**Homework 3**

**Edge Detection and Hough Transform**

Submission deadline: 11:59 pm, 28/2

**Note:**

1. Do not forget to review and complete exercises in the tutorial notebooks.
2. It is also good to review the quiz answers.
3. Readings: 5.1, 5.2 (Image gradient) and 10.1 (Hough Transform), Forsythe and Ponce: Computer Vision: A Modern Approach (Just a few pages)
4. Submission: Put your code and output in **a Jupyter Notebook** and submit the whole folder.
5. **Submission of Homework 3 is Compulsory as part of the 10% in Attendance and Homework item mentioned in the Syllabus. Zero marks will be given for non-submission.**

**Tasks:**

1. Given the file “circuit.png”, write a program to carry out the following tasks and output the results:
   1. Rotate the image 33 degrees
   2. Find its edges using the Canny function
   3. Using Hough Transform to find lines in the image. An example result (yours may be different):

Diagram

Description automatically generated with medium confidence

1. Given the file “noisyImage.png”, write a program to carry out the following tasks and output the results:
   1. Remove noise using a Gaussian filter
   2. Find its edges using the Canny function
   3. Using Hough Transform to find lines in the image

Note: Your goal is to adjust the filtering, the edge finding, and the Hough algorithms to find the lines as best you can.

1. Given the file “coins.png”, write a program to carry out the following tasks and output the results:
   1. Using Hough Transform to detect and fit circles to the coins.
   2. Output their size

Note:

* The following tutorial may help: <https://docs.opencv.org/3.4/d4/d70/tutorial_hough_circle.html>
* My slides in Lecture 3b also include an explanation of Hough Transform for detecting circles.

1. Complete the lane detection exercise in the tutorial notebook.