University of Hawai'i at Manoa SCEL

Acoustic Wind Sensor Proposal Presentation

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Summary

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Motivation

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- Knowing the wind patterns (speed and direction) allows for predicting where buildings can be built so that there's natural ventilation
- Traditional wind sensors are large, have moving parts, and are generally expensive
- We want something that is small, has no moving parts, and is inexpensive to manufacture, something that can be integrated with the weatherbox

Some examples of traditional wind sensors

Project Overview

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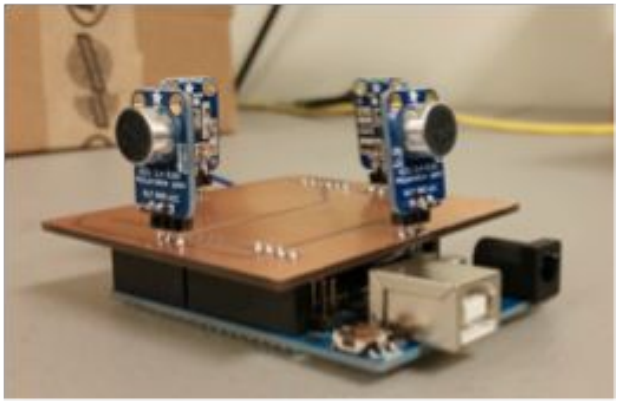
Objective: To build a small, static, and inexpensive, wind sensor that is able to:

- Gather accurate data in real-time on wind speeds and directions using microphones and signal processing
- Be integrated into a weatherbox design



First iteration of the wind sensor using an Arduino and 4 omnidirectional microphones

Block Diagram

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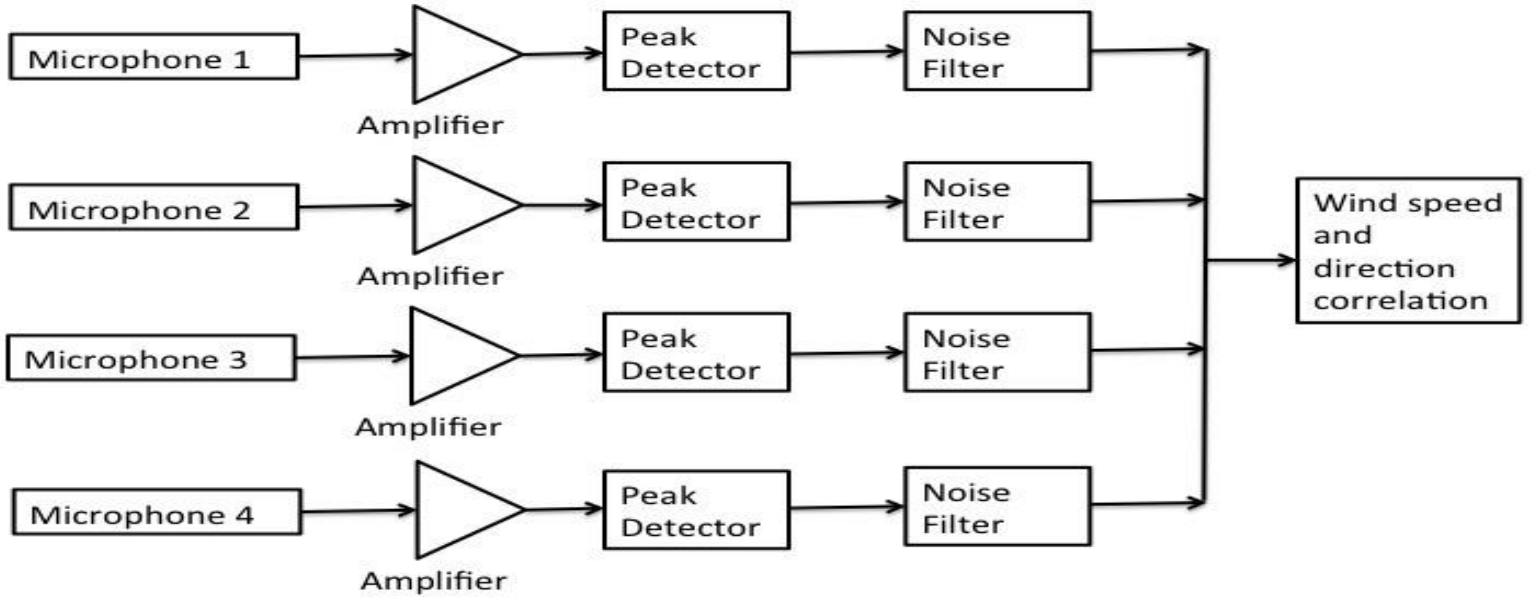

Block diagram for the acoustic wind sensor

Current State of Project

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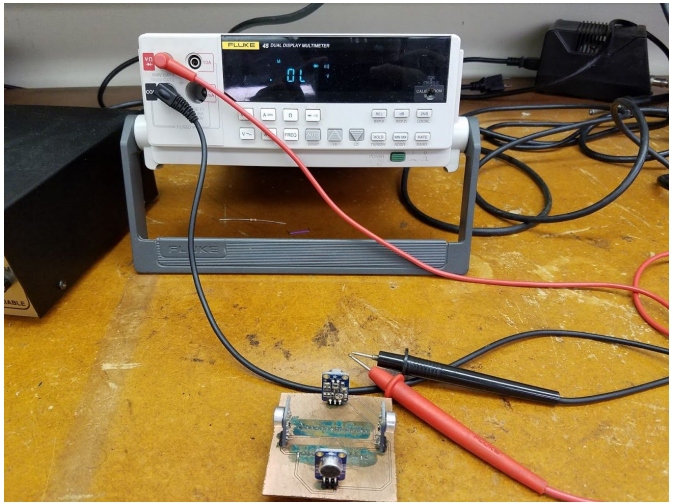
- Two revisions (Teensy and Arduino)
- Accurate readings with one microphone facing fan directly (skewed data when not direct)
- Have not been tested outdoors
- Discovered faulty traces on Teensy PCB



