HR 2 BREAKDOWN

TEAM: Red Feather

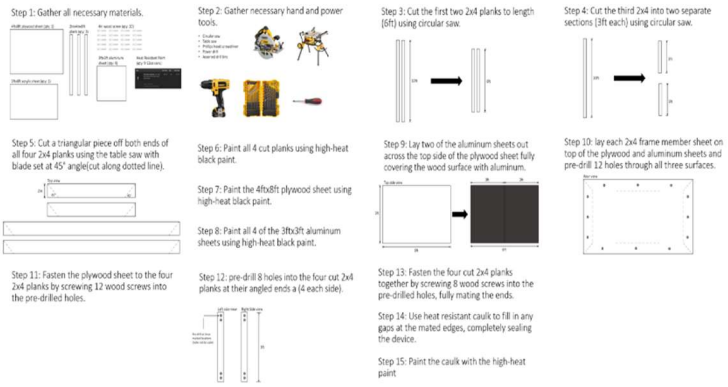
Friday, October 16, 2020

The following are the Action Items each person completed between Hardware Review 1 and Hardware Review 2:

Team Member: Nathan Fisher

Action Item	Date Completed	Result/Proof of Completion
Created preliminary construction plan for device, to be updated later.	8/29/20-9/1/20	PowerPoint presentation with listed steps of how I expected construction to be completed. It was anticipated that many items would be changed or reordered (which they were).
Cut 2x4's to size, as well as cut 45° angle into ends.	9/12/20	

Reduced size of 2x4's down to new scaled down dimensions (from 4ft and 8ft, to 3ft and 6ft).	9/23/20	
Cut plywood down to size (3ftx6ft).	10/2/20	Plywood was purchased at a size of 4ftx8ft, which was the original dimensions of the device. After scaling down, it was necessary to reduce the size to 3ftx6ft using a circular saw.
Painted 2x4's, plywood, and aluminum sheets with heat resistant black paint.	10/2/20- 10/6/20	In order to increase the life span of the wood, as well as increase the heat absorbing capability of the aluminum, they were spray painted black. Since the device heats up to a high temperature, heat resistant paint was used. Each material received 2+ coats of paint.
Completed individual analysis on heat loss out of system	10/5/20- 10/11/20	In order to understand the heat loss out of the system, a MATLAB program was written to determine, in watts, the heat loss out of each boundary. These values were then summed. The result has prompted a reevaluation of certain design aspects to reduce heat loss.

Attached wood frame to plywood and aluminum sheet.	10/10/20	
Updated construction plan to reflect work completed thus far.	10/12/20-10/15/20	

