

# Atmospheric Water Extraction Device

Midpoint Review Presentation  
Team 10

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# Overview

- Introduction
- Needs and goals
- Electronics
- Lid
- Frame
- Bill of Materials
- Conclusion

# Need Statement

There is not enough research to determine if extracting water from air is a viable option in arid environments.

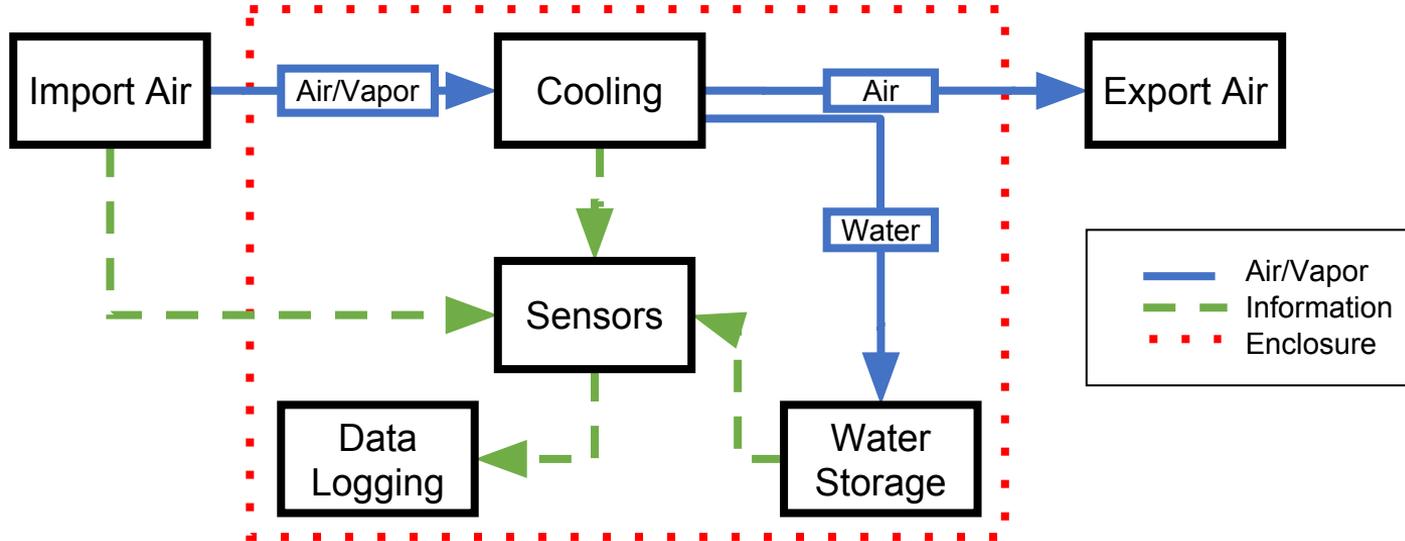
# Project Goal

Create an atmospheric vapor extraction device to collect 2 liters of water per day and researching optimal operating conditions.

# Objectives/ Constraints

- Collect Water
- Portable
- Inexpensive
- Data Logging
- Production (<\$1000)
- Power Usage
- Power Source (110V)

# Functional Diagram



# Arduino

- The arduino is used to control the major components of this project
- The components include:
  - DHT11
  - Pump
  - Fans
  - Liquid Level Sensor



