



# UCI E-Thermosensor

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## Background:

A thermocouple is an electrical device used to detect the temperature changing. Nowadays, thermocouple, as thermal sensor, is being used in industries such as hospital, automobile and aerospace. With the trend in demand for increased performance and reliability in high tech field, shorten the response time is essential. We are focusing on reducing the time response in microscale by decrease the size of the sensor, or by using different materials for the sensor, to improve the efficiency of the temperature sensor system, which would benefit in many industries.

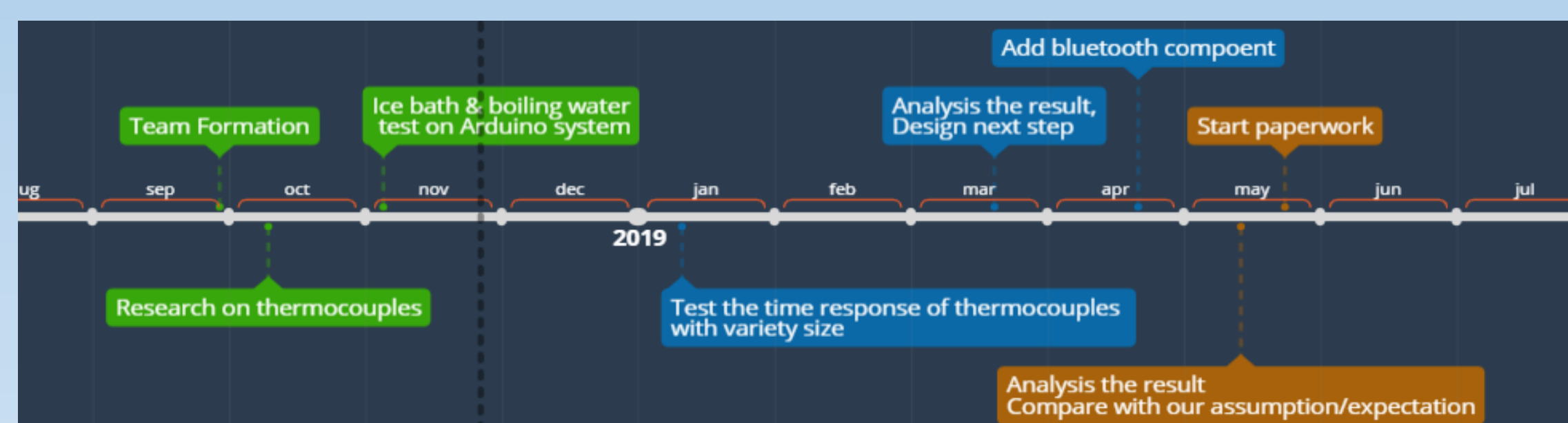
## Goal:

Our goal for this project is to build a nano-thermosensor connected with a microprocessor. The time response for an accurate reading of thermocouple should be reduced from 0.16s to 0.03s by reducing the size of thermocouples. Having a faster response, thermocouples can be more efficient in measuring temperature changes in industrial, medical and daily

## Objective:

- Improve the circuit to reduce data fluctuation.
- Find relationship between time response and the change of specification in thermocouples.
- Reduce the time response from to 0.03s.
- Break down the thermocouple and research about materials (aluminum, copper, steel) of the sensor and graphene coating impact on the response time.

