

F25.27: Development and Experimentation of Autonomous Robots

Overview

Autonomous robots, such as unmanned aerial vehicles (UAVs), commonly known as drones, and self driving cars, are becoming ubiquitous. They see numerous applications in all aspects of our society and will have tremendous impacts on our lives. These robots are enabled by advances in science and technology, from electronics to computing and artificial intelligence (AI). However, many challenges remain to be addressed.

The Intelligent Control Systems (ICONS) Laboratory at NAU, directed by Professor Nghiem, develops fundamental theory for and implementation of autonomous robots. Currently, the lab has facilities for research in UAVs, unmanned ground vehicles (UGVs), and autonomous race cars, from advanced theory and algorithms to real implementations and practical applications. This project aims to develop hardware, software, and education/training materials for experimental robotic platforms, including UAVs, UGVs, and autonomous race cars.

What the student will DO and LEARN

The student intern will support the development of the experimental platforms as well as educational / training materials for these platforms. Depending on the student's capability and interest, the student will participate in one or more of the following activities:

- Research different options for these experimental platforms.
- Help assemble and develop the experimental platforms.
- Help set up and write software for the platforms (in Python, C++, for PX4, ROS, and Qground Control).
- Help graduate students develop control code for these robots.
- Help conduct research experiments on these platforms, gather and analyze data. • Create educational / training materials for the platforms (manuals, slides, and videos)

During the internship, the student will learn:

- Basic electronics and mechanics.
- Software and basic algorithms for autonomous robots.
- The ubiquitous applications of robots and autonomous systems.
- Programming for robots and embedded systems.
- Skills for data gathering and analysis.
- Skills for scientific writing, illustration, and presentation.

All the above activities will be in collaboration with and supervised by members of the ICONS Lab (Dr. Nghiem and graduate students). The student will experience how STEM research in an academic lab is conducted.

Additional benefits

This internship will help the student build a relationship with the faculty member and his lab and

graduate students; improve soft skills such as time management, scholarly reading, general understandings of research, responsibility, and accountability. Besides, the intern will gain experience in modern and advanced engineering platforms and software such as UAVs, UGVs, ROS, PX4 and advanced control systems. It will also help develop the student's interest and experience in research and STEM education and career.

Additional qualifications

We are particularly interested in students who have strong interest and motivation in STEM, particularly in the Electrical and Computer Engineering, Computer Science, and Mechanical Engineering disciplines. Desirable qualifications also include experience and skills in electronics, programming, or robotics (for example, if the student has created DIY robots, has programmed in Raspberry Pi or Arduino, has participated in robot competitions, etc.).

This position is partially-funded by NAU's LSAMP program, so acceptance to this position is contingent upon [LSAMP-eligibility](#).

Time commitment

8 hrs/week for 30 weeks