Static Weather Station

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Purpose

Main Objective:

- Make an easy to use weather station with no moving parts

Why?

- Less points for mechanical failure
- No noise pollution

For who?

- If rooms/compartments need specific environmental factors to be controlled (as is the case for storage of materials like 3d-printing filament)
- Check the environment outside for botanical purposes

Features

| Feature	Description
UltraSonic Anemometer	Reads wind speed and direction
Temperature Sensor	Reads ambient temperature
Humidity sensor	Reads ambient humidity
LCD Display	Displays weather data
ESP-32 Wireless connection	Sends data from weather station to display station

Failed circuit prototype

- Our original design had 2 level shifters for the transmit and 2 inverting op amp stages for the recievers.
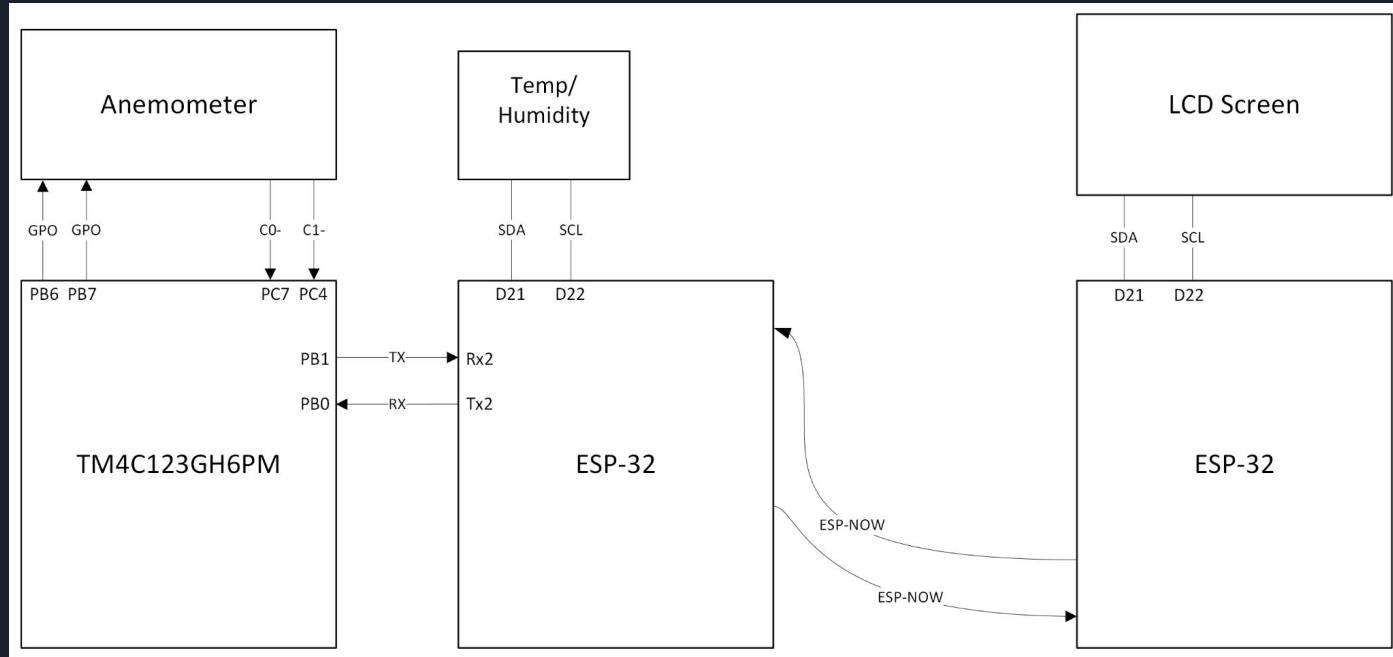- Through testing we found that we could not detect wind with this configuration
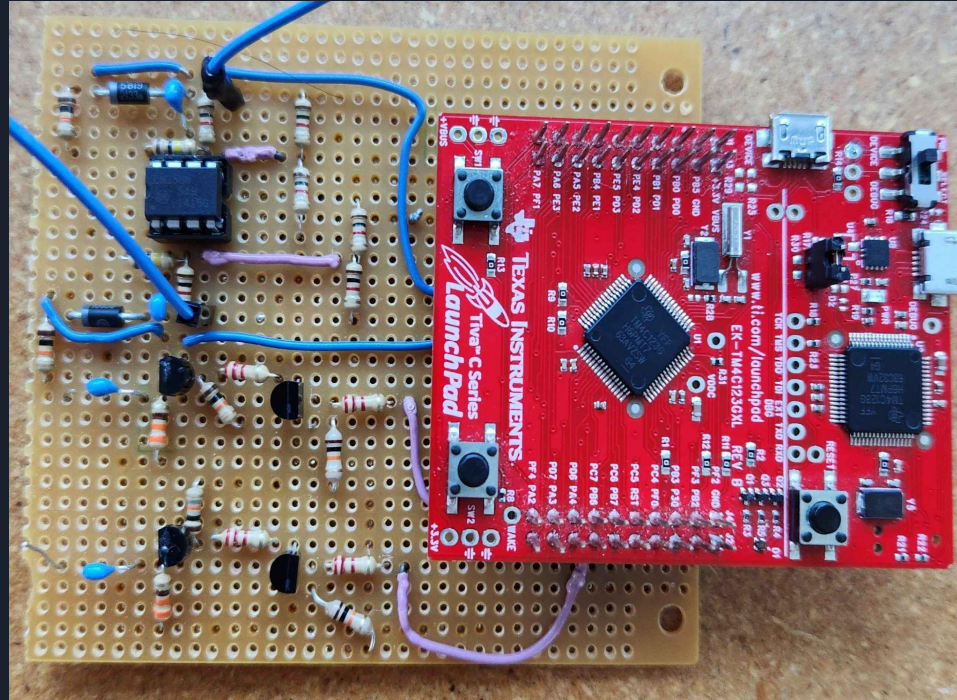
Failed circuit prototype part 2

