EEE 5772

Intelligent Robotics, Vision, and Controls

Section: RVC

Internet/Fully Online

Spring Term 2026

Course Time Zone | Eastern Time (ET). Course due dates are according to this time zone.

Professor Information

Lauren Ervin

Roles: Primary Instructor

Email: laervin@fiu.edu

Phone: 305-348-2683

Office Hours: By appointment. Due to the nature of the online course, the professor will be fastest to respond over email. One-on-one Zoom meetings may also be scheduled as needed.

Office Location: via Zoom

Department or Academic Unit: Electr & Computer Engr/CENGR

Course Prerequisites

Course prerequisites, if any, are listed below.

Course Description

This course provides the fundamentals of mobile robots, arm robots, camera models, image processing, feature extraction, and multi-view geometry, and visual servo systems. Prerequisite: Python/MATLAB experience or permission from the instructor.

Textbook and Course Materials

ROBOTICS,VISION+CONTROL

Required/Recommended: Required

Authors: CORKE

Publisher: SPRINGER

Publication Date: 2023

Copyright Date: 2023

ISBN 10: 9783031064685

ISBN 13: 9783031064685

Chapters/Pages: All

Student Learning Outcomes/Objectives

- **Identify different types of robotic systems, first principles of computer vision, and challenges that come with combining the two.**

- **Compare representations in different dimensions, calibration techniques, and various algorithms for individual tasks.**

- **Evaluate important/recent research papers within the fields of robotic vision and control.**

- **Discuss why the papers are impactful, and what limitations of the work may still exist.**

- **Create their own research project and articulate the motivation, process, and findings in a submission-ready manuscript.**

Expectations of this Course

This is an online course, which means most (if not all) of the course work will be conducted online. Expectations for performance in an online course are the same as a traditional course. In fact, online courses require a degree of self-motivation, self-discipline, and technology skills which can make these courses more demanding for some students.

Students are expected to:

- **review the getting started page located in the course modules;**
- **introduce yourself to the class during the first week by posting a self-introduction in the appropriate discussion;**
- **take the practice quiz to ensure that your computer is compatible with the learning management system, Canvas;**
- **interact online with instructor and peers through discussion forums;**
- **review and follow the course calendar and weekly outlines;**

- **log in to the course at least 2 times per week;**
- **respond to discussions by the due date specified. No late work will be accepted;**
- **respond to emails within 1 day;**
- **submit assignments by the corresponding deadline.**

The instructor will:

- **log in to the course 3 times per week;**
- **respond to emails within 24 hours;**
- **grade assignments and/or provide feedback within 10 business days of the assignment deadline.**

Course Communication

Communication in this course will take place via the Canvas Inbox. Check out the Canvas Conversations Tutorial or Canvas Guide to learn how to communicate with your instructor and peers using Announcements, Discussions, and the Inbox. I will respond to all correspondences within 24 hours.

Policies & Resources

Before starting this course, please review the Policies & Resources Page in Canvas which includes comprehensive information on various University and Course Level Policies such as:

- **University Policies**
- **Accessibility and Accommodations**

- **Online Etiquette**
- **Technical Requirements and Skills**
- **Computer & Digital Literacy Skills**
- **Course Technology Accessibility Statements and Privacy Policies**
- **Academic Integrity**
- **Copyright Statement**
- **Core Principles of This Course**
- **Nondiscrimination Statement**
- **Panthers Care & Counseling and Psychological Services (CAPS)**
- **Fair Use Policy**

Assignments & Assessments

Discussion Forums

Reading research papers is an important part of expanding one's own knowledge within a given field. The more one reads, the more patterns and research gaps will arise. A large portion of the grade in this course is dedicated to "reading group" discussions. Four research papers will be provided for the entire class to read, and each student is expected to find one additional research paper.

Discussions will be due biweekly until all papers (5) are read. Discussions will open on Monday (1/12, 1/26, 2/9, 3/2 3/16) at 8:00am and are due the following Sunday (1/18, 2/1, 2/15, 3/8, 3/22) at 11:59pm. Specific guidelines and questions to be answered for each paper will be provided at the date and time the discussion forum opens. Keep in mind that your discussion forum postings will be seen by

other members of the course.

