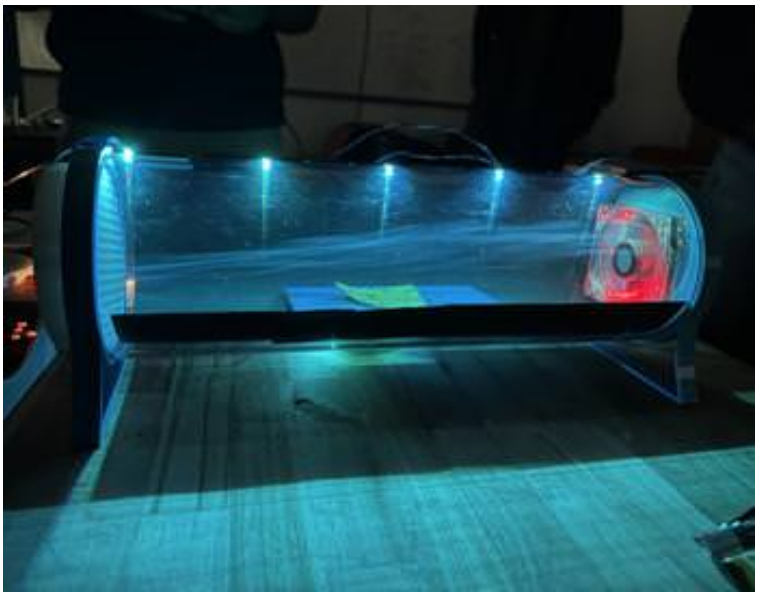
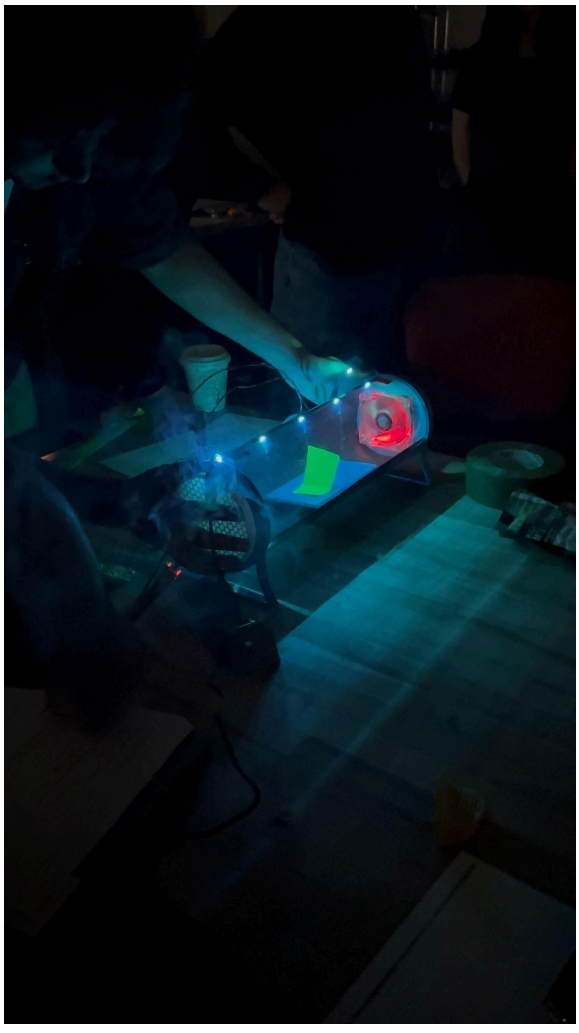
Aerodynamics of Potato Chips Activity Documentation

