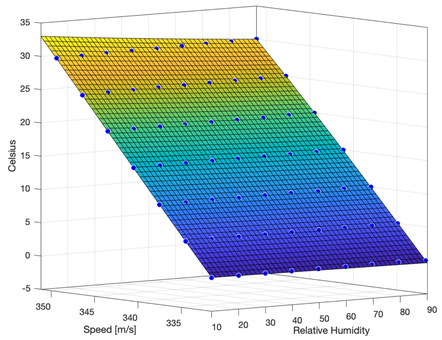
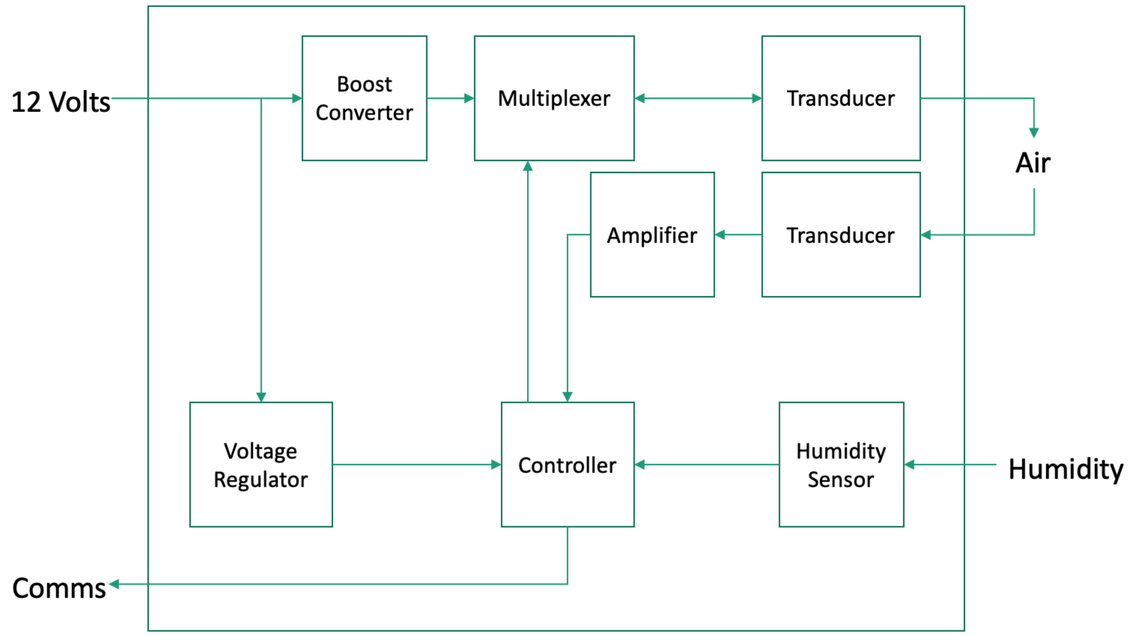
Ultrasonic Temperature Sensing

Project

- Traditional temperature sensors suffer from radiant heating and temperature averaging.
- Measuring the air directly mitigates false measurements.
- Ultrasonics are used to measure the speed of sound and derive the temperature directly.



System



Methods

- The time of flight is found by finding the phase difference between the transmitted and received signal using correlation.
- A best fit parabola interpolates the correlation to find the peak.
- The peak value and the distance between the two transducers are used to calculate the speed of sound.
- The speed of sound and relative humidity give the temperature using an equation.

Conclusion

- Temperature measurement is possible by measuring time of flight.
- High ADC resolution is necessary for low error results.
- This method is advantageous in high accuracy applications.
- An FPGA implementation with a higher resolution ADC is the next step.

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