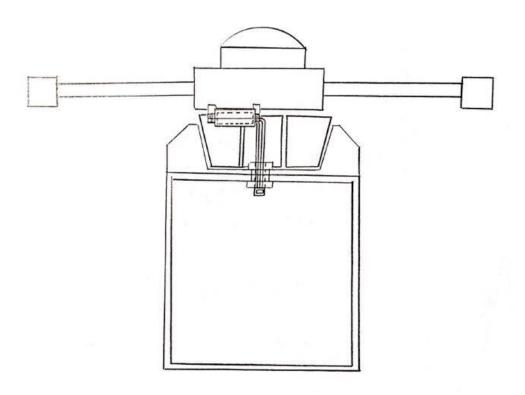
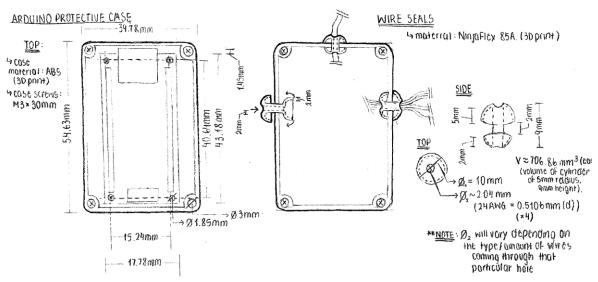


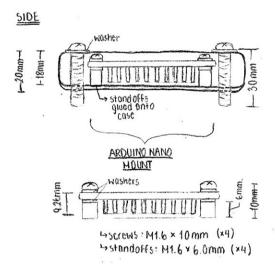
GNG1103: Deliverable E

Group C12

Chosen Design Concept







Material identification

#	Quantit	Components	Unit price	Shipping	Cost (\$)	Source
	у		(\$)	cost (\$)		
1	2	AHT20	6.66	0	13.32	Digikey
2	1	Arduino nano	18.99	0	6.33	Amazon
			(6.33/pc)			
3	NA	Arduino IDE	0	0	0	Arduino
4	NA	Adafruit SHT31 library	0	0	0	Arduino
5	NA	Wire.h library	0	0	0	Arduino
6	NA	Onshape	0	0	0	Onshape
7	1	DC voltage converter	5.09	0	5.09	Amazon
8	1	Logic level voltage shifter	10.88	0	1.09	Amazon
			(1.09/pc)			
10	1	Wires (Spool)	1.00(5FT)	0	1.00	Makerlab
				(Pickup)		
11	2	3D printed sensor case*	0.25	0	0.34	Makerpo
		r- r	3.23	(Pickup)		<u></u>
12	1	3D printed arduino case**	0.25	0	3.85	Makerpo
		*		(Pickup)		-
13	1	3D printed voltage shifter case	0.25	0	0.41	Makerpo
				(Pickup)		
14	2	M3 x30mm screws	1.23	0	1.23	Home depot
			(0.615/Pc	(Pickup)		
)			
		Total		Total	32.66	

Alternative sources will need to be researched to meet the project budget, or review of other concepts/materials will need to be conducted.

Note: The need for a voltage regulator was found in the client meeting on Wendsday, Feb 24 and as result, it was added to the material and task list. It will follow the same principles from the other case design methods and will not affect the plans too much.

CHANGES MADE TO THE BOM since wends lab meet: Removed M1.6 and 3D wire seals. Logic level voltage shifter was added (for GPIO comm). Changes to 3d printed arduino case price. Mouser and digikey was not used due to the \$20 shipping fee. Price difference between digikey and other online retailers did not outweigh the total cost of the shipping from digikey/mouser.

Justification for Parts: The major components of a climate sensor are the actual sensor, which monitors the temperature and the humidity, and the Arduino which contains the code for the system. The Arduino controls the main system and processes the data. The 3D printed cases for both the Arduino and the climate sensor are to protect the systems from the elements. This extra layer of protection will help to ensure that the system functions properly for as long as possible. The PTFE membrane also protects the SHT31-D sensor. Part of the sensor is exposed to the climate of the box; the PTFE membrane protects the part that is exposed while still allowing the sensor to function as intended. The wires connect the Arduino to the sensor. This allows for the sensor to receive the coded commands and function as intended. The silicone sealant will also help with weatherproofing. The wires must exit the Arduino case, this creates a small opening when the Arduino is exposed. The sealant helps to completely seal up the case and ensure that the Arduino is not damaged by weather. The DC voltage converter is used to convert the voltage from the drone into a voltage that can be used by the Arduino. This will prevent different system components from burning out, which would ultimately affect the functionality of the system.

Task List

Prototype I

Create a low-definition mock design of the individual subsystems in a virtual setting to better understand the size and issues that may come from the designs.