Testing the Teensy PCB, found some faulty traces

Semester Goals

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- Create a new board for Teensy
- Run tests and gather data
- Create an automated test bench in MATLAB for easier testing
- Design a housing

Approach

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- **Improve current platform (Teensy 3.2)**
  - Faster processor (x4.5)+
  - “Simpler”
  - Refabricate existing Teensy PCB
- **Conduct tests in different situations**
  - Sensors at different angles to wind source
  - One sensor facing up
  - Putting a funnel around a sensor

Schedule

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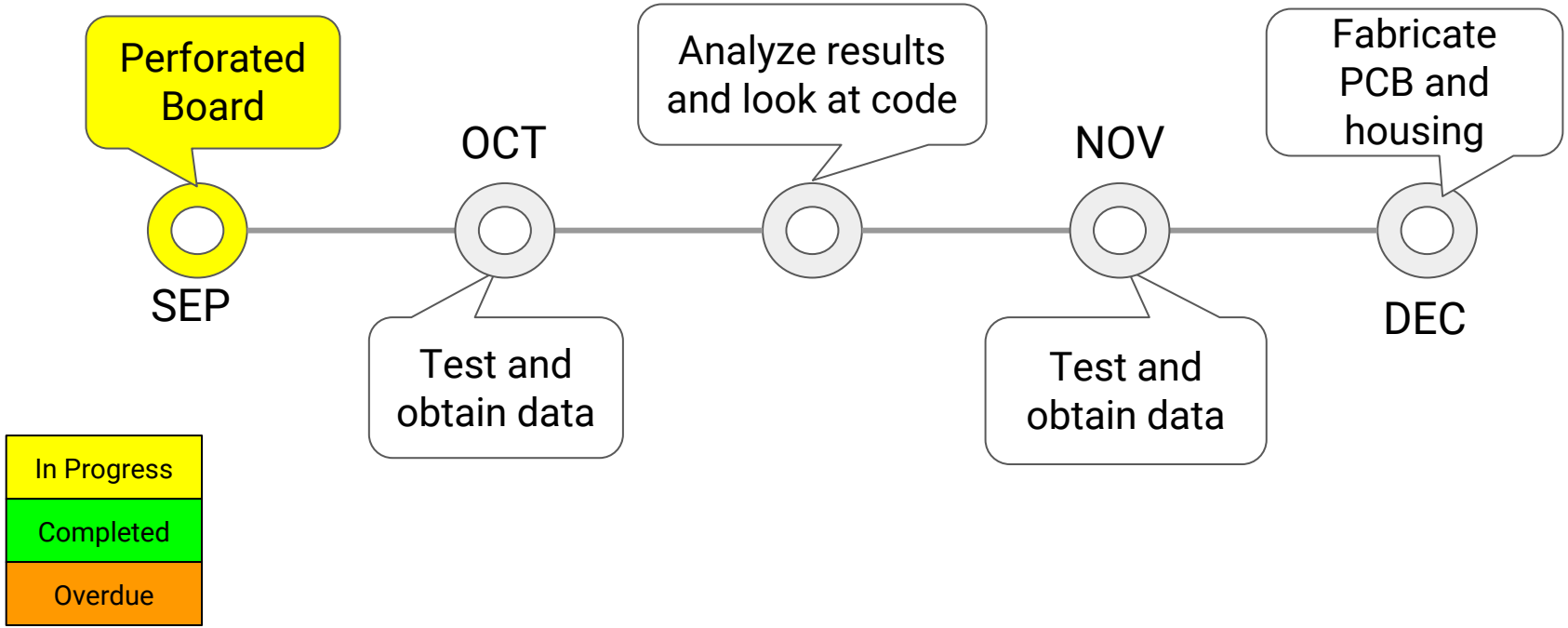

Learning Expectations

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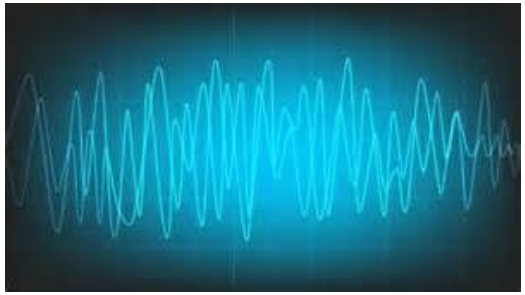
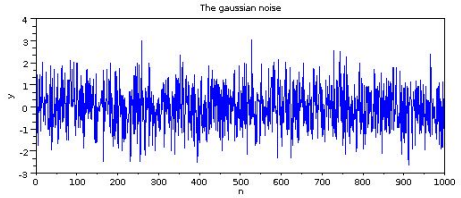
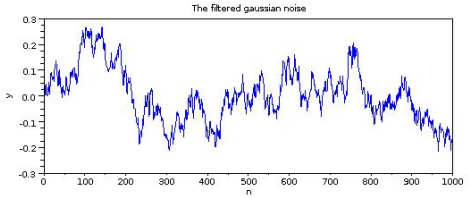
- Arduino programming
- Digital and hardware-oriented filtering methods
- Automating data collection and tests (MATLAB testbench)
- Digital Signal Processing
- 3D Printing and Etching







Problems

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- Not “elegant”
- Code from the Arduino not working as it should on the Teensy
- Anemometer is difficult to work with

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Questions?