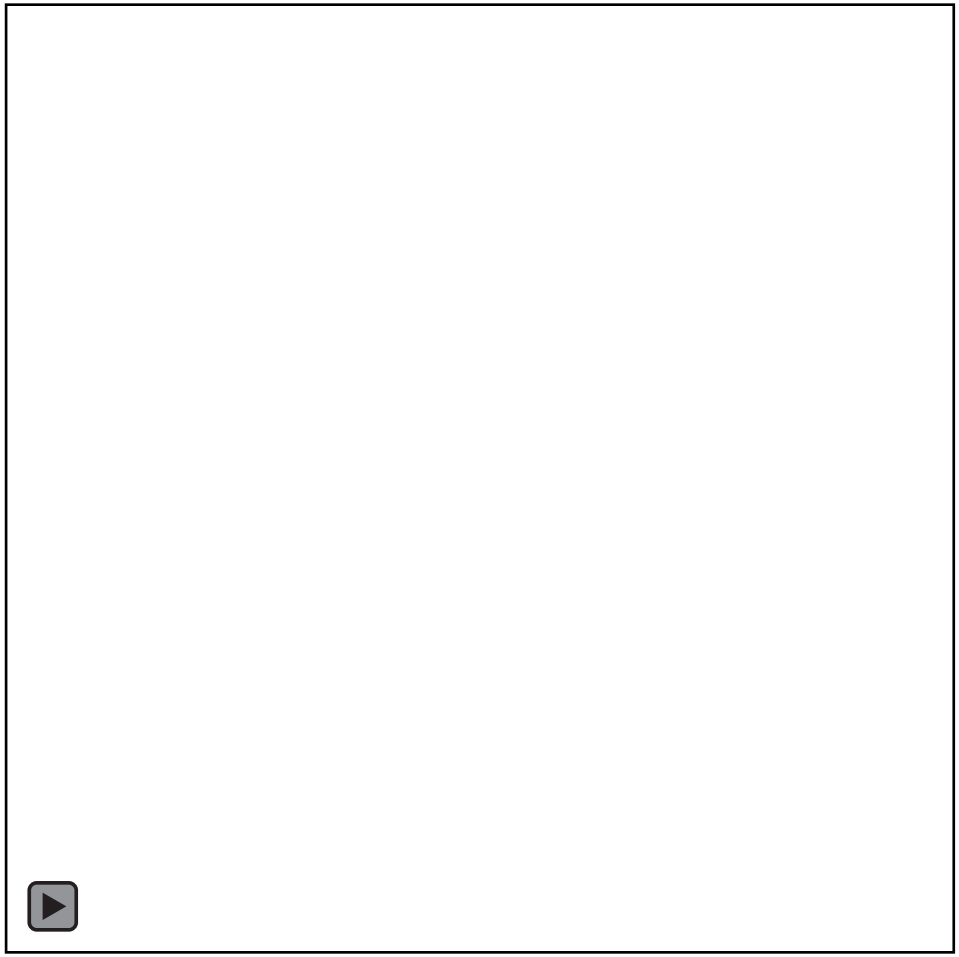


Figure from [Long et al 2020]



Broader Impacts

- Curriculum development: K-12, college, graduate
- Online education: YouTube channel
- Underrepresented groups: SWE, Northwestern Summer Research Opportunity Program (SROP)
- Public outreach: Museum of Science and Industry in Chicago