

# Computer Vision with MATLAB

## Prerequisites

*MATLAB Fundamentals* or equivalent experience using MATLAB. *Image Processing with MATLAB* and basic knowledge of image processing and computer vision concepts.

Day 1 of 1	
<b>Importing, Visualizing, and Annotating Videos</b>	<p><b>Objective:</b> Import videos into MATLAB, as well as annotate and visualize them. The focus is on using System Objects™ for performing iterative computations on video frames.</p> <ul style="list-style-type: none"><li>Importing and displaying video files</li><li>Highlighting objects by drawing markers and shapes like rectangles</li><li>Combining and overlaying two images</li><li>Performing iterative computations on video frames</li></ul>
<b>Detecting Objects</b>	<p><b>Objective:</b> Utilize machine learning and deep learning algorithms for complex object detection.</p> <ul style="list-style-type: none"><li>Marking objects of interest in training images</li><li>Training and using a cascade object detector</li><li>Using a deep learning object detector</li></ul>
<b>Estimating Motion</b>	<p><b>Objective:</b> Estimate direction and strength of motion in a video sequence.</p> <ul style="list-style-type: none"><li>Understanding motion perception in images</li><li>Estimating motion using optical flow methods</li></ul>
<b>Tracking Objects</b>	<p><b>Objective:</b> Track single and multiple objects and estimate their trajectory. Handle occlusion by predicting object position.</p> <ul style="list-style-type: none"><li>Tracking single objects using a Kalman Filter</li><li>Tracking multiple objects using a GNN tracker</li></ul>
<b>Camera Calibration</b>	<p><b>Objective:</b> Remove lens distortion from images. Measure size of planar objects.</p> <ul style="list-style-type: none"><li>Estimating intrinsic, extrinsic, and lens distortion parameters of a camera</li><li>Visualizing the calibration error</li><li>Removing lens distortion</li><li>Measuring planar objects in real-world units</li></ul>