* Step 1 – Coordinate Extraction
  + Delta wing airfoil coordinates lost and needed to be recovered. The only reference for airfoil coordinates was in Dr. He’s master’s thesis.
  + I took a screen shot of his airfoil coordinate figure and saved it as a jpeg.
  + To extract the data points for the airfoils, I discretized the image into its size and looped over these indices checking the pixel color. If the pixel color matched the airfoil, I was looking for I saved the location of where the pixel was in an array.
  + Going image size by image size resulted in multiple y values for a single x value so the data was very messy even though the airfoil shape was correct when replotting. To correct this, I implemented a FIR (moving average filter) where I average a group of data points in a region to obtain singular data points.
  + Although the FIR filter helped to reduce data points and the airfoil shape was correct when viewing on the macro scale, the data was rugged/inconsistent on the micro scale which resulted in a non-smooth flowing curvature.
  + To correct this, I implemented curve fitting to each airfoil’s upper and lower skin to obtain functions to describe the data and curvature while remaining smooth. Normal curve fitting was accurate in the middle of each airfoil but didn’t go through the leading and trailing edge points, so I implemented weighted curve fitting to prioritize these points more.
  + After finding values to describe the polynomials of the airfoils, I passed in 123 evenly spaced x values for each airfoil’s upper and lower skin to find their corresponding y-coordinates.
  + I then manually added points for the leading edge and trailing edge where I knew their values from reference geometry in Dr. He’s thesis. This resulted in 249 total data points for each airfoil
  + I divided the final airfoil coordinates by the root chord length of 330 to normalize the data for scaling in future use.
* Step 2 – Airfoil Design
  + Choosing the optimal root chord length depended on a few factors such as: 12% wind tunnel blockage, angle of attack, and inner space for instruments/actuators.
  + To find the chord length that corresponded to desirable characteristics listed above, I chose 5 root chord lengths, 400-425-450-475-500 mm.
  + With these chord lengths, I calculated the wind tunnel blockage and corresponding angles of attack, the root chord maximum thickness, and the 5% leading edge inset thickness from airfoil 1 to airfoil 3.
  + From these values, we determined that a root chord of 450mm was best.
* Step 3 - CAD