DesignOtt Engineers Inc.

PROTOTYPE III

GNG1103, Section # F, Team # F3

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Prototype III Outline

Test ID	Test Objective	Description of Prototype used and of Basic Test Method	Recorded Results
1	Propellor	3D print full size propellor using PETG and attach to motor, confirming rotation of propellor	Motor does not have enough power to rotate the propellor so a new one will be selected.
2	Determine feasibility of container	Purchase container, fill with water, insulate, and confirm no leakage as well as rate of heat absorption	Before cutting the drainage hole, the container did not leak water. The tinfoil is effective for the given budget.
3	Assemble electronic systems	Connect Arduino, circuit board, temperature sensors, cooling system, DC motor, and propellor, then confirm whether motor runs or not	All components work successfully in tandem, but the Peltier plates do not have an automatic on/off.
4	Install filtering system into container	Secure the sloped divider & filter system into the test container and observe if there is leakage or not; if so, determine sealant required	Leakage can be prevented from the top half to the bottom half using sealant (hot glue).
5	Install drainage system	Construct drainage system with sloped divider & filter (top to bottom half) and plug (bottom half to outside of container), then confirm whether water drains and how quickly	Leakage can be prevented using sealant. The water drains in 15 seconds from the top half into the bottom half and drains in 20 seconds from the bottom half into a sink.

Test 1

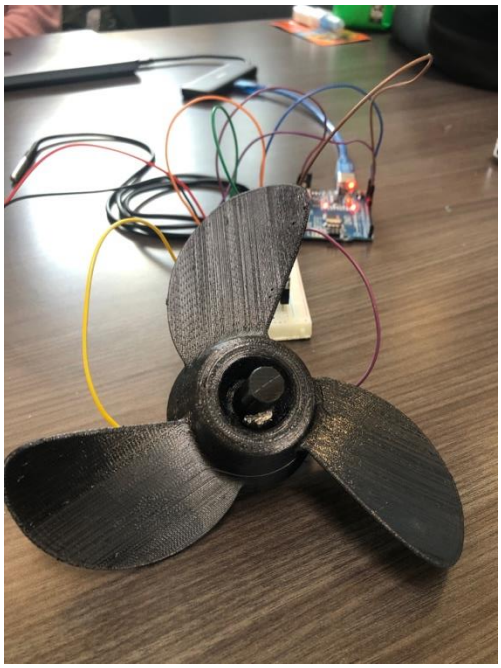
The objective of this test is to make sure the propellor can move.

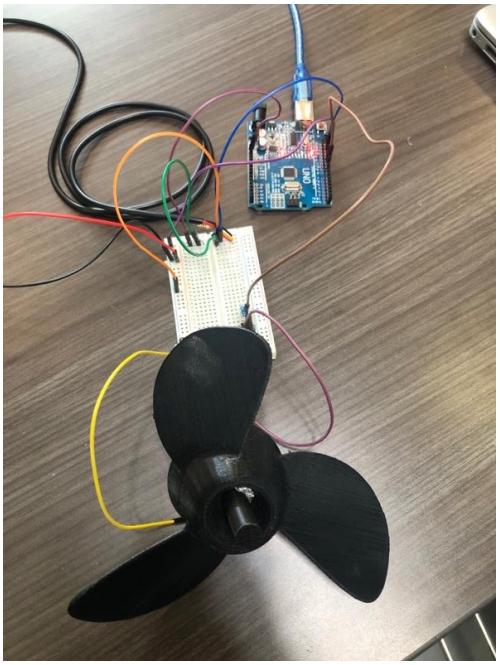
The testing will be done by 3D printing the full size propellor & connecting rod, then attaching those to the motor.

The testing will be evaluated by whether the propellor rotates for 5 minutes without any issues.

The results of the testing were that the motor that is currently in use is too weak. The team will research different motors and select one with more power.

The test setup was as such:





Test 2

The objective of this test is to confirm that the container selected retains its contents (i.e. water)..

The testing will be done by filling the container with water.

The testing will be evaluated by the amount of leakage and the location of water loss.

The results of the testing were that the container will not leak water. The tinfoil is somewhat effective but not ideal.

The test setup was as such:

