

Wave Power Conversion

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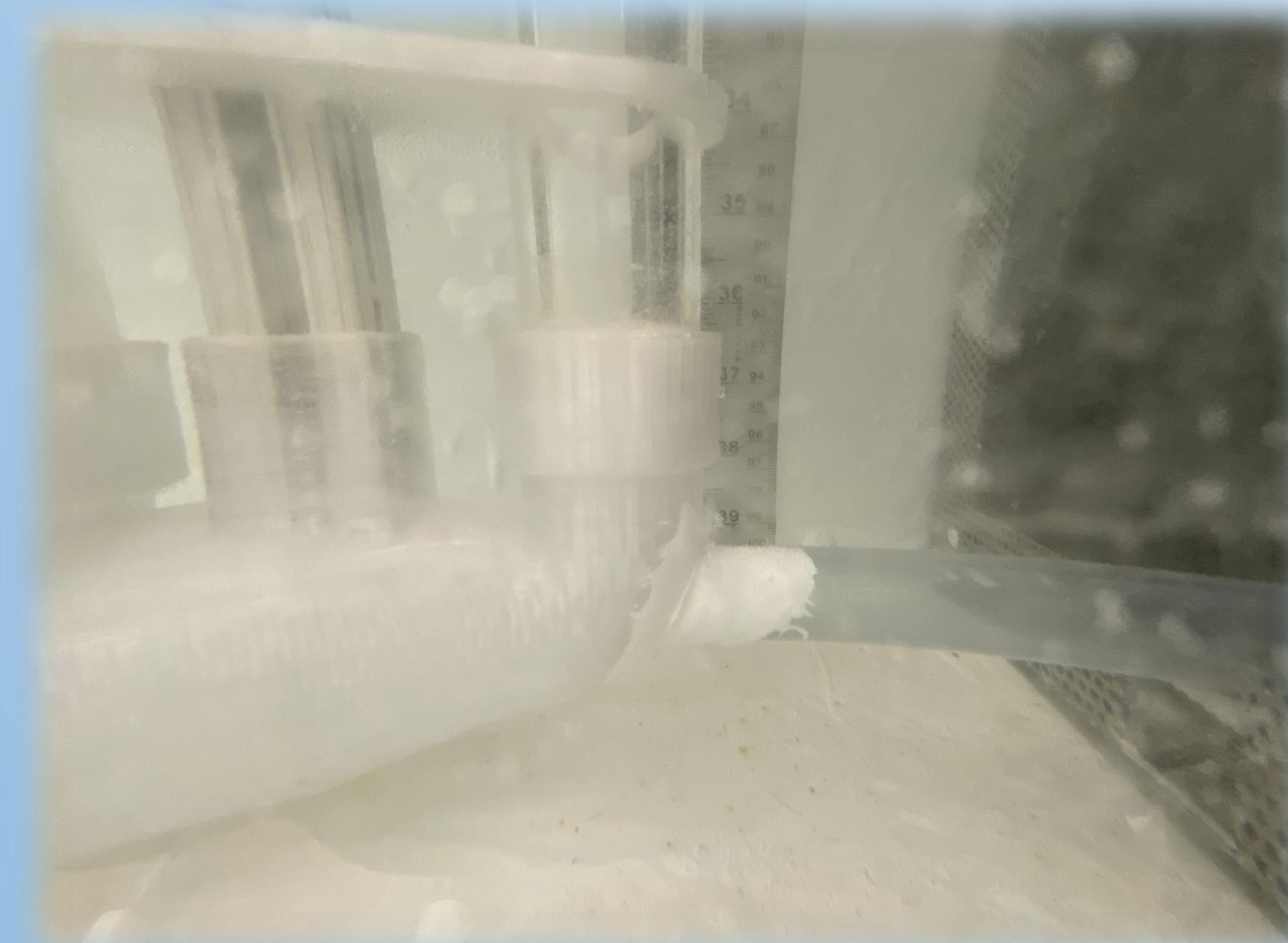
Starting Point

The wave flume as assembled at the start of Fall, 2022. Teams that came before ours designed and built this system with a resonance device that intakes the wave energy and amplifies the height of the wave. Using this energy and amplified wave height, we will draw from the system to fill a storage tank which will drain through a turbine.



