Faculty of Eng. & Natural Sci.
EE417-202201
Computer Vision

Instructor

<table>
<thead>
<tr>
<th>Name</th>
<th>Email</th>
<th>Office</th>
<th>Phone</th>
<th>Web</th>
<th>Office Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mustafa Ünel</td>
<td><a href="mailto:munel@sabanciuniv.edu">munel@sabanciuniv.edu</a></td>
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<td>Before and after classes, or by appointment.</td>
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Course Content


Objectives

To teach the fundamentals of computer vision which tries to make computers see and interpret the world.

Recommend or Required Reading

Textbook


Optional Readings

Assessment Methods and Criteria

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<tr>
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<th>Percentage (%)</th>
<th>Number of assessment methods</th>
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<tbody>
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<td>Midterm</td>
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<td>1</td>
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<td>Assignment</td>
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<td>Group Project</td>
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Course Outline

- Introduction
- Image Transformations, Pointwise Image Processing, Spatial Filtering
- Image Gradients, Edge Detection
- Line and Circle Detection using Hough Transform
- Corner Detection
- Feature Detectors and Descriptors
- 2D Transformations and Image Warping
- Image Homographies and RANSAC
- Geometric Camera Models and Calibration
- Optical Flow, Tracking
- Stereo Vision
- Structure from Motion
- Object Detection and Recognition

Learning Outcomes

Upon successful completion of EE 417 Computer Vision, students are expected to be able to:

- Discuss the main problems of computer vision, its uses, and applications
- Design and implement various image transforms: point-wise transforms, neighborhood operation-based spatial filters, and geometric transforms over images
- Design and implement several feature extraction algorithms including edges and corners
- Design and implement line and circle detection using Hough transform
- Calibrate real cameras and determine both intrinsic and extrinsic parameters
- Formulate and solve the 2D optic flow problem
- Establish correct correspondence for stereo images using a correlation-based matching technique
- Estimate the essential/fundamental matrix and determine extrinsic parameters (rotation and translation) of a stereo vision system
- Reconstruct 3D structure from 2D images using estimated extrinsic parameters
- Identify or recognize objects from images

Course Policies

Makeup only for official excuses