Link to all Code, Graphs, and Simulations
https://github.com/JCWILLIS02/Berlin-Heart-Capstone.git

Model 1
Model one of the simulation takes an input of a pressure signal and a flow signal to output the change in pressure and volume of the membrane. The model also includes the option to select the duty cycle; a duty cycle of 40% for example would mean the pump runs at a specified pressure and flow rate for 40% of the time then switches to another flow rate and pressure 60% of the time. The model assigns a stiffness and damping constant to the membrane to mimic resistance to expanding. Below is a list of planned updates to the model.

- Calculate the pressure based on the flow and resistances in the system
- Include tube dimensions as a resistance
- Include the stopcock as a resistance
- Include fluid properties of water
- Include the pressure of the reservoir

Model 2
Model two expanded upon model one by adding all the planned updates. The simulation now models the system as a fluid circuit with the flow being defined by the pump purchased by the team. This simulation currently runs assuming the same 6 feet of tubing used in the current cough machine model, but can be adjusted. The user can also change the diameter of the tube; currently it is set to a quarter inch to represent the smaller Berlin Hearts. Using the Darcy-Weisbach Equation and fluid properties of water the pressure drop from the pump is calculated along the length from the pump to the membrane which was 3 feet. The simulation also defined a resistance for the stopcock placed right before the reservoir and changed it in the form of a sine wave to represent it opening and closing. The other three feet of tubing from the membrane to the stopcock was also modeled as a resistance the same as the 3 feet to the membrane. Finally the option to pressurize the reservoir was included. Currently it is assumed to be at atmospheric pressure.