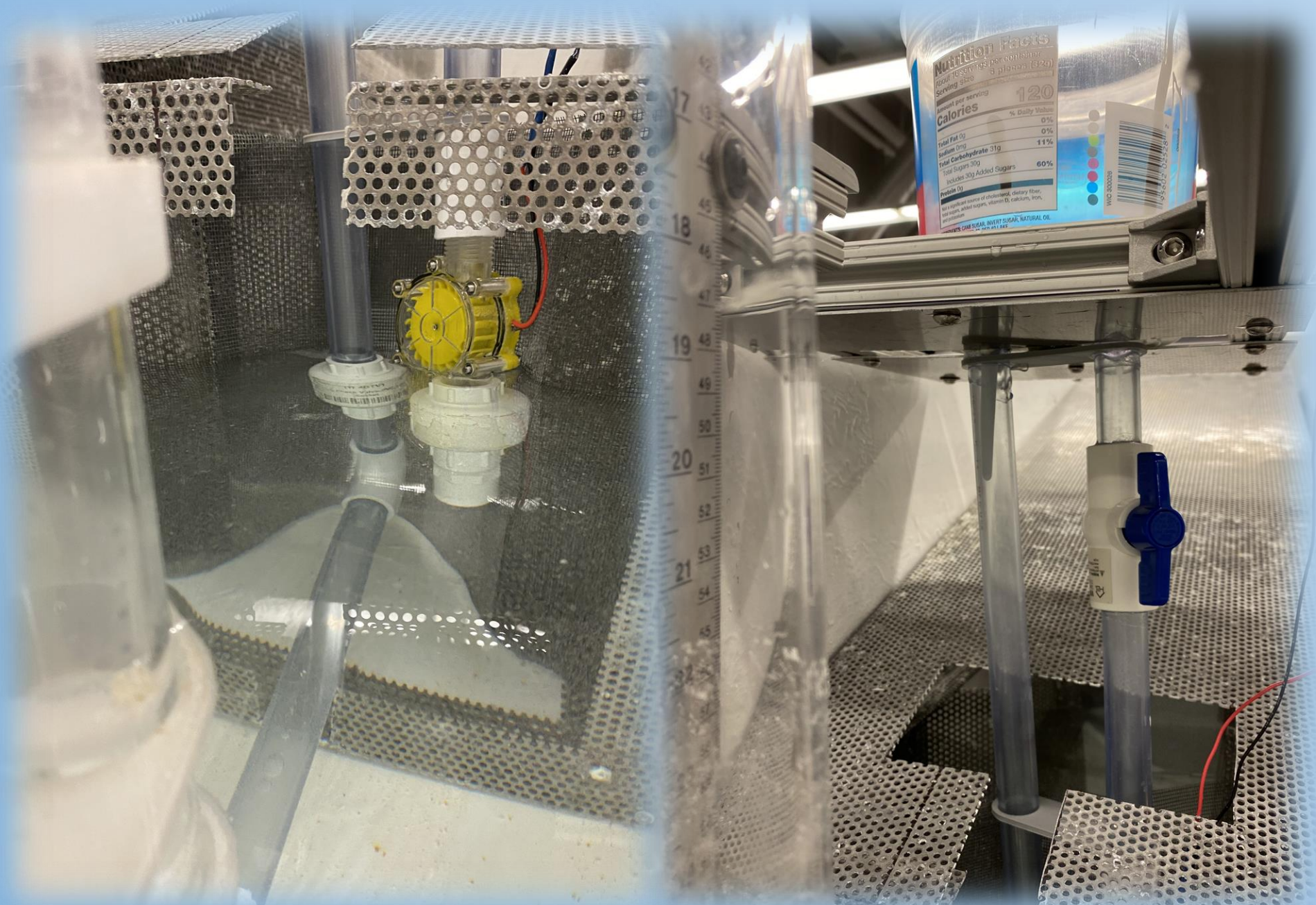
Extraction

By extracting water from the bottom of the resonance device on the right side, we can use the resonance to fill a storage tank.



