# Team Project 2

Each group should
- Submit one hardcopy of the report containing procedures and results by Jan. 28 (Monday) at the beginning of class.
- Attach a printout of your well-commented code to the report.
- You can choose MATLAB or C/C++ to do the project. MATLAB is preferred.

Part A – Image Filtering
In the following (electronic versions of these files can be found on PolyLearn), you will find two imperfect images. First analyze these images and discuss ways to find out problems in them. Then use image filtering techniques covered in class to reduce noise in these images. Please do not use MATLAB built-in functions to do this project.
Make a printout of your filtered images and submit it along with the report. It should include the technique(s) you applied, comparisons of different techniques you used, if applied, and a discussion on the results.
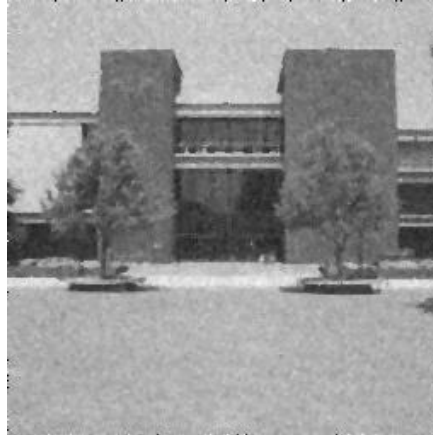
Part B – Edge Detection
Test your edge detectors on the following images (electronic versions on PolyLearn). Discuss which operator gives better results.
- Implement the Prewitt Operator and the Sobel Operators. Discuss which operator gives better results. In your report, include
  a. the original image
  b. compute and display the sum of squared gradient magnitude
  c. display the edge map by using top 5% of (b) as the threshold
  d. compute and display thesum of the absolute values of the two mask responses
  e. display the edge map by using top 5% of (d) as the threshold
  f. Select your own threshold that produces the best edge map

- Implement the LoG Operator. Consider the masks approximating the LoG with $\sigma^2 = 1$ and 2. Discuss the effects of mask size on the output. In your report, include
    a. the original image
    b. output image from LoG with $\sigma^2 = 1$
    c. output image from LoG with $\sigma^2 = 2$
    d. determine the σ^2 value that produces the best edge map.
- Apply the Canny Edge Detector to the images. Discuss the effects of threshold and σ on the output. In your report, include
    a. the original image
    b. output image with several threshold and σ values
- Using outputs from the optimal operator from the above edge detectors, apply the Hough Transform to extract lines from the test images. Discuss your method for selecting likely lines from the Hough Space. In your report, include
    a. the original image
    b. image of detected lines overlaid onto original image
- Extra credit will be given if you implement your own Canny Edge Detector and Hough Transform.