Synopsis:

Vision is arguably the most important of the five senses, and is commonly used by humans in many daily tasks (e.g., for recognizing objects or locations, as well as for safe navigation). Endowing robots with such an expert and autonomous sense of vision has been a dream of scientists and engineers for over half a century. Potential fields of interest are space exploration, home-, industrial-, and medical-robotics.

In this course, students will be introduced to the basic techniques of autonomous vision-based robot perception, recognition, localization and navigation. The topics covered include a description of the main robotic and vision-sensing devices, as well as of the basic techniques for image processing. Particular attention will be given to recognition and robot localization techniques that use single and multiple images. Emphasis will be given to introducing the main up-to-date strategies for vision-based robot navigation (Position-, Image- and Hybrid-Based Visual Servoing).

Throughout the course, students will work individually and in groups to analyze vision-based robotics problems and to design software solutions. Matlab will be the primary programming language/environment used in the assignments. After successfully completing this course, students will be able to apply a variety of techniques for the design of efficient algorithms in order to address complex problems of vision-based sensing, localization and navigation.

CSE, EE, MAE students are encouraged to register.

Course Information:

Instructor: Dr. Gian-Luca Mariottini (http://ranger.uta.edu/~gianluca)
Office Hours: Monday & Wednesday, 1:30-3:30pm or by appointment
Course webpage: http://ranger.uta.edu/~gianluca/teaching/CSE4392-5369/
Email: gianluca@uta.edu
Class Schedule: Monday & Wednesday, 4:00-5:20pm
Prerequisites: None. This class is self-contained!
Prior familiarity with linear algebra, computer vision or control topics can be beneficial. MATLAB programming experience is required.

Assignments:

Students will be graded based on homeworks and a major course project. The course project will focus on designing and implementing a particular algorithm, and walking through details related to its analysis, and design. The course project can be done either individually or in a team. Students will report their findings in a research report, and an in-class oral presentation.

NEW! Students will have the possibility to use iCreate robotic platforms (by iRobot) for the course project. USB cameras and laptops are available to program the robot and process sensor data.