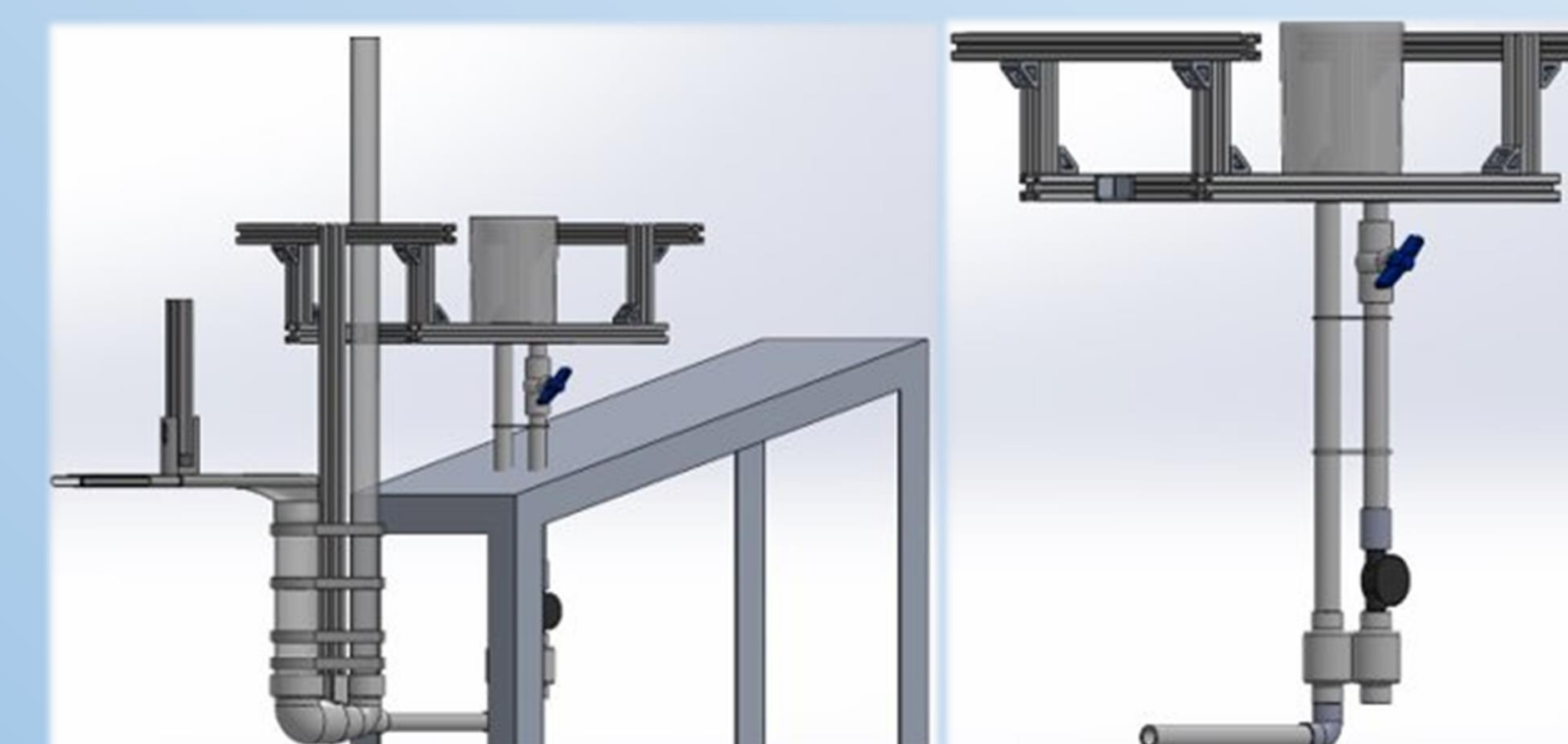