Team Member: Leann Hernandez

<table>
<tr><th>Action Item</th><th>Date Completed</th><th>Result/Proof of Completion</th></tr>
<tr><td>Improve Calibration on Arduino and update Arduino Instructions</td><td>10/9/20</td><td>$$temperature[C°] = 5.89 * voltage[v] + 11.85$$
Table 1: New Calibration Calculations using Probability and Statistics
<table><tr><td>voltage average[v]</td><td>0.678</td></tr><tr><td>variance</td><td>0.03</td></tr><tr><td>temperature average[C]</td><td>14.96</td></tr><tr><td>covariance</td><td>2.74</td></tr><tr><td>b1</td><td>5.88</td></tr><tr><td>b0</td><td>15.66</td></tr></table></td></tr>
<tr><td>Conduct Uncertainty Analysis for Testing</td><td>10/9/20</td><td>Table 2: Uncertainty Analysis
<table><tr><td>v</td><td>10</td></tr><tr><td>Syx</td><td>0.0541</td></tr><tr><td>t(10,95)</td><td>1.812</td></tr><tr><td>Sp</td><td>0.0981</td></tr><tr><td>bp</td><td>0.01</td></tr><tr><td>up</td><td>0.098</td></tr></table>The error due to the accuracy for the temperature sensor is 0.01 volts.</td></tr>
<tr><td>Conduct Cost Analysis for prototype size and full size model</td><td>10/12/20</td><td>The total amount the team has spent for the scaled down prototype not including testing materials is $388. If we made 100 units of the prototype size, we could get the price down to $331. For a full size prototype, the current cost analysis is at $447 each for 100 units.</td></tr>
<tr><td>Search for vendors for bulk pricing</td><td>10/10/20</td><td><table><tr><th>Source</th><th></th></tr><tr><td>Home Depot</td><td>https://www.homedepot.com/p/2-in-x-6-in-x-10-ft-2-and-Bette</td></tr><tr><td>acme plastics</td><td>https://www.acmeplastics.com/acrylic-sheets/clear-cast-acrylic-</td></tr><tr><td>Home Depot</td><td>https://www.homedepot.com/p/7-16-in-x-48-in-x-8ft-Oriented-</td></tr><tr><td>menards</td><td>https://www.menards.com/main/paint/spray-paint/all-purpose</td></tr><tr><td>Home Depot</td><td>https://www.homedepot.com/p/Master-Flow-4-in-x-12-ft-Insul</td></tr><tr><td>Hotmelt</td><td>https://www.hotmelt.com/products/high-temperature-silicone-</td></tr><tr><td>industrialmetalsales</td><td>https://www.industrialmetalsales.com/5052-H32-Aluminum-Sh</td></tr></table></td></tr>
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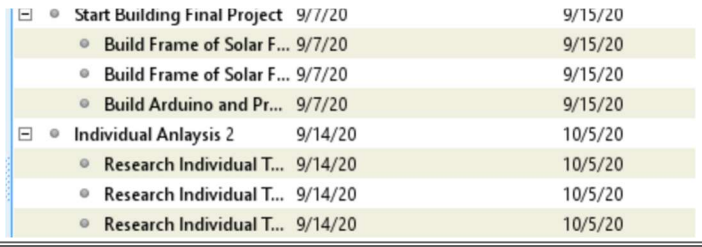
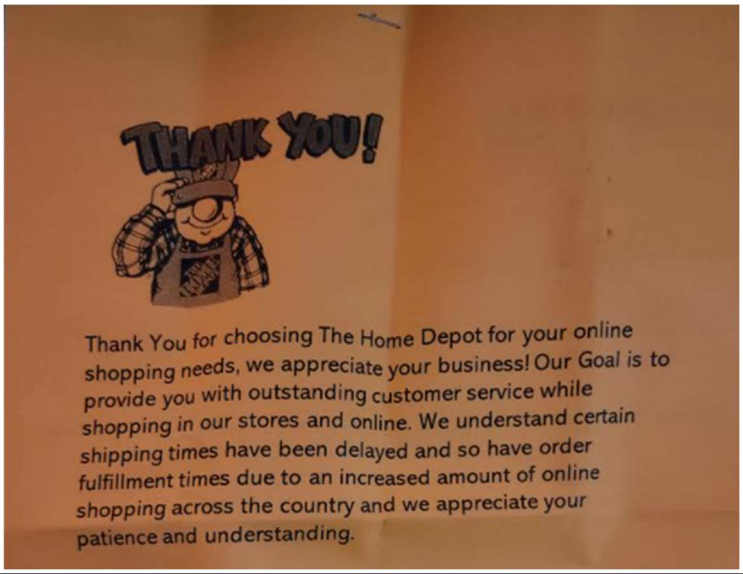
Update Gannt Chart	10/15/20	

Team Member: Trevor Scott

Action Item	Date Completed	Result/Proof of Completion
All parts ordered for prototype. Found vendors and competitive pricing on parts.	10/15/20	Final purchase request confirmation: 
Picked up materials from orders. Trips were made to and from Home Depot to deliver materials to Nathans house.	10/15/20 (Ongoing)	
Prototype construction (Frame + prep for fins) See Nathan's action items relating to build. All construction was done by Trevor and Nathan together.	9/12/20-10/10/20	
Fin analysis and justification.	10/9/20	Proved that corrugated metal fins were 3.7 times more effective than flat fins while only being 2.3 times the price.

Meeting scheduling and communication.	10/15/20 (Ongoing)	Coordinated meetings through zoom with client. Communicated updates and feedback with advisor. Next meeting is Oct. 21 @ 2:00 PM.

The following are the Action Items for each team member between HR 2 and the Final Product presentation:

Team Member	Action Items	Date Due
Nathan Fisher	1. Poster draft started 2. Update website 3. Complete construction of main device 4. Implement fan and solar panel into device 5. Complete construction manual	1. 10/20/20 2. 10/20/20 3. 10/25/20 4. 10/30/20 5. 11/04/20
Leann Hernandez	1. See if we can get cost analysis down even lower 2. Poster draft started 3. Put all testing equations in one spreadsheet 4. Transport the Arduino to Flagstaff for testing 5. Complete testing write-up/summary 6. Update any changes in Gannt Chart	1. 10/20/20 2. 10/20/20 3. 10/26/20 4. 10/26/20 5. 11/04/20 6. 11/01/20
Trevor Scott	1. Set up final meetings with red Feather/Chuck 2. Poster draft started 3. Help Nathan update website 4. Order any last-minute materials 5. Complete prototype construction 6. Complete construction manual	1. 10/25/20 2. 10/20/20 3. 10/20/20 4. 10/21/20 5. 10/30/20 6. 11/04/20