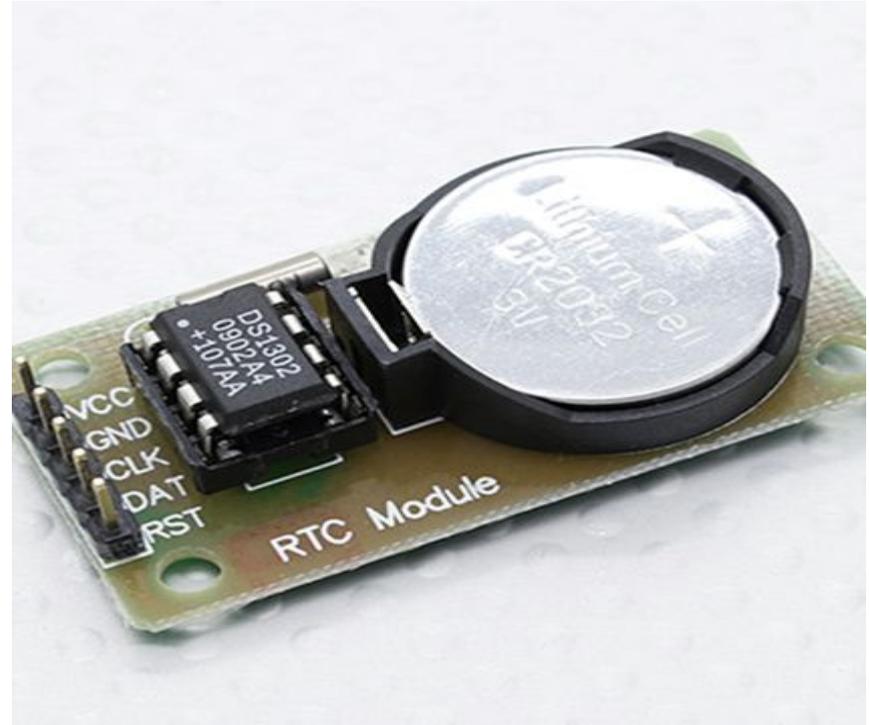
# SD Card Module

- The Arduino is capable of showing data, but does not store it
- Used to store data onto an SD drive
- SD drive is removable and portable
- Utilizes a 2GB SD card



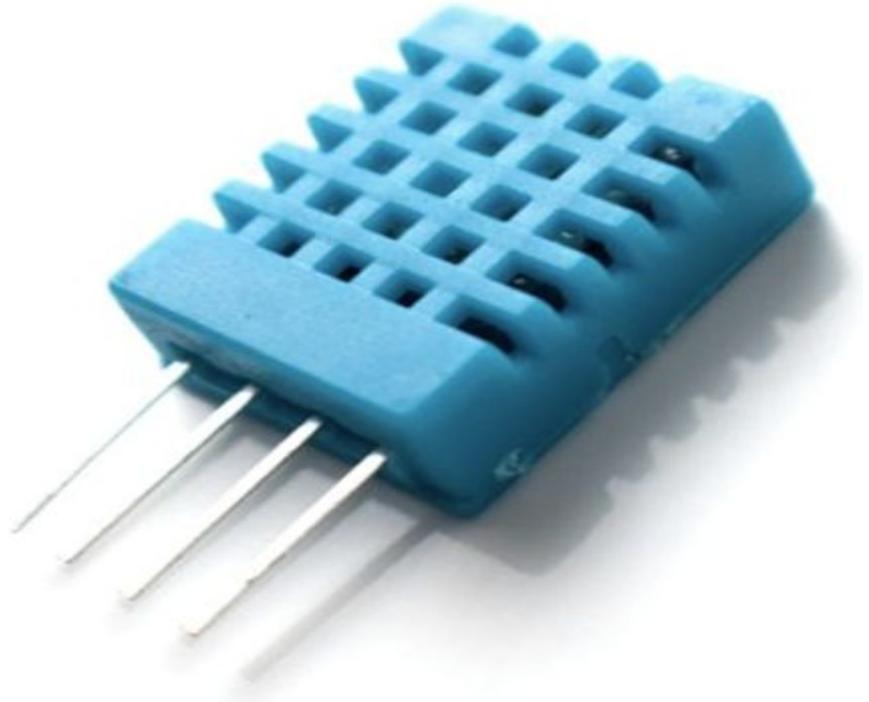
# Real Time Clock Module

- RTC is an important component for arduino
- Establishes a clock with in arduino
- With RTC, the arduino can tell what time and day the data is collected
- Also used with the pump to tell it when to begin pumping



# DHT11

- 2 DHT11 sensors
  - Ambient air inlet
  - Dehydrated air exit
- Collects Data and stores it onto an SD drive
- Also tells the fan when to stop and how much air should be pushed through the inlet