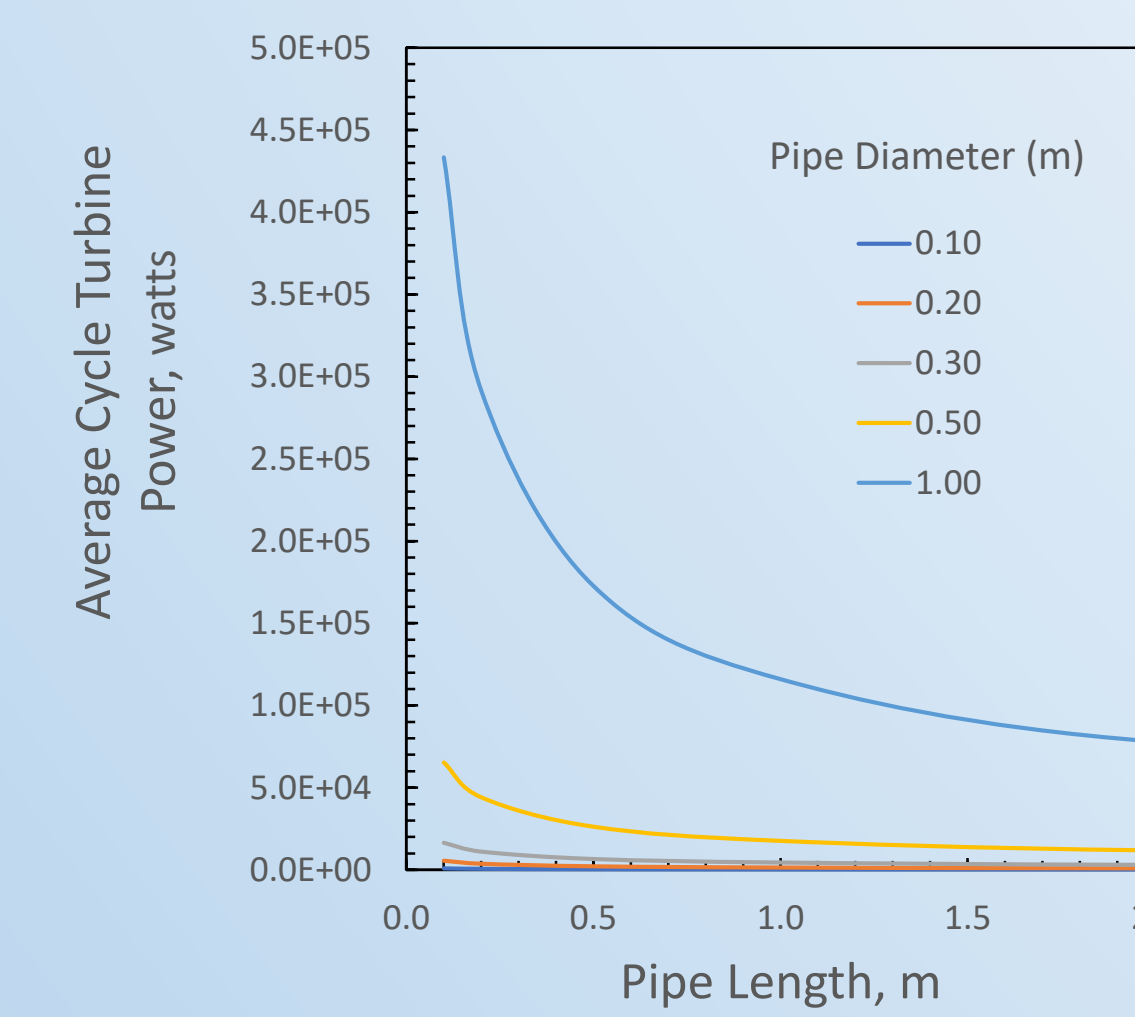
