# CYPHER

## Cyber-Physical Intelligence and Security

# NEWSLETTER

· SPRING 2021·

HELLO

*Spring*

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THE
**UNIVERSITY**
OF RHODE ISLAND
COLLEGE OF
ENGINEERING

# ECBE GRADUATE STUDENT RESEARCH SHOWCASE

The CYPHER Center sponsored the 2nd Annual ECBE graduate student research showcase which took place on February 19th, 2021. Graduate students in the electrical, computer, and biomedical engineering department came together to showcase the research they have done in the past year. This year, there were 22 poster submissions. For most of these students, their research is what they will defend when it comes time to present and defend their thesis. This showcase is a great way for the students to get together and share their research with other students and professors. Due to the COVID-19 pandemic, the showcase was held on a website called Gather.Town. This platform offers a simulation that is very similar to the way conversations work in real life.



The event started with remarks by ECBE department chair, Haibo He. Students were then given 2 minutes to present their posters to the audience. When lightening presentations were finished, networking and collaboration started. Students stood at their posters while professors, other students, and staff walked around and were able to ask questions and engage more with the students' research. Awards for top graduate assistant, research assistant, and best poster were then presented. A social event was held after in a virtual room with the graduate students, the poster committee, attendees, and professors. Students were able to play games, socialize, and whine down after their great deal of hard work.
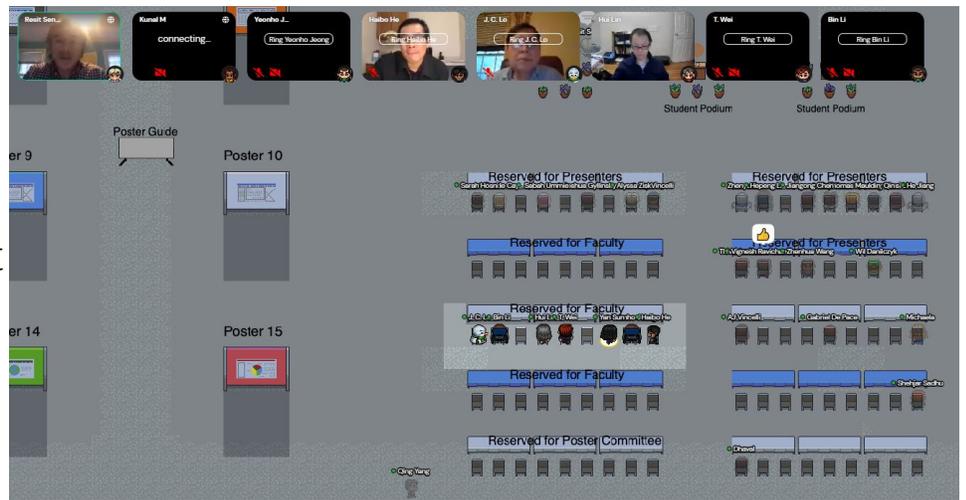
# FEATURED FACULTY MEMBERS' RESEARCH LAB



# INTELLIGENT CONTROL AND ROBOTICS LABORATORY

Founded in 2016, the Intelligent Control and Robotics (ICRobots) Lab is currently a major robotics research lab at URI, co-directed by Profs. Chengzhi Yuan, Paolo Stegagno, and Musa Jouaneh, focused on cutting-edge research of adaptive learning and control theory, robotic intelligence, automation technologies, and their applications. The lab is now hosting 5 Ph.D. students and numerous master and undergraduate students as research assistants. Research of the lab is sponsored by various agencies, including National Science Foundation, URI Foundation, URI Division of Research and Economic Development, RI DOT, and various industrial partners.



