

Introduction to Robot Vision

CAP 4453

Designation: Elective for BS-CS, BS-CpE

Catalog Description: CAP 4453 **3 Credits**

Course Name: Robot Vision

Course Description: Perspective and orthographic projections; the processing of edges, regions, motion, shading, texture, object detection, recognition, and machine learning. Fall, Spring.

Pre-requisite: COP 3530 and MAC 2312.

Textbook(s) and/or other required material(s):

- All materials are provided electronically. No Textbook.

Reference(s):

- None

Course learning outcomes/expected performance criteria:

The course goals are to enable students to:

- Be knowledgeably familiar with algorithms in vision for edge detection, object detection using AdaBoost, face recognition, motion computation (Critical)
- Be introduced to concepts in Machine Learning for computer vision. (Relevant)
- Write programs for computer vision (Critical)
- Integrate large portions of code and run effectively. (Critical)
- Orally present explanations for a current vision research paper. (Critical)
- Use existing vision libraries to demonstrate vision capabilities. (Critical)
- Be familiar with a broad set of current vision research topics. (Relevant)
- Become familiar with the process of reading a current vision research paper. (Critical)
- Be familiar with the process of understanding a current vision research paper. (Important)
- Gain experience writing an explanatory version of a current vision research paper. (Important)

Topics:

- Edge detectors (Roberts, Sobel, Canny)
- Face detection using AdaBoost
- Eigenfaces for recognition
- Optical flow motion and structure from motion
- Support Vector Machines
- SIFT and SURF features
- Variety of current research topics

Class Schedule:

Number of sessions per week 2
 Duration of each session 1 hr 15 min

Laboratory Schedule:

Number of sessions per week N/A

Contribution of course to meeting requirements of Criterion 5 Curriculum (credit hours):

Math & Science Topics: 0 *Computing Topics (A): 3 General Education: 0

*Computing Topics – Mark with (F) or (A) for Fundamental or Advanced

Student Outcomes in Criterion 3 addressed by the course:

Check if the course is used in assessment of the program's student outcomes (√)

| Description of the Program's Student Outcomes addressed by the course | |
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| Outcome | Description |
| 1 | Apply knowledge of computing and mathematics appropriate to the discipline; specifically to include the application of mathematics, science and engineering to solve and reason about computational problems. |
| 2 | Analyze a problem, and identify and define the computing requirements appropriate to its solution. |
| 6 | Communicate effectively with a range of audiences; in particular, graduating majors shall demonstrate effective oral and written communication skills while disseminating technical information about computing technology and its applications. |
| 8 | Recognize the need for continuing professional development and shall demonstrate the knowledge of research tools and professional resources necessary to accomplish this end. |
| 9 | Use current techniques, skills, and tools necessary for computing practices. |