Task #	Task	Member responsibility	Estimated time
			(Days)
1	Understand the overall system design	Everyone	1
2	Mock design of arduino case (CAD)	Ilda	3
3	Mock design of sensor case (CAD)	Christian	3
4	Mock design of hole cover (CAD)	Mihai	3
5	Purchase materials needed (Keep record)	Christina	0.5
6	Prepare presentation for client meeting	Christina	2
7	Create code for data processing and	Joon/Christina	3
	raspberry pi communication		
8	Compile Data/information (ie. Weight)	Everyone	0.5

^{*}Sensor case volume was calculated to be around 0.68g (ABS-1.04g/cm³, V- 65.5mm³)

^{**}Arduino case volume was calculated to be around 15.38 g(ABS, V- 14.79 cm³)

^{***}Voltage shift case was calculated to be around 1.64g(ABS, V -1.573cm^3)

9	Analyze and conclude information from	Everyone	0.5
	data		

Prototype II

Create and test physical prototypes to find challenges/issues that may arise from the design or manufacturing process.

Task #	Task	Member responsibility	Estimated time
			(Days)
1	Discuss customer feedback	Everyone	1
2	Refine design for arduino case and create physical prototype (if possible)	Ilda	4
3	Refine design for sensor case and create physical prototype (if possible)	Christian	4
4	Refine design for hole cover and create physical prototype (if possible)	Mihai	4
5	Test the physical prototypes	Idla, Christian, Mihai	1
6	Prepare presentation for client meeting	Christina	2
7	Optimize code for data processing and raspberry communication (Test if possible)	Joon/Christina	3
8	Compile data/information	Everyone	0.5
9	Analyze and conclude information from data	Everyone	0.5

Prototype III

Finalize and merge the subsystem into one larger system and test its functionality.

Task #	Task	Member responsibility	Estimated time
			(Days)
1	Discuss customer feedback	Everyone	1
2	Refine design for arduino case and modify physical prototype	Ilda	3
3	Refine design for sensor case and modify physical prototype	Christian	3
4	Refine design for hole cover and modify physical prototype	Mihai	3
5	Prepare presentation for client meeting	Christina	2
6	Finalize and test code with sensor and pi	Joon/ Christina	3
7	Merge and connect the subsystems	Christina	2
8	Test the finalized prototype	Mihai	1
9	Analyze and conclude information from test	Everyone	0.5

Uncertainties and Risks

Uncertainties/Risks	Contingency Plan
Prototype 1	
Size/dimensions of arduino case, sensor case and hole cover	Multiple virtual designs will have to be created to find the optimal dimensions for the module's subsystems.
Ideal material for arduino case, sensor case and hole cover	Varied materials will have to be researched to find which will be best used for the project. Also, since none of our members have tools at home to build the prototypes (ie. 3D printer), we will have to see what materials are offered from the school or online to build our prototypes.
Long shipping time may delay physical prototypes for prototype 2	If our module parts require a long time to ship, we may not be able to incorporate them into a physical prototype for prototype 2. If this happens then we will have to proceed with the parts we have and keep the rest of the prototype virtual. Once the parts arrive, they will need to be tested immediately in case the prototypes are failures and we need to rebuild a prototype for design day.
Prototype 2	
Inability to create physical prototype ourselves	Due to school being online we do not have physical access to the tools available for us to build our prototypes. As a result, we will have to order our parts to be built online at the school. This makes it a little more difficult as we cannot see and test our prototype right away. We will need to ensure that our original prototypes are effective to minimize the risk of our group having to reorder parts to be built.
Prototype failures that aren't compatible with holding arduino, sensor	If we do order physical prototypes with incorrect dimensions, then we will need to reorder them with the correct dimensions immediately. If we must reorder prototypes to be built, then we may run into the risk of not being ready for design day.
Code doesn't work when tested with sensor	If the code doesn't work when tested with the sensor then we will need to figure out where the mistakes were made. If there are errors in the code, then it will need to be adjusted.
Waterproof testing fails for hole cover, arduino and sensor case	If our subsystems fail waterproof testing, then our module is at risk to water damage. Depending on how much time we have left we can either redesign our subsystems or try to modify them with a sealant to make them waterproof.

Prototype 3	
Climate sensor module doesn't work	If our climate sensor doesn't work, then it will
	become the highest priority to try and fix. We
	hope to have an operational sensor for design day.
	We will have to try to trouble shoot our mistakes
	and find our errors.
Subsystems don't fit together	If our subsystems don't fit together in our last
	prototype, then we will be at risk of not being
	ready for design day. If this happens then we will
	most likely not have time to reorder parts and will
	have to look to improvise by creating a model at
	home from simple materials. We will have to
	proceed and prepare for design day with what we
	have.