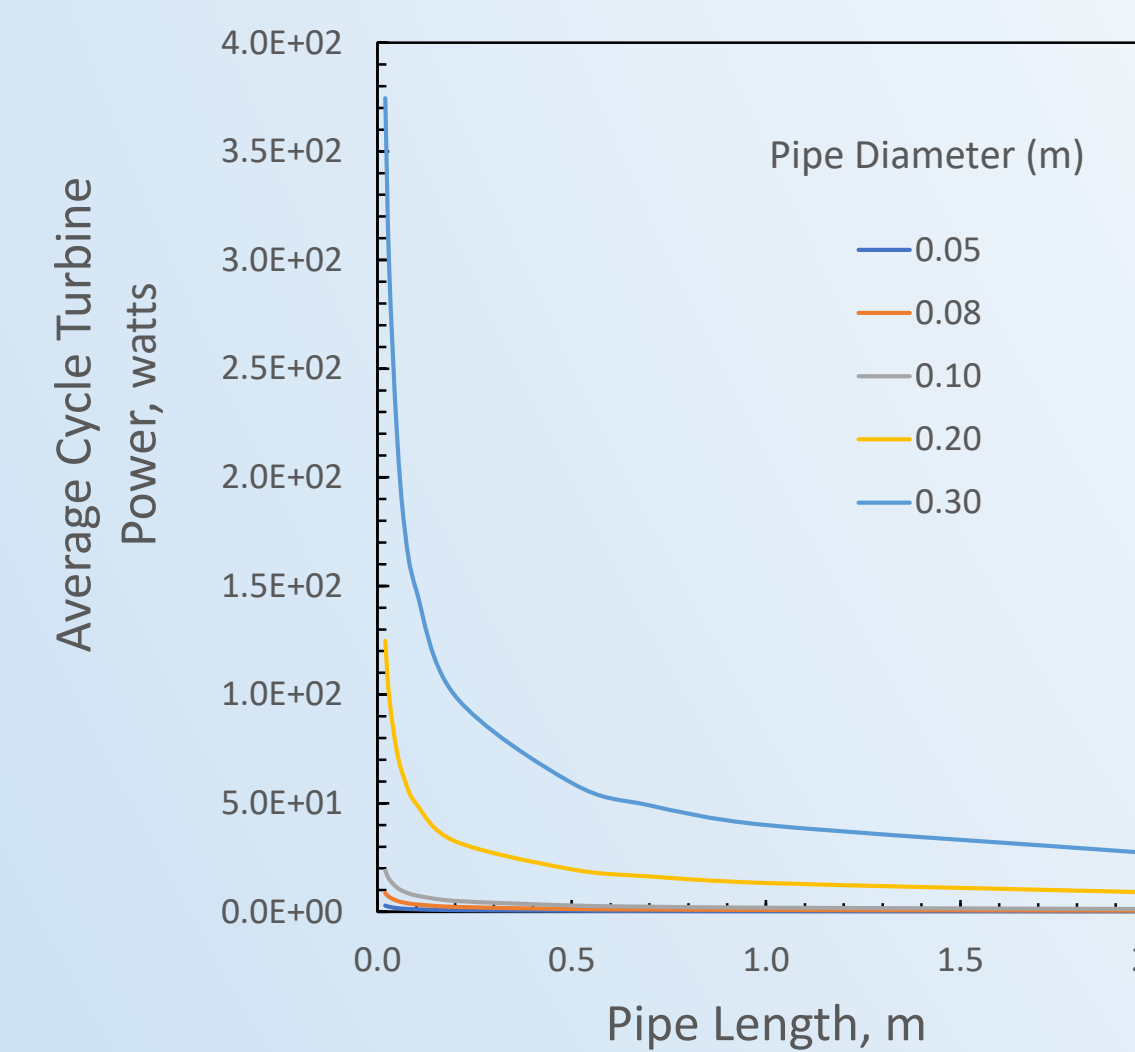
Turbine