## Timeline:



## Innovation & Current Work:

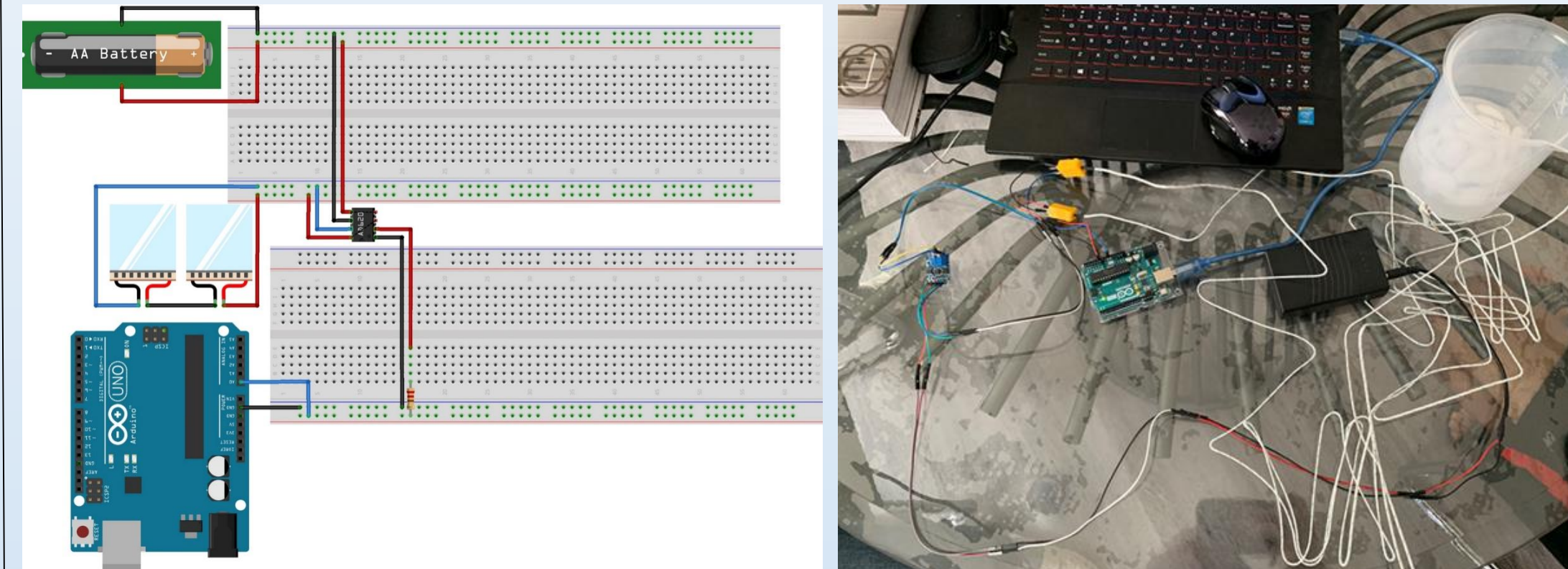


Figure1: Arduino system with AD620 amplifier & 12 V power supply

