Introduction
This assignment consists of estimating the trajectory (up to a scale factor) of a monocular camera as it records a short video. The technique employed to perform this assignment is to estimate the essential matrix between successive frames, extract the rotation matrix $R$, the translation vector $\vec{T}$, and 3D plot the trajectory using the $\vec{T}$ vectors obtained between each frame of the image sequence.

The 3D Motion Problem
The required steps to complete this assignment are as follows:

• For two successive frames in the video, find point correspondences (more than 8). Use the FLANN matching technique with SIFT features.

• With the correspondences, now estimate the fundamental matrix $F$. Use OpenCV routines and make sure RanSaC is on while performing this estimation.

• Once $F$ is estimated, use OpenCV routines and the intrinsic calibration parameters obtained in Assignment 3 to estimate $E$, the essential matrix. (Pay attention to the difference in resolution between the calibration images and the video itself. You will need to resize the calibration images to that of the video sequence, and then calibrate to obtain the intrinsic parameters).

• Decompose $E$ into $R$ and $\vec{T}$.

• Add this translation to your 3D plot for the camera trajectory. Use GnuPlot to produce the final 3D plot of the camera trajectory.

• Get the next frame in the video and repeat the previous steps.

The video sequence is available here.

What to Hand In
1. The source code for the program. The program must be well structured and documented. The program should output the data for the 3D plot. The camera trajectory must be clearly visible in the graph.

2. A report with a presentation page, containing the 3D trajectory plot, and a description of the algorithm you have used to solve this problem.

3. Submit these files with OWL, on or before the deadline.