A one-way flow valve in the inlet pipe restricts backwards flow. Water flows out through the turbine and a second check valve. The pipe on the right is the outlet pipe of the storage tank. A ball-type control valve allows for the controlled flow of water out of the storage tank and through the turbine.

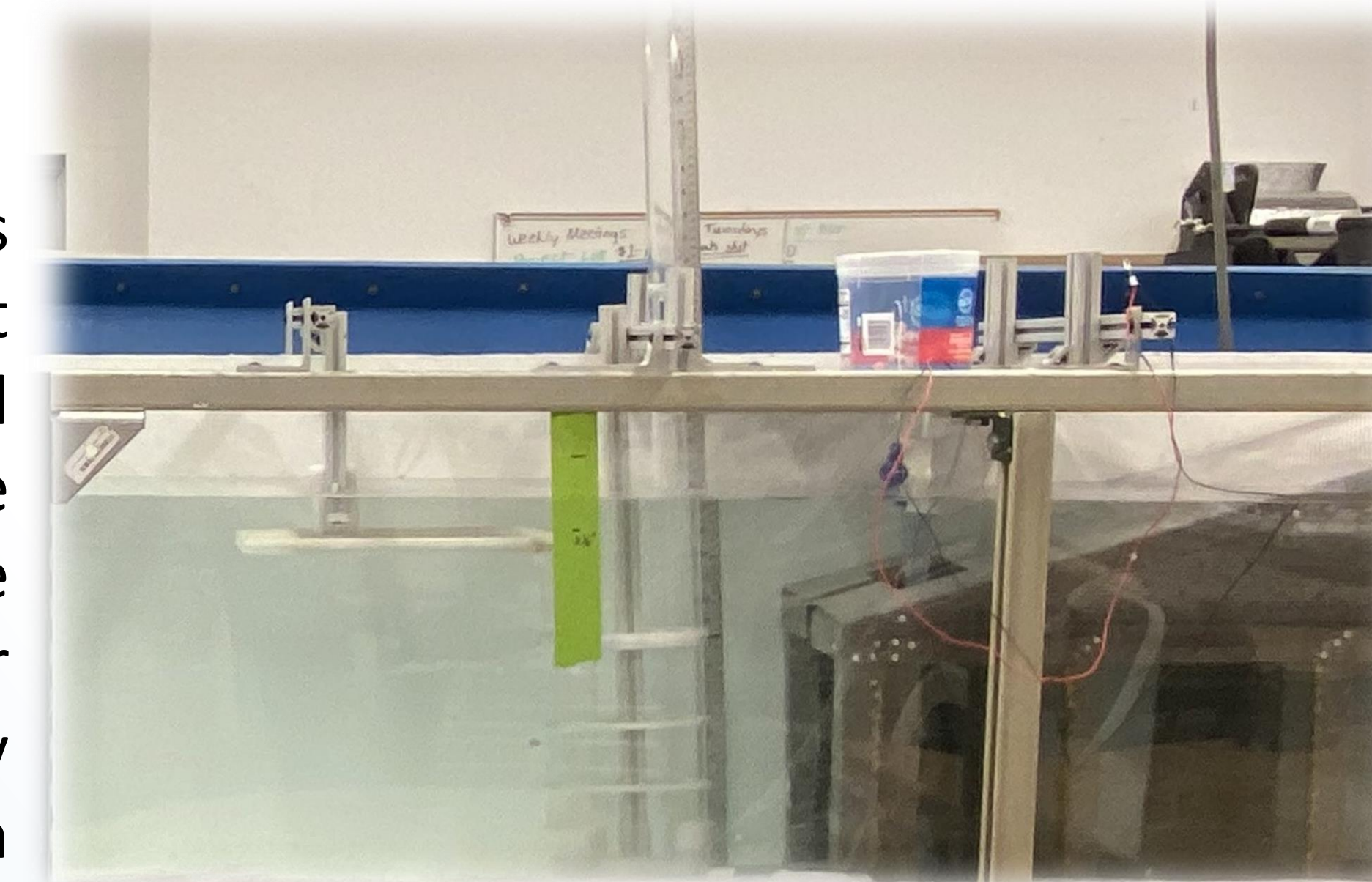


MATLAB

Experimental code is constructed so that it represents the overall makeup of the resonance device. The plots shown are for multiple laboratory systems. Even though the system that is currently built can only produce 0.2 Watts, there is potentially more power available if the system were to have more depth and different dimensions. Looking at the system with a 0.3 m pipe diameter and a given pipe length of 0.5 m, that system could produce approx. 50 Watts.