Figure2: Arduino system schematics

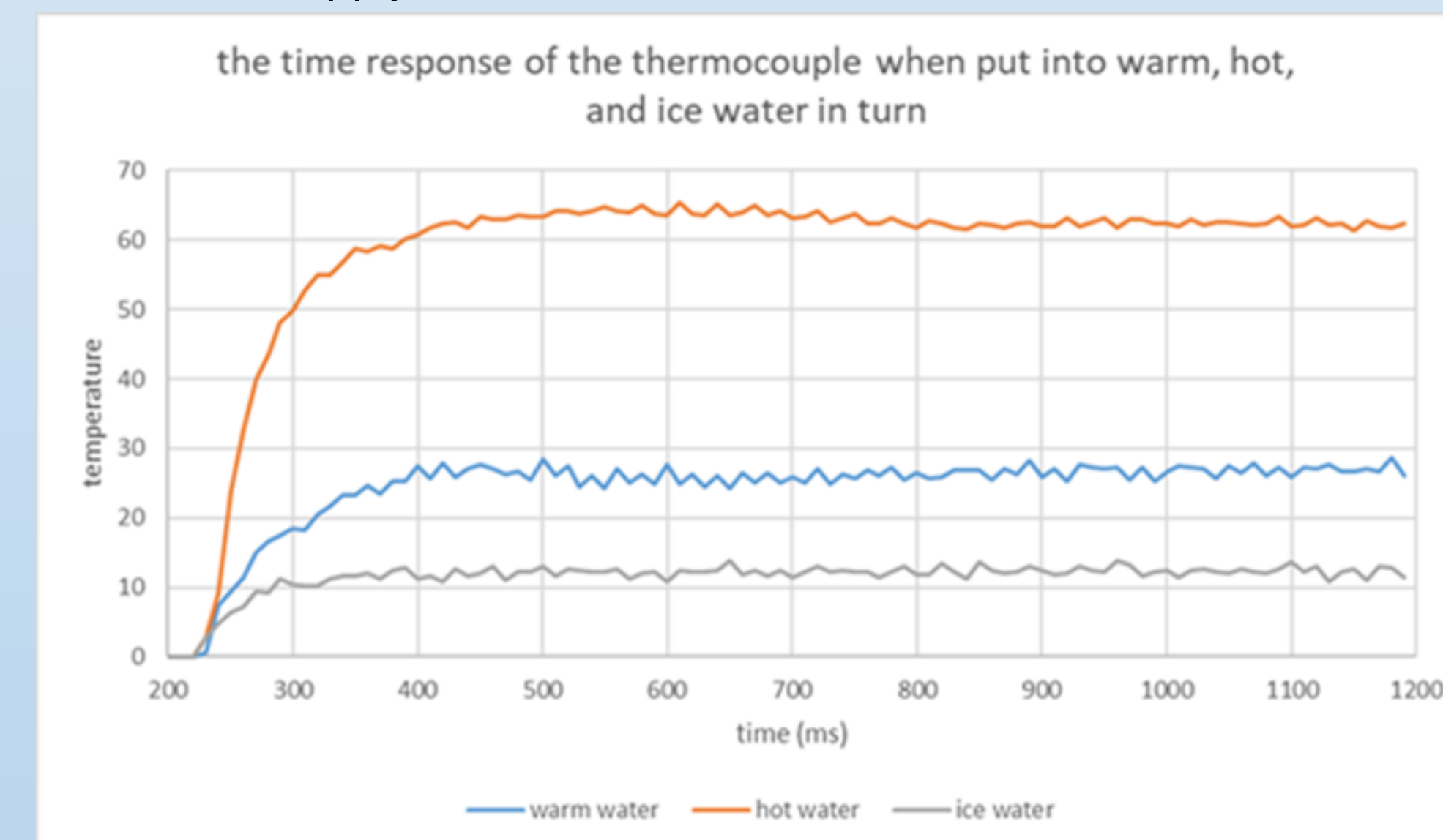
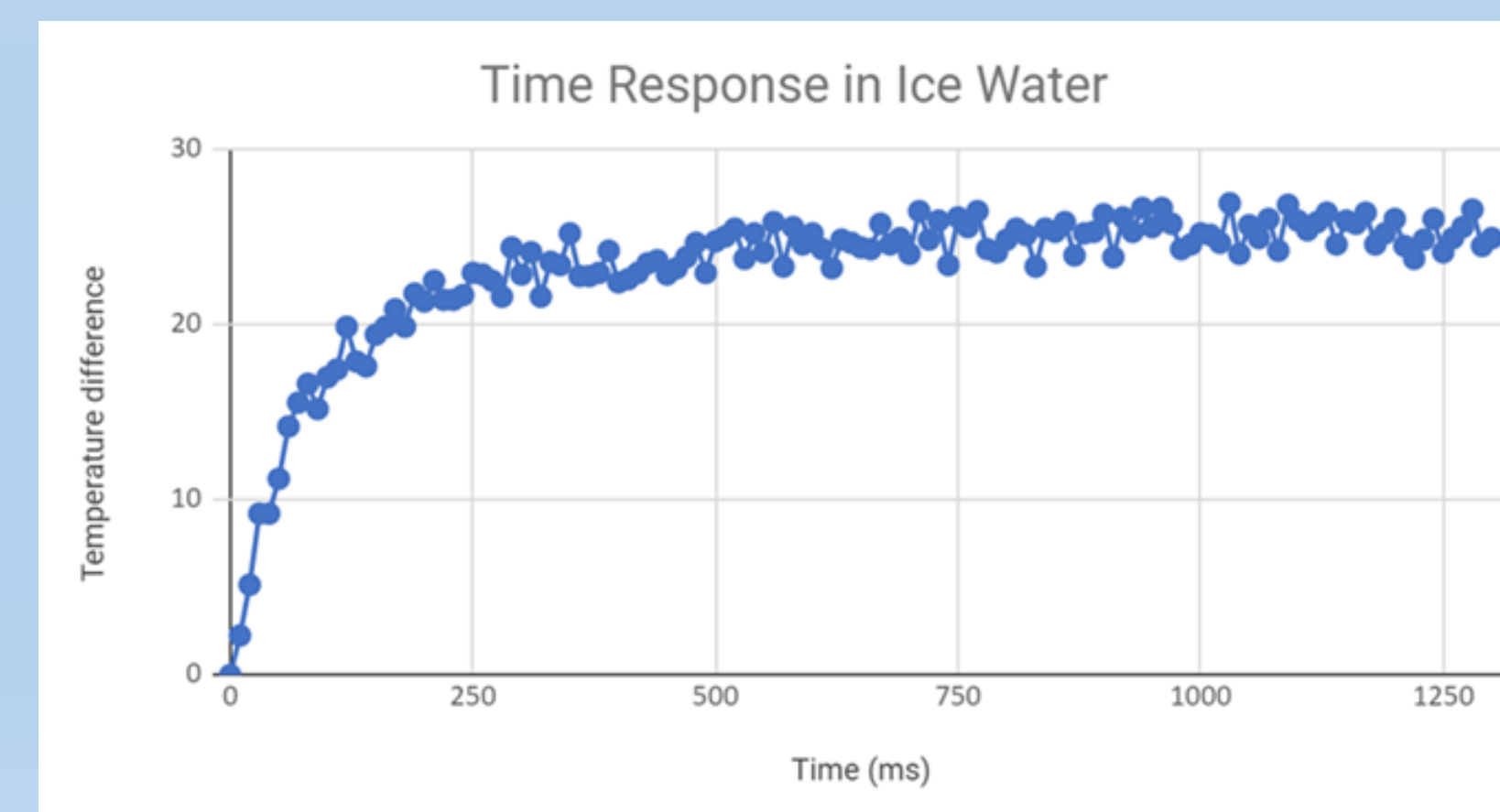


