

Perpetual Motion Machine

Leveraging Capillary Action

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Previous Approach:



Project Background:

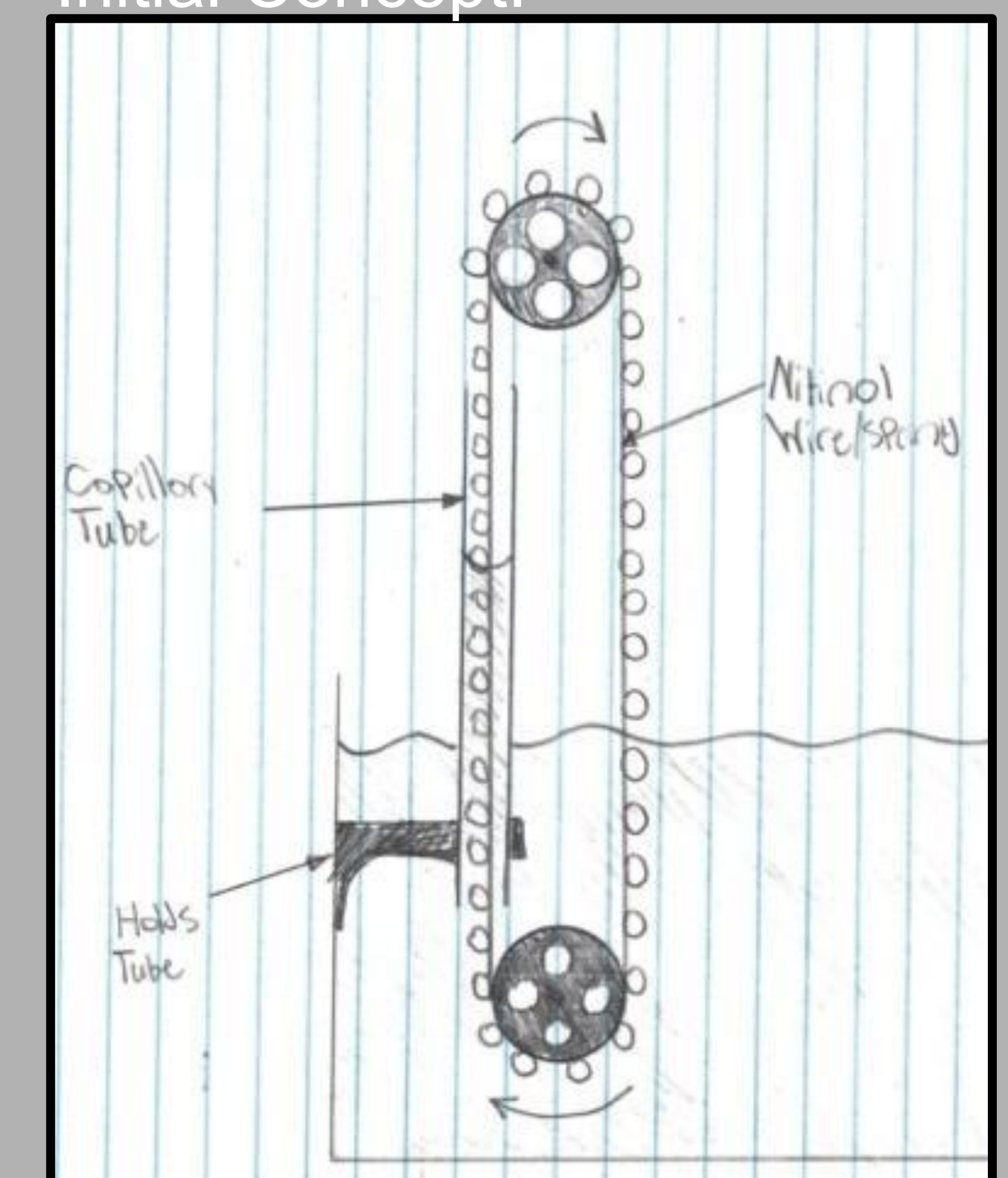
- The Capstone Team was tasked with creating a Perpetual Motion Machine. As perpetual motion is impossible due to the laws of thermodynamics, specifically that in a realistic environment energy will always leave a system, the team had to create a machine that only looks like it perpetually moves. This involves a front, a “Red-Herring” that looks like it can create perpetual motion to the average viewer, and a hidden driver that actually drives this motion.
- After studying many previous approaches, such as the example above, the team determined that a device that seems to leverage capillary action in a perpetual manner would be the most effective solution.
- By following the engineering design process and utilizing the skills learned at OSU thus far, the team produced a successful final product.



Design and Manufacture:

- A special consideration that had to be made by the Capstone Team was waterproofing. The interior corners of the acrylic tank are sealed using silicone. All of the surfaces have been coated in Flex Seal to waterproof the underlying wood.
- The black wheels on the front were designed in a CAD (Computer-Aided Design) software called Fusion360 then 3D printed using PLA, a type of plastic. Inside of the bottom wheel there are 8 magnets which makes it one part of the magnetic couple. A nearly identical interior wheel with magnets is the second half of the magnetic couple. The two wheels that can be seen from the outside are attached to bearings in the center to give a frictionless rotation.
- A low-speed, high-torque motor is used to drive the wheels. This motor is specifically used because the low speed helps sell the perpetual motion idea, and the high torque overcomes the poor torque transfer of a magnetic coupler.
- The interior motor circuits are attached to an acrylic board that easily slides in and out of the wooden base. This allows for ease of access to components for charging and maintenance purposes.

Initial Concept:



“Red-Herring” Capillary Action:

The red-herring (trick) of this machine is that it appears to rotate freely without the aid of a motor by utilizing buoyancy and capillary action. Capillary action is the process of using a small space to allow liquid to climb walls using its surface tension to overtake gravity. This is how trees can transport water from the roots to the top of the tree.

In the system above there is a narrow glass tube that acts as the capillary tube. The capillary tube pulls the water inside above the tank's water level. A buoyant fishing line is used as the belt between the two visible wheels. Because this fishing line floats, this makes it seem as the system creates perpetual motion from the differential in the force of buoyancy on each side of the belt.

Hidden Magnetic Coupler:

Magnetic coupling is a method of transmitting power between two rotating components without any physical contact. It works by using magnetic fields to transfer rotational or input torque from a driving component to a driven component. The key parts of a magnetic coupler include a primary magnet, a secondary magnet, and a magnetic flux path.

A magnetic coupler is used in this system to drive the “perpetual motion.” The capillary action effect only looks like it works, in reality the force required to submerge the buoyant fishing line cancels out any force created by the water level differential. This magnetic coupler allows a motor to be hidden behind a solid wall and for a seemingly free spinning wheel on the outside to further hide this motor.