ECE 3730 Fundamentals of Robotics

Modified: June 30, 2024

4 Credits, 6 Contact hours

Text: Learning Robotics using Python, Joseph Lentin, Packt Publishing

Other materials: ros.org

Description: Fundamentals of robotic systems. Introduction to the Robot Operating System and the Gazebo simulator. Topics include reading data from sensors, localization, mapping, navigation and task planning. Students will demonstrate the ability to program a provided robotic system to navigate to a position and perform a task in both simulated and real environments.

Pre-requisite(s): ECE 1400 or CS 1410.

Educational Objectives:

- Demonstrate knowledge of the operation, interface and data processing of various sensors such as accelerometers, gyroscopes, GPS, compass and encoders.
- Demonstrate working knowledge of the Robot Operating System to collect and process sensor data and communicate with mechanical systems.
- Demonstrate the use of the Gazebo system to visualize and simulate robotic systems

Topics:

- Robot Operating System and Gazebo
- Nodes, Topics, Subscribers, Publishers
- Services, Actions
- Sensor collection, processing
- Cameras
- System integration and launching
- Localization, navigation
- Sensor fusion
- Path planning, obstacle avoidance
- Visual navigation and feedback
- Executive control and state machines

University Policies:

Americans with Disabilities Act: If you require accommodations or services due to a disability, please contact Disability Services in Student Services Center, room 181 (Ogden campus) or Building D2, room 262 (Davis Campus). Disability Services can arrange to provide course materials (including this syllabus) in alternative formats upon request.

Academic Integrity Policy: As part of the Student Code (PPM 6-22), students are expected to be academically honest and ethical. Academic dishonesty includes cheating; plagiarizing; colluding with others to be dishonest; falsifying information; giving, selling, or receiving unauthorized course or test information; using a tool or other aid not explicitly permitted by your instructor such as generative AI (e.g., ChatGPT) to complete assignments or exams; or infringing on others' copyrights and intellectual property. Academic dishonesty can have serious consequences in the class and/or at WSU. Be sure, if you borrow an idea, to express it in language entirely your own and let the reader know the idea's source in a citation note.

Videoconferencing Policy: If the class needs to be held virtually due to campus closure, sickness, or any other appropriate reason, students will receive a notification from your instructor via Canvas. Remember that attendance is just as important virtually as in the face-to-face option. During video conferencing, be present, avoid multitasking, and wait for your turn to speak and/or contribute to the class discussion. Be courteous and respectful of your classmates. As stated in the class recording policy, you may not record any segments and/or the full class unless you have authorization from the instructor. If you do not have the technology necessary for video conferencing, contact your instructor as soon as possible. This policy applies also to virtual office hours.