For more information, please visit their website at
https://web.uri.edu/icrl/home/
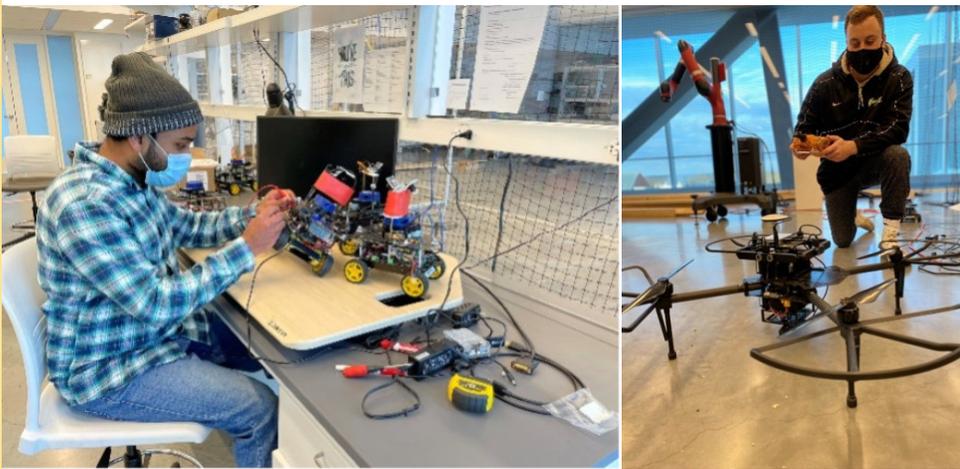
Students working on projects on Ground Vehicle (Left) and Aerial Vehicle (Right).

## RESEARCH HIGHLIGHT

Swarms of robots have been proposed to perform tasks as search and rescue, exploration, monitoring and construction. Their ability to perform tasks in parallel, as well as the relatively low cost of each swarm component, makes them more suitable than single robots in spatially distributed tasks. However, to collaborate efficiently they need to know each other's position. In a recent paper



published at the International Symposium on Distributed Autonomous Robotic Systems, the teamproposed a novel algorithm that uses the information from an omnidirectional camera and a laser scanner to identify other robots, distinguish them from other obstacles, and compute an estimate of their position. The algorithm can be performed by each robot independently from the rest of the swarm, so each robot can rely on its own sensors only. Experiments with four robots show that the algorithm achieves correct estimates for 95% of the time. In the future, the team plans to test the algorithm with more robots and use it to perform real tasks.

**OPPORTUNITIES**
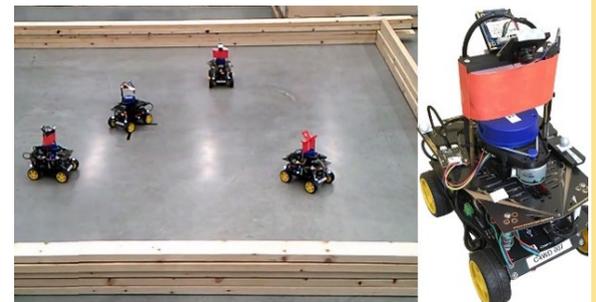
**We are hiring both undergraduate interns and perspective M.S. and Ph.D. students.**
- If you are one of these perspective students (graduate student), there will be full coverage of your tuition and health insurance. You will also receive a stipend in addition.
- If you are an undergrad, you will be paid hourly.
- If you are a graduate student and you cannot commit to full time, there are hourly positions available.

**We are hiring in the following areas:**
- For Undergraduates
  - Machine-learning based anomaly detection; Adversary modeling
  - Network Programming
  - Artificial intelligence, machine learning; smart grid
  - Hardware design
- For perspective Ph.D. Students
  - Robotics - theory development of multi-agent distributed control and its applications to multi-robot coordination
  - Background in computer architecture, embedded systems, cyber security, machine learning, and data storage
  - Background in FPGA/SoC embedded systems; PCB design and prototyping; and optoelectronic devices
- For perspective M.S. Students or part-time Ph.D. Students
  - Security in cyber-physical systems; Intrusion detection
  - Artificial intelligence, machine learning; smart grid
  - Security in cyber-physical systems; software-defined networking; edge computing; IoT; deep learning; and power system analysis

*Please send CVs and cover letters to cypher_info@etal.uri.edu along with which area you're interested in applying for*

**Please visit https://web.uri.edu/cypher/ for more detailed information regarding these opportunities and to stay up to date with the latest information**