- These we're the original circuit designs for our transmit and our recieve circuits
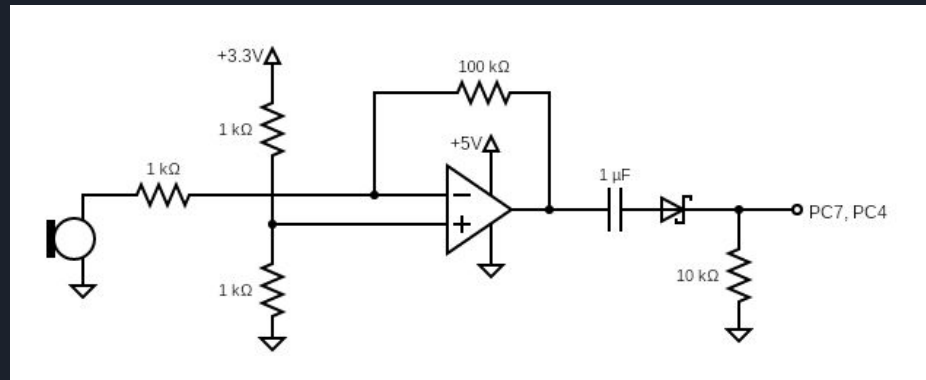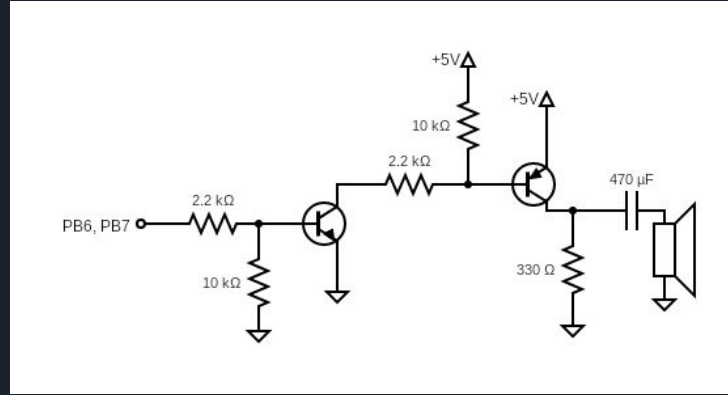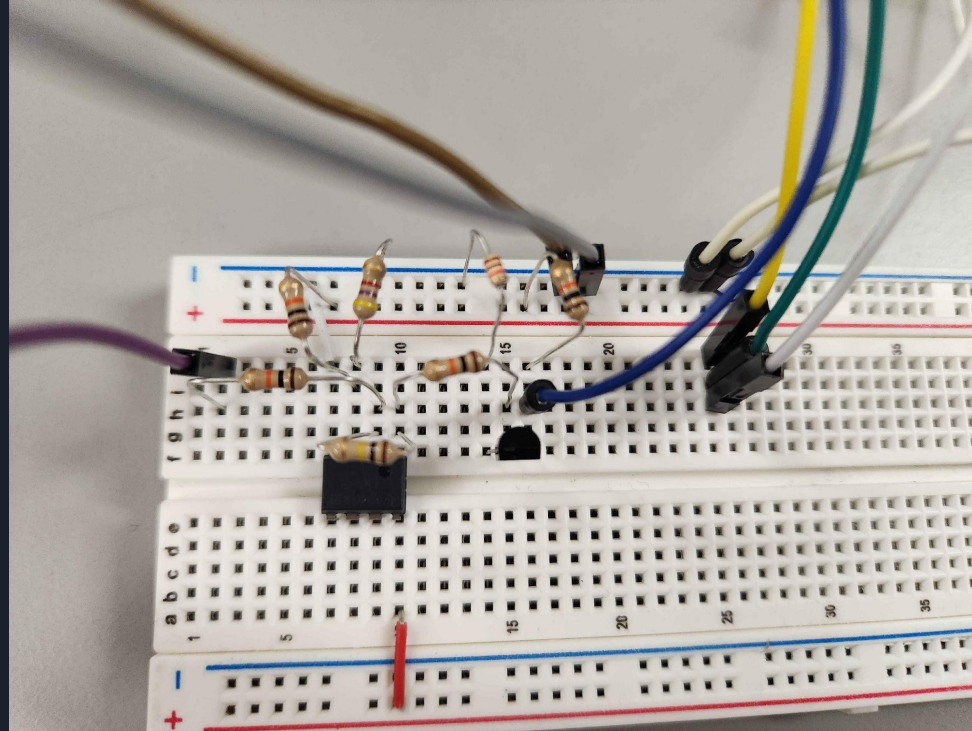
Architectural Overview

