

CSE475: AI-Driven Robotics

University of Tech Dynamics

Course Duration: Fall 2022 - Winter 2023 (Full Year)

Course Description:

This course involves designing and programming a robotic system that utilizes artificial intelligence to perform complex tasks. Students will focus on machine learning, computer vision, and sensor integration, culminating in a final project demonstration.

- Learning Outcomes:**
- 1. Robotic System Design:** Develop a robotic system with integrated AI capabilities for performing specific tasks.
 - 2. Machine Learning Implementation:** Apply machine learning algorithms to enable the robot to learn and adapt to its environment.
 - 3. Computer Vision:** Implement computer vision techniques for object detection, recognition, and navigation.
 - 4. System Integration:** Integrate various sensors and components to create a functional robotic system.
 - 5. Presentation Skills:** Effectively present the design, implementation, and outcomes of the robotic system.

Course Structure & Timeline:

Week	Topic	Deliverable	Due Date	Weight
1-2	Introduction & Team Formation	Team Formation Report	September 15, 2022	5%
3-5	AI Basics & Machine Learning	Literature Review & Research Proposal	October 15, 2022	10%
6-8	Computer Vision Fundamentals	AI & Computer Vision Design Proposal	November 15, 2022	15%
9-12	Mid-Term Progress & Feedback	Mid-Term Presentation	December 15, 2022	15%
13-16	Robotic System Design & Development	Initial System Design Report	January 31, 2023	10%
17-20	Sensor Integration & Testing	Sensor Integration Report	February 28, 2023	10%
21-24	Final System Testing & Optimization	Final Testing Report	March 31, 2023	15%
25-27	Final Presentation & Project Submission	Final Presentation & Final Report	April 15, 2023	20%

- Grading Breakdown:**
- Team Formation Report:** 5%

- **Literature Review & Research Proposal: 10%**
- **AI & Computer Vision Design Proposal: 15%**
- **Mid-Term Presentation: 15%**
- **Initial System Design Report: 10%**
- **Sensor Integration Report: 10%**
- **Final Testing Report: 15%**
- **Final Presentation: 10%**
- **Final Report: 10%**

Total: 100%

Detailed Deliverables:

- 1. Team Formation Report (5%)**
 - **Description:** Document outlining team members, roles, and initial project ideas.
 - **Due Date:** September 15, 2022
- 2. Literature Review & Research Proposal (10%)**
 - **Description:** Summarize relevant research on AI and robotics, propose a plan for the design and implementation of the robotic system.
 - **Due Date:** October 15, 2022
- 3. AI & Computer Vision Design Proposal (15%)**
 - **Description:** Detailed proposal for the design and implementation of AI and computer vision components in the robotic system.
 - **Due Date:** November 15, 2022
- 4. Mid-Term Presentation (15%)**
 - **Description:** Presentation showcasing preliminary designs, progress, and challenges.
 - **Due Date:** December 15, 2022
- 5. Initial System Design Report (10%)**
 - **Description:** Report detailing the initial robotic system design, including components and algorithms.
 - **Due Date:** January 31, 2023
- 6. Sensor Integration Report (10%)**
 - **Description:** Report on the integration of sensors with the robotic system, including testing and calibration.
 - **Due Date:** February 28, 2023
- 7. Final Testing Report (15%)**
 - **Description:** Comprehensive report on final system testing, performance, and optimization.
 - **Due Date:** March 31, 2023
- 8. Final Presentation (10%)**
 - **Description:** Presentation of the complete robotic system, including design, implementation, and results.
 - **Due Date:** April 15, 2023
- 9. Final Report (10%)**

- **Description:** Detailed final report covering all aspects of the project, from design to implementation and testing.
- **Due Date:** April 15, 2023

This syllabus outlines the course structure for CSE475, emphasizing practical application and integration of AI and robotics technologies through a comprehensive project.