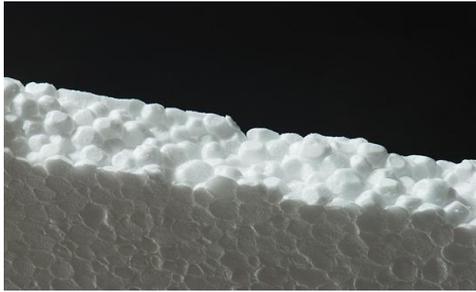
# Fan

- 2 fans used for the project
- One fan pushes air through the inlet
- Other fan pulls the dehydrated air through exhaust
- Speed is determined by the inlet humidity

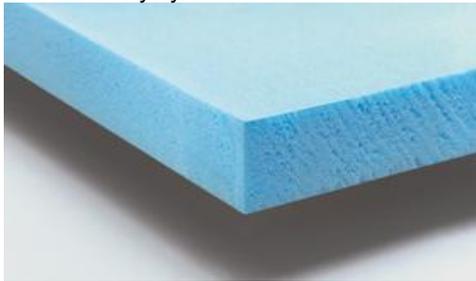


# Lid and housing

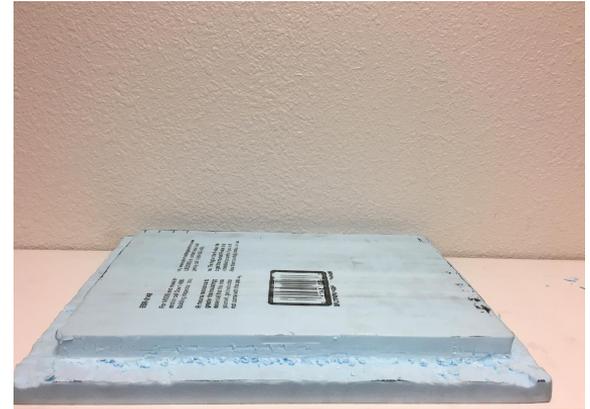
Lid is made of Polystyrene (R5) and cut with (vertical band saw)



R5 Polystyrene Foam Board



Box cutter



# Lid and housing

- Handles are screwed into the lid
- holes drilled for inlet/outlet
- Funnel to concentrate the airflow
- Pipes to direct the airflow inlet and outlet
- Sensors placed in the pipes
- Box for holding electronics



# Whole lid



# Pump

- Using a Peristaltic liquid pump
- At a specific time during the day, arduino will tell pump to begin pumping
- Once the liquid level sensor maxes out or is at a constant below max the pump will reverse
- Used to move water to a reservoir



# Liquid Level Sensor

- Used to measure the amount of water collected
- Water is pumped into a pipe with known diameter and height via the sensor
- Water is pumped out the other end to a reservoir