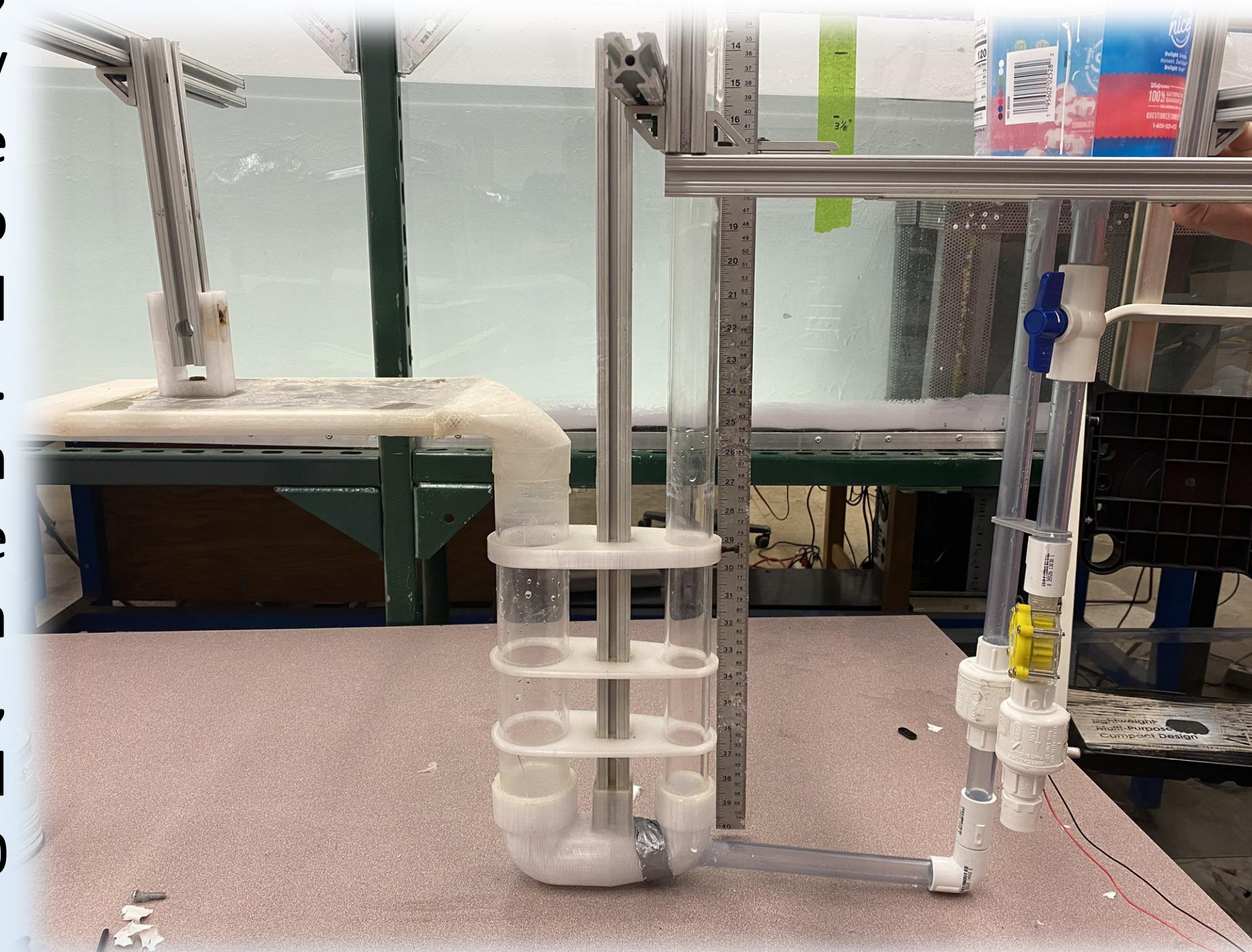


3D model of the system, rendered in Solidworks.
(Model created by Garrett Meyers)