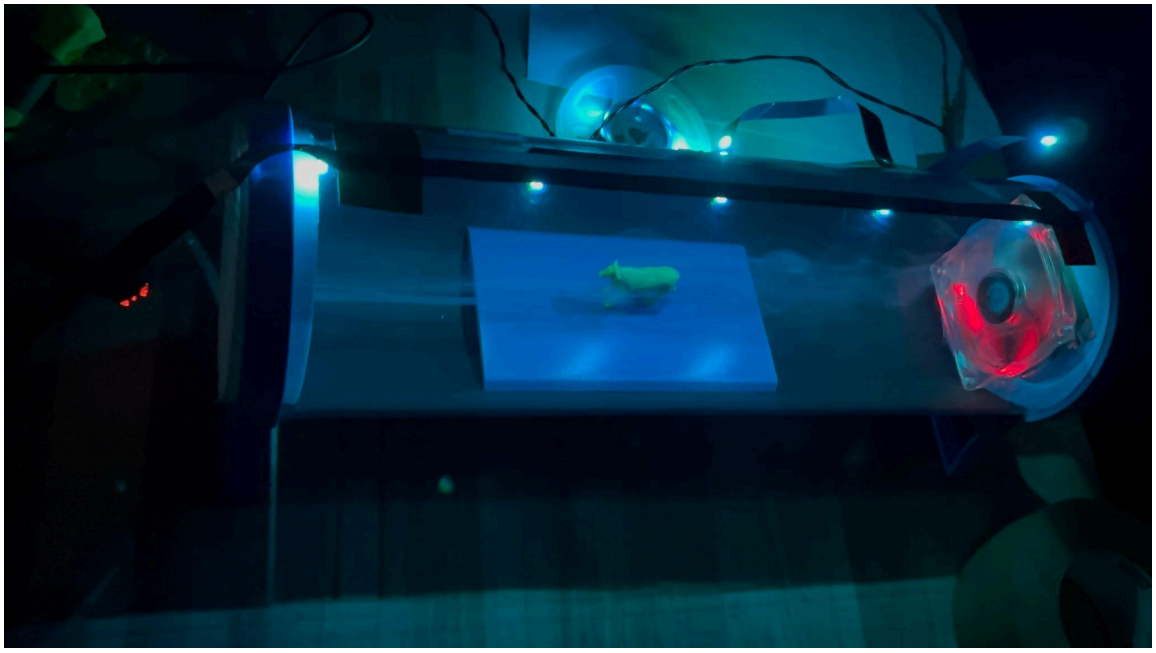
Jack & David

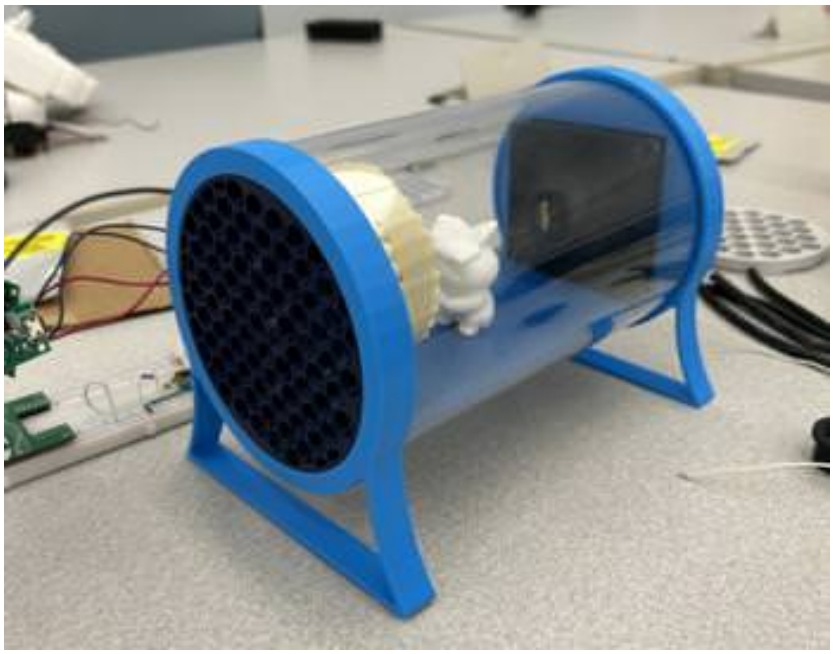
Our activity has two parts. It begins with a quick lecture about the Navier-Stokes equations and their derivations for our understanding. Following this, we introduced our activity: Which potato chips have the best aerodynamic shape under streams of air flows? We then asked participants to choose a potato chip they would like to analyze. We made them draw a side and top-down profile of the potato chip on a blank sheet of paper, and predict the behavior by drawing vector field lines of the velocity around the chip. Then each chip hypothesis is tested by placing the chips in the wind tunnel, and observe the flows of the air with the room's lights off. Finally, participants were asked to compare their expectations and observations, followed by a quick reflection connecting to the Navier-Stokes equation.

For the making of the wind tunnel, we used materials including 3D printed pieces, transparent plastic tubes, incense sticks, misters, O-scope, and LED light strips.









Reflection:
Our activity was tried by Zachary Wolter, Ivry Frost, Mehmet Friat, Grant Rechin, Kieran Erwin, and Aidan Maiorino, in addition to many others surrounding the tables during the demonstration.

The activity went well! People were generally pleased with the experiment. A lot of people outside of our group showed up as well to watch the demo when the lights were off. We personally would polish out certain things and make better stands so the whole process is more streamlined.

Based on the feedback from our peers, we would:

1. Improve the lecture part flow with clearly defined steps when we derive the equation.
2. Include more theory about the wind tunnel design principles
3. Make the process more interactive by letting students use the tunnel more fairly. We need to make better guiding questions and a framework, like a worksheet, for this.
4. Create a chip stand and make the process of putting things in the tunnel polished.