

Talking Points for the Logan Ranger Desalination Machine

1. This project combined mechanical and electrical engineering skills to create a proof of concept humidifier/dehumidifier desalination machine.
2. The most important goal was to give students an authentic engineering experience with a project that would make a difference in peoples lives.
3. Key points:
 - a. Over 70 wires from pumps, LED's, peltiers, sensors, etc.. had to be stripped, soldered, crimped and terminated in our fuse box.
 - b. The Desalination Machine draws over 50 amps and is powered by a car battery which is charged by a solar cell.
 - c. The total cost of the project was around \$1800 (Grant from the LPEF) with the PVC pipe and connectors being donated by Niebuhr Plumbing.
 - d. I would estimate 40% of the budget went toward experimenting with materials and components.
 - e. Over 200 hours of time went into the design, fabrication and programming for this project. Most was done outside of class after school.
4. An Arduino Uno controls 4 thermistors which allows us to view our temperature differences on an LCD screen.
5. A Raspberry Pi with a camera was used to wirelessly send our telemetry to a cell phone.
6. The peltier chips are keys to the heating and cooling on this project. They work on the principle that if someone applies voltage to a thermo-couple, one junction will be heated and the other cooled. That is why one side is hot and the other cold.
7. We did a lot of initial testing with peltiers to determine temperature thresholds. We were confident that we could cool the water based on our initial testing. In reality, it was easier for us to heat the water than to cool it.
8. The evaporator peltiers could also be used to harvest clean water as it condenses off them.
9. Kids learned skills that are not part of the regular class like crimping electrical connections, working with pumps and water flow.
10. One of the biggest challenges we had was when the condenser radiators would not let the clean water drop down to collect. We then implemented cell phone micro vibration motors set up on a timer to vibrate the water to our collection tank.
11. In the collection tank we have UV LED's on to kill bacteria and viruses in the water.
12. Our industry partners were essential in providing guidance and helping us define the parameters of the project.
13. We can use a multimeter see the water purity by seeing how much the water resists the flow of current. The more salts found in the water, the higher the conductivity rating.