Anemometer Circuit

- Two transmitter's and two receivers for east->west and north->south
- The transmitters are GPO's and the receivers are converted from analog to digial using an inverting op amp with a bjt

Anemometer Receiver inverting op amp with an offset to bjt

- We are receiving a 200mV pk-pk sine wave from our receiver. We turn this into a readable square wave using a schmitt trigger
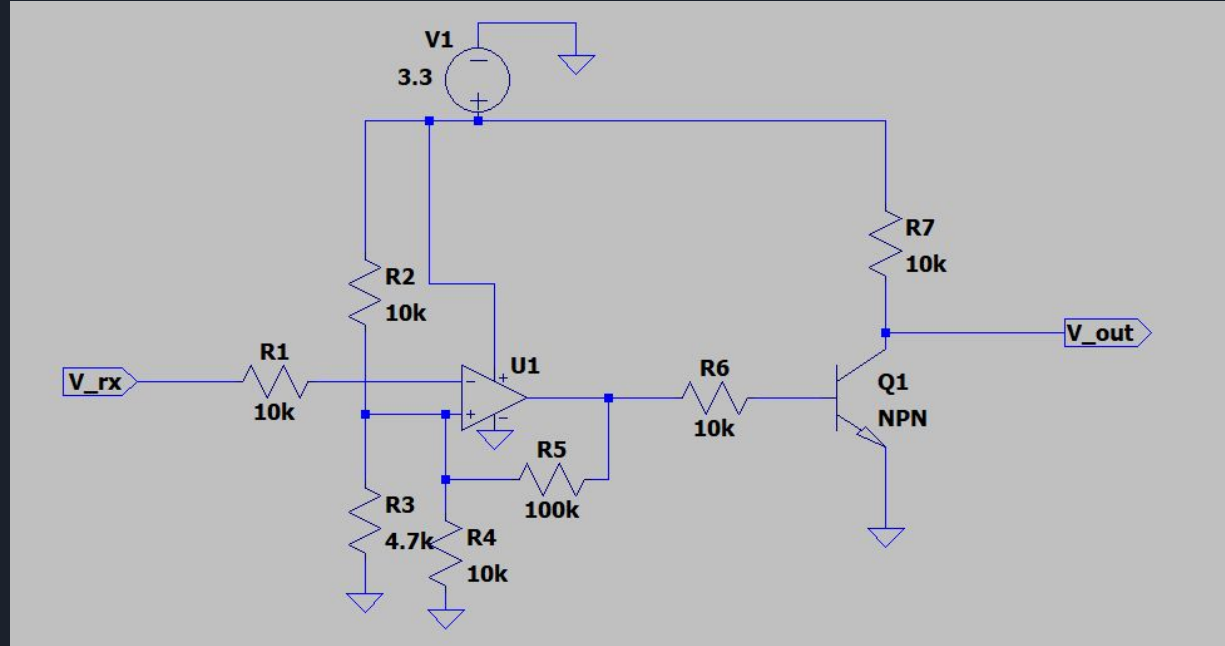
Raw transmit and receive