Homework

There will be a short homework assignment each week up to week 14 that corresponds with that week's lecture content. Similarly to the discussions, the homework assignments will become available Monday at 8am and are due the following Sunday at 11:59pm. Each homework assignment will vary depending on the week, but they will range from modifying provided programming examples to a small set of questions testing the comprehension of the lecture material. In total, there will be 13 homework assignments.

Semester Project and Manuscript

The biggest outcome of this course is applying lessons learned from the lectures towards a real-world, semester-long project. Each student is expected to write an accompanying manuscript intended for submitting to a conference or journal. Several recommended conference venues include IROS 2026, RO-MAN 2026, ECCV 2026, CASE 2026, CoRL 2026, ICML 2026. Actual submission and/or acceptance to the venue is not required and will not be considered for the final grade. There are two options for choosing a project topic; a student can 1) propose their own topic to be approved (this may include a research project that you are currently working on if appropriate), or 2) pick from a selection of topics provided. Students may additionally choose to work alone or in groups, but individual responsibilities and expected contributions must be explicitly outlined in the planning phase.

The semester project and manuscript is also the largest portion of the grade, making up a total of 50% that is split between three smaller submissions. The project formulation will be the initial plan for the semester project. It will be due in the 3rd week of the course, and it is worth 10% of the grade. It must be approved or revised until approved before moving forward. Next, the manuscript outline will be a rough draft of the intended sections and subsections of the paper. Some sections may not be filled in at all yet, such as results or conclusions sections. This assignment is due in the 7th week of the course and is also worth 10% of the

grade. It will ensure that some progress has already been made on the approved project, and there is a plan for what is remaining. The remaining 30% of the grade is left for the final project results and accompanying manuscript. It is considered the "final" of the course, and is due Friday, April 24th at 11:59pm.

Grading

Course Grades Distribution Table				
Course Requirements	**Number of Items**	**Points for Each**	**Total Points Available**	**Weight**
Homework	13	1-2	25	25%
Paper Discussions	5	5	25	25%
Project Formulation	1	10	10	10%
Manuscript Outline	1	10	10	10%
Final Manuscript	1	30	30	30%
Total	21	**N/A**	**100**	**100%**

Letter Grade Distribution Table

Letter Grade	Sample Range %
A	95 - 100

Letter Grade	Sample Range %
A-	90 – 94.99
B+	87 – 89.99
B	83 – 86.99
B-	80 – 82.99
C+	77 – 79.99
C	70 – 76.99
D	60 – 69.99
F	0 – 59.99

Schedule of Topics

Course Calendar Outline		
Dates	**Topics, Readings, & Resources**	**Activities Due**
Week 1	Introduction to course, robotics, and CV; basics of coordinate frames in 2D	HW #1; introduction discussion
Week 2	Representation in 3D; basics of exponential mapping	HW #2; paper discussion #1
Week 3	Rotation and transformation matrices	HW #3; project formulation

Course Calendar Outline		
Dates	**Topics, Readings, & Resources**	**Activities Due**
Week 4	Dynamic movement: forces and torque; IMU application	HW #4; paper discussion #2
Week 5	Computer vision basics: color	HW #5
Week 6	Image processing: an array of different operations	HW #6; paper discussion #3
Week 7	Image processing: transformations and dealing with noise	HW #7; manuscript outline
Week 8	Spring break (no classes)	
Week 9	Pixel classification	HW #8; paper discussion #4
Week 10	Object detection and feature extraction	HW #9
Week 11	Camera perspective and matrix	HW #10; paper discussion #5
Week 12	Camera calibration and fiducials	HW #11
Week 13	Combining multiple views	HW #12
Week 14	Point clouds and visual odometry	HW #13
Week 15	Position-based and image-based control	
Week 16	Computer vision based control applied towards different types of robots	Final project manuscript

Nondiscrimination Statement

The **Office of Civil Rights Compliance and Accessibility** (CRCA) is responsible for ensuring that FIU maintains a workplace and learning environment free from discrimination, where current and prospective faculty, staff, and students are treated equitably. If any student, employee, or applicant has a sincere and reasonable belief that they have been discriminated against or harassed based on age, color, disability, marital status, ethnic or national origin, race, religion, retaliation, sex, or any other protected category, they can report their concerns to the CRCA team through report.fiu.edu.