**Test:**

In order to determine whether or not our design successfully accomplishes our goals, we need to prove that our system is capable of of determining the minimum pressure to stop blood flow, and then set the tourniquet cuff at that pressure.

To do this we will use plastic tubing, representing a mock artery, as well as two different colored liquids, a red liquid representing oxygenated blood and a blue liquid representing deoxygenated blood (this is to exaggerate the difference in color). While the red liquid passes over the oximeter, the tourniquet should inflate (this represents oxygenated blood flowing past the tourniquet cuff and out of a wound). When we switch the liquids and the blue liquid passes over the oximeter, the system's pressure sensor should determine at what pressure this occured and keep the tourniquet cuff regulated at that pressure. We will then agitate the cuff, in order to represent changes in cuff pressure. The system should recognize these changes and work to maintain an equilibrium.

**Factors Testing For:**

1) Cuff Inflation: We need to test that our tourniquet cuff is capable of inflating without any air leakage.

2) Maximum Cuff Inflation: We need to make sure that our design can determine and set a maximum pressure for inflation.
https://tourniquets.org/wp-content/uploads/OurLiteraturePDFs/Noordin-Surgical-Tourniquets-in-Orthopaedics-2009.pdf

3) Regulate Maximum Cuff Inflation: We need our system to regulate the cuffs maximum pressure by either pumping or releasing air when necessary.

4) Self contained System: Our design has to be completely disconnected from any computer. Relying solely on the onboard microprocessor and battery.
https://www.instructables.com/id/Powering-Arduino-with-a-Battery/

5) Blood flow occlusion: Our design needs to be able to foremost stop all blood flow from the arteries.
https://tourniquets.org/wp-content/uploads/OurLiteraturePDFs/McEwen-Complications-of-and-improvements-in-pneumatic-tourniquets-used-in-surgery-1981.pdf

We will consult our mentor at UCLA to see if these factors are applicable and useful

1. We will take our design and a computer and slowly start to pump the cuff up. We will monitor the air pressure and listen for leaks. The goal of this test is to make sure there are no leaks in the system, and that our pump can successfully inflate the cuff.
2. We will take our design and a computer as well as a small pipe. We will run a red color liquid through the pipe and over the sensor to simulate blood flow. The pulse oximeter should detect the color and the pump should start. We will then change the color of the

liquid to simulate blood flow occlusion. The pulse oximeter should record this and stop pumping. Then the air pressure sensor should record this and keep the pressure at that point.

3. We will take the same setup as number 2 and apply pressure to the cuff to simulate a change in cuff pressure. The system should respond and work to counter this change with a combination of the two pumps.
4. We will write code that allows for automatic functionality. It recalibrates itself after every use and can run its program independently of any computer source. This only requires a code input from the computer and the arduino attached to the prototype.
5. Our pneumatic cuff will inflate to the calculated level which will cease all blood flow at the minimum pressure. This requires the cuff, air pump, air pressure sensor, dump valve, and tubing — essentially all the elements involved in the pneumatic process. Safety is certainly a concern when testing our product because it can be dangerous to occlude the flow of blood in a healthy person.