Figure3: Temperature VS Time in Ice water, hot water and warm water

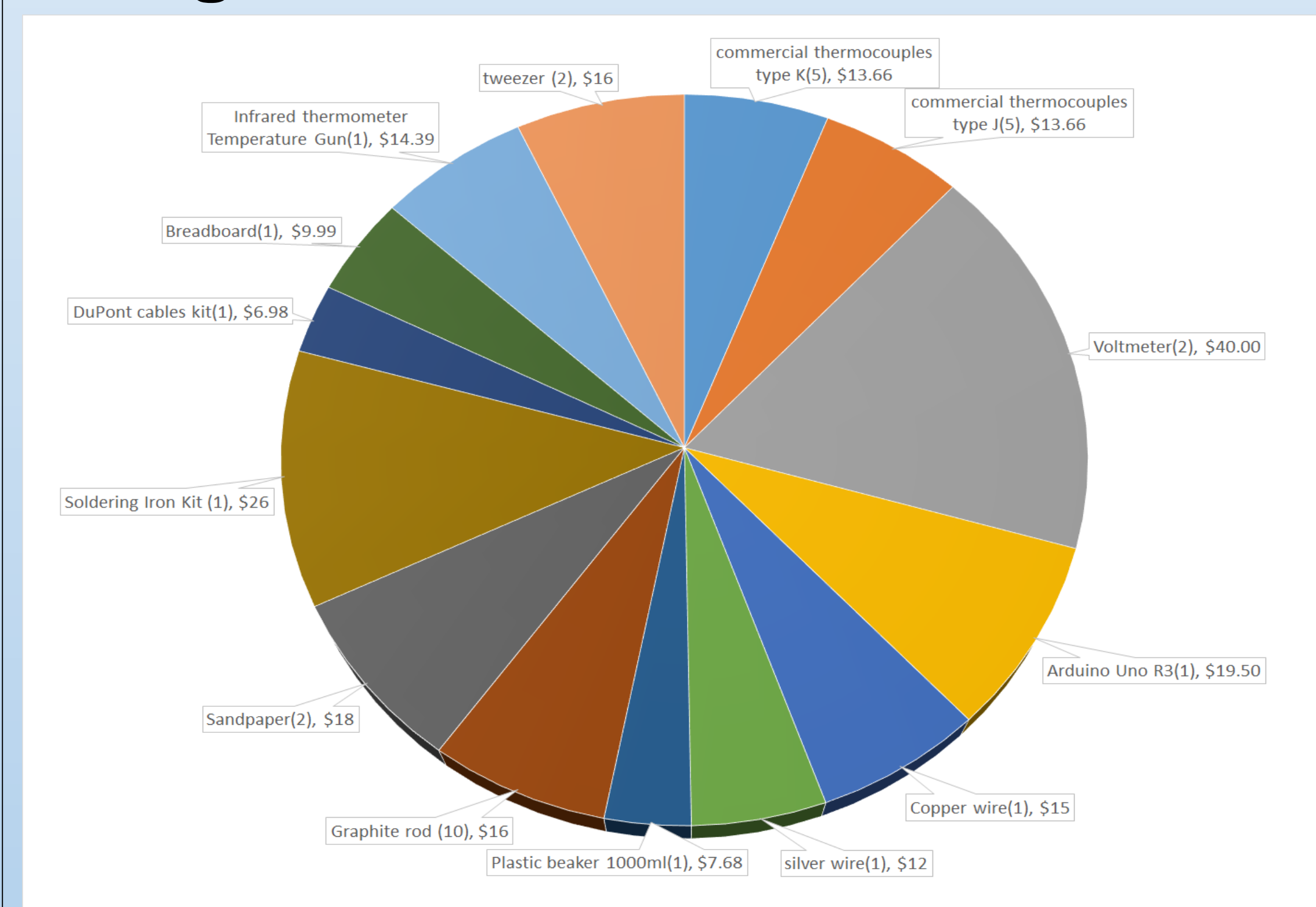


We upgraded the circuit, by tightening the cord, and using jumper cable instead of breadboard. We managed to shorten the time response from 0.16s to 0.08s, But the noise is a lot more than the previous setup.

## Prospected work:

- Test different types and materials of thermocouples and compare the measured data with our assumption.
- Build a thermocouple by our own and choose proper material.
- Make the final thermocouple Bluetooth compatible that can be attached to the human body .

## Budget: 250\$



## Team member:

- Team lead: Zijian Zhang
- Document Manager: Zhu Huang, Zheju Shi
- Safety Officer: Bowen Chen
- Purchase Manager: Zhengtao Li

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