

# ***ELEC4630 Image Processing and Computer Vision***

## **Assignment 2**

(Due Date: Friday, 24th April 2020 at 11:00pm)

1. Use the Hough transform to find the straight lines of the concrete edging under the metal fence in this image and project them back onto the original image. Also use the circular Hough transform to detect both wheels and project them back onto the image. Hough transform and circular Hough transform functions are available in Matlab. The car image is on Blackboard.

(5 Marks)

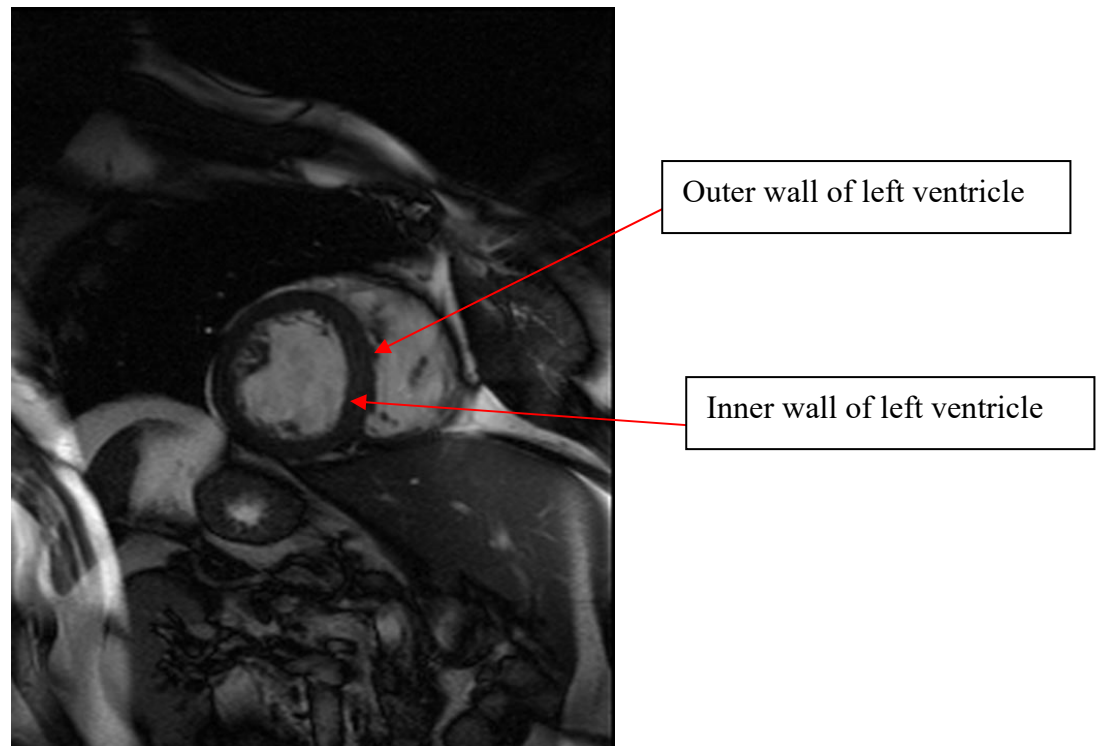


**Figure 1 Morgan**

2. Design an algorithm to determine the cross-sectional area of the heart in this MRI Image Sequence of a beating heart. An example image is given; the other images are on the Blackboard site along with sample segmentations. By examining the cross-sectional area over time, a cardiologist can determine the efficiency of the heart. This is especially important diagnostic information for cardiologists after patients have had heart attacks.

Use any method, but I suggest you examine snakes, viterbi, thresholding, morphology and related methods to solve this problem.

For your report, you should determine the area inside the inner wall of the heart in each image example, and provide commented code, a description of your methods, and why you chose them. Your algorithm should be able to work on the entire set of images without modification or parameter adjustment. Produce a graph of cross-sectional area versus time.



**Figure 2 MRI Image of Heart**

(15 Marks)

(Total 20 Marks)

## Assignment 2 Marking Scheme and Criteria

### Q1

- Coding of a solution to locate straight lines and backproject to image, description and explanation of method, issues of implementation, related images and graphs
  - (2 marks)
- Coding of a solution to locate wheels (circles) and backproject to image, description and explanation of method, issues of implementation, related images and graphs
  - (3 marks)

### Q2

- Coding of a solution to locate inner wall. Description and explanation of method, Production of graph of cross-sectional area.
  - (5 marks)
- Coding of a solution to locate more challenging outer walls which may be different from the method used for the inner wall. Description and explanation of method.
  - (5 marks)
- Description and explanation of methods used and the challenges in processing the entire sequence. Suggestions for improvements.
  - (5 marks)