Test 3

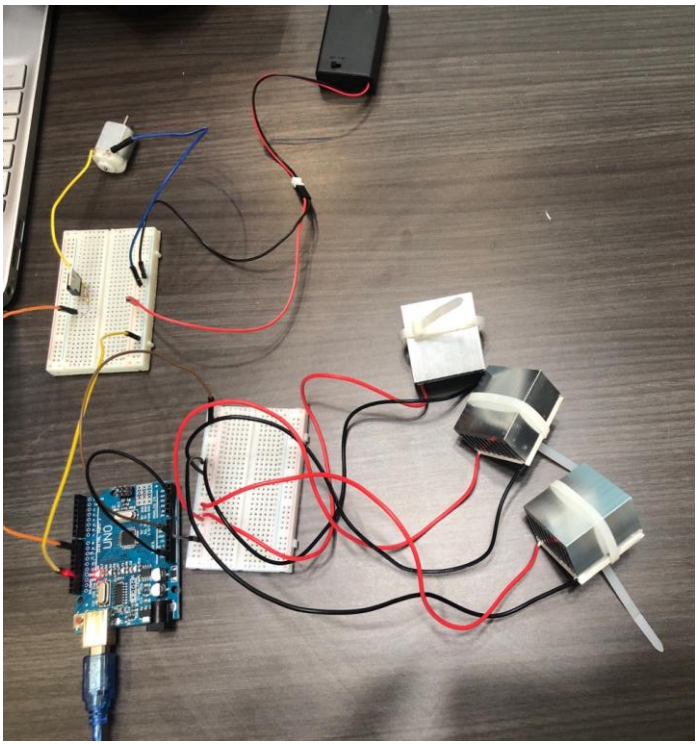
The objective of this test is to connect all the electric devices which are: the Arduino, circuit board, temperature sensor, cooling system, and DC motor, then confirm each component is running.

The testing will be done by putting all the components together and then running the code when it's not attached to the container and when the propellor is submerged underwater.

The testing will be evaluated by seeing if the motor, temperature sensor, and cooling system runs.

The results of the testing were that all components run, but the Peltier plates have to be controlled by unplugging and plugging in the wires to the Arduino, which is connected to a computer to supply power to that part of the system.

The test setup was as such:



Test 4

The objective of this test is to confirm no leakage from the top half into the bottom half of the container.

The testing will be done by installing the system without applying sealant.

The testing will be evaluated by the amount of water in the bottom half of the container.

The results of the testing were that there is currently leakage and the sealant that will be implemented is hot glue.

The test setup was as such:

Test 5

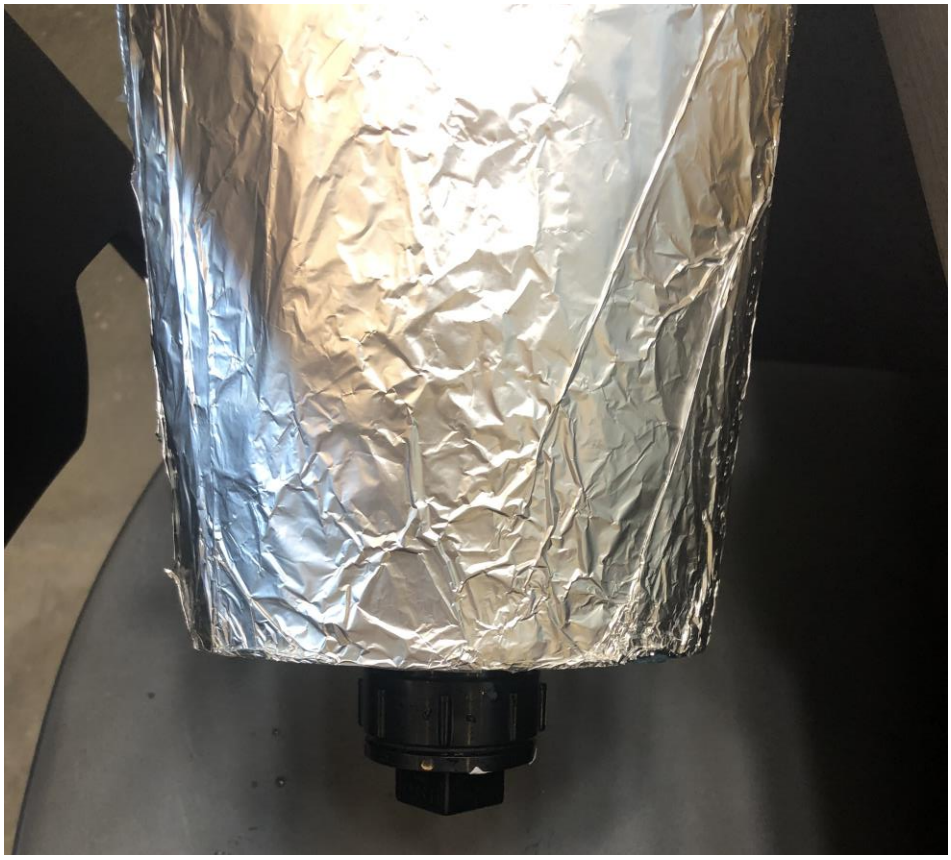
The objective of this test is to test the fit of the drainage system.

The testing will be done by assembling the drainage system with sloped divider, filter, and plug for stopping water leakage.

The testing will be evaluated by whether water leaks unintentionally, and how long it takes for the water to drain from the container when the plug is removed.

The results of the testing were that the water takes 15 seconds from top to bottom and 20 seconds from bottom half into a sink.

The test setup was as such:



Feedback

- Increase visual appeal of design (PM)
- Clarify the effects of the cooling system in producing erosion (Dr. Knox)

Updated Bill of Materials

- Purchased a bowl from Dollarama ($3) which separates the top and bottom halves of the design while also facilitating the drainage of the water and eroded material after the test
- Purchased a waterproof seal from Home Depot ($4) which seals the bottom of the container and allows drainage once the water is at a safe temperature