**OBJECTIVE**

As part of my Stress Analysis class, my group and I were tasked with designing and building a mechanism powered by a servomotor which could lift a cylindrical weight. Our mechanism was fixed in a given starting position and had to pass through an obstacle as it moved towards the weight which placed constraints on its shape and size.

Additonally, we were required to keep our crane design under 20 ounces and left the weight a minimum of 2 inches. Our design competed in two categories: lifting the weight the highest or having the lightest crane to achieve the minimum lift of 2 inches.

**TEAMMATES**

 [Kevin O'Neill](https://koneill.me)

 [Samantha Ho](http://saho.studio)

At our first design review we assumed that the arm itself was massless. This is neither practical nor possible; however, we chose to assume this because the center of mass of the arm was so close to the axis of rotation-- thus the moment caused by the arm itself was negligible compared to the torque of the servo, the weight of the counterweight, and the force due to the weight.

Additionally, we assumed that the arm would lift a max of 60 degrees. Although the servo was capable of rotating further, the change in x position of the counterweight as the arm increased in angle would cause the arm to no longer be able to lift the weight. As a result, a 60% lift angle would be a safe assumption for the actual max lift angle.

Lastly, we assumed that the max torque by the servo was 57 oz-in as stated by the manufacturer. After some prototyping, we discovered that we weren't getting anywhere near that torque despite that was what the manufacturer rated the servo for. We suspect that this is due to the fact that these servos were reused for several years.