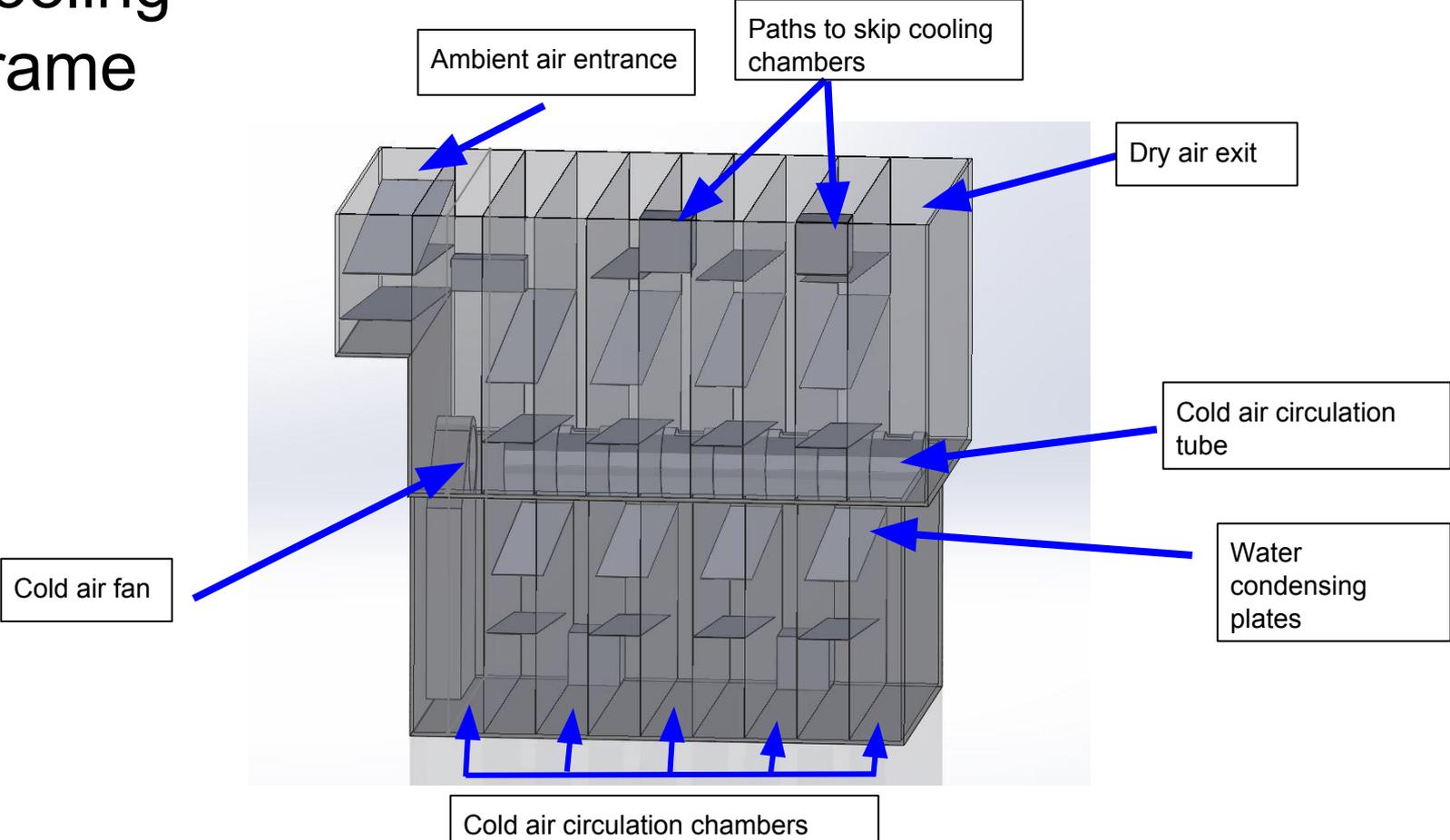


# Frame

Four main parts of frame

- Vertical plates
- Inserts
- Square connectors
- Tube

# Cooling Frame



# Frame (manufacturing)

- The vertical plates, inserts and pump box were cut with tin snips and electric metal shears.
- Stainless steel tube had holes milled in it
- square inserts were cut to size with a vertical band saw

# Frame



# Bill of Materials

Part #	Part Name	Qty.	Price
1	Portable Cooler	1	\$169
2	Aluminum Sheet	20 ft <sup>2</sup>	\$37
3	Arduino	1	\$70
4	Fan (3 pack)	1	\$12
5	Styrofoam Insulating Lid	1	\$45
6	Pipe (PVC 1.5in diameter)	1	\$7
7	Stainless Steel Pipe (2in diameter)	2 ft	\$37
8	2GB Micro SD Card	1	\$8
9	Aluminum square tubing 1"x1"	1	\$20
10	Dremel bits (3-pack)	3	\$11
11	Python Airline Tubing	1	\$5
12	Jardin Plastic Air Valve Connectors	1	\$5
13	eTape Standard Liquid Level Sensor	1	\$30
14	Plastic Air Pump Check Valves	1	\$4
15	Peristaltic Liquid Pump	1	\$24
16	Relays x3	1	\$4
17	Real Time Clock Module	1	\$8.99
18	Ethernet Shield	1	\$47.90
19	DHT11 x 4	1	\$7.50
20	Arduino w/ SD slot	1	\$50
21	Optocouplers x10	1	\$14
22	2 Y Adapters for female connectors	1	\$5
23	4 pin connectors (Female)	1	\$5
			<b>Total: \$626.39</b>

# Conclusion

- Our goal is to create an atmospheric water extraction device that will collect 2 liters of water and log the atmospheric data
- Progress
  - Frame
  - Lid
  - Electronics
- Possible concerns are heat losses through holes in the lid and frame
- We plan on starting to test our device after spring break

# References

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# Questions?