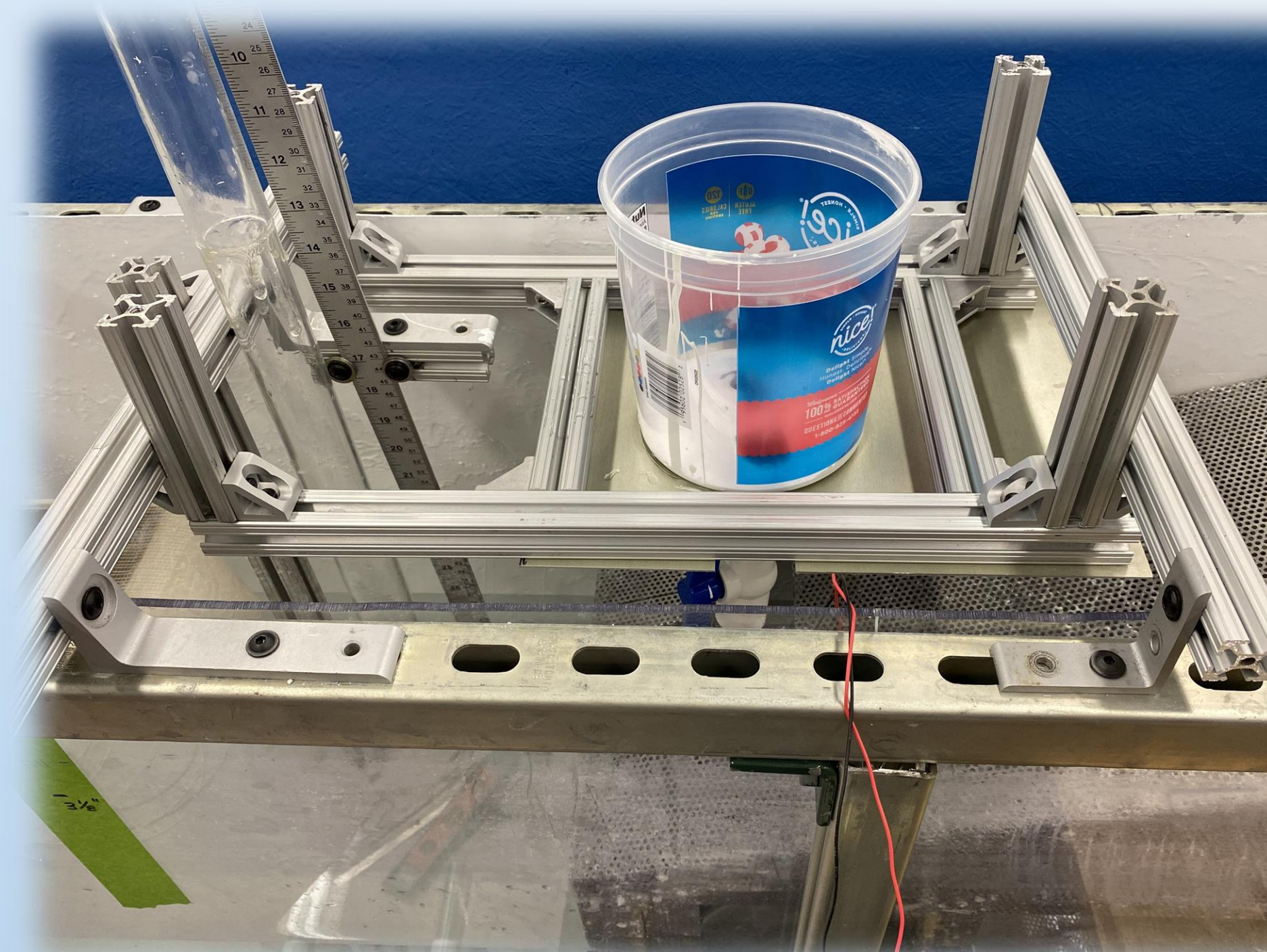
End Result

The wave flume set up at the end of this team's design project. This was our final point which we were to have a system of power extraction from.



Full Assembly

The fully assembled system outside of the tank after having some conditional adjustments made. Fittings at the point of extraction from the resonance device and at the bottom of the storage tank were sealed with clear silicon caulking material.



Storage Tank

The storage tank needed to be large enough to hold some water, but not too large. For this, we chose a small plastic bucket that holds approx. 1.5 liters.