- In this image it can be seen that when we send a trigger shortly after we get a single amplified wave packet

Anemometer phase shift with wind detection

- As we blow in one direction the phase of the output is shifted to the right and we can measure this shift
- When we blow in the opposite direction the phase is shifted to the left

Static Weather Machine Sensor Stack

- Top layer to hold the transducers and the temp/humidity sensor
- Hollow columns to move wires through
- Middle layer for transducer reflection
- Bottom layer to hold uC's
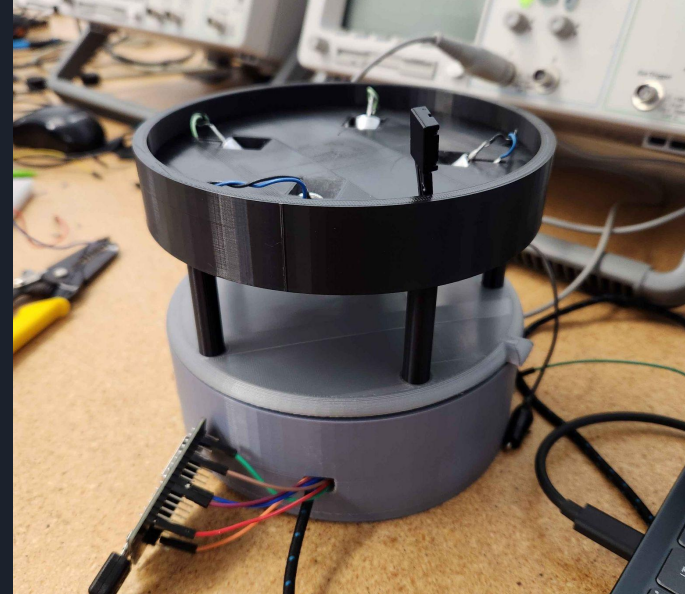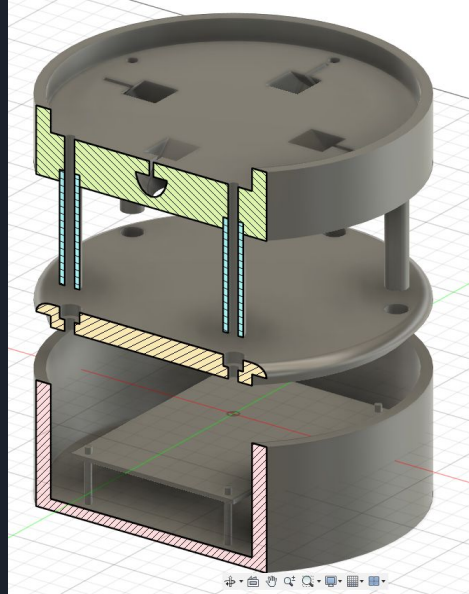
Things to implement in the future

Feature	Description
Battery Power	Using batteries, we can make it a stand-alone system
Home base for receiver end	We could add a 3D printed base for the LCD screen set up
Touch screen/better LCD screen	We could add a touch screen and implement a nicer LCD screen
Add more sensors	We could add rain, light and air pressure sensors

Demo