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Exploration of PocketLab Devices for UNI's Campus, Classrooms, and Community

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Exploration of PocketLab Devices for UNI's Campus, Classrooms, and Community

Isabel Harms and Alexa Sedlacek

Introduction

PocketLab devices by Myriad Sensors were acquired by UNI's Earth and Environmental Science department in the fall of 2022 through the Carver Grant. These citizen science devices are incredibly useful in educating and exploring real life issues in the environmental sciences that we are experiencing today. Issues such as air quality and weather are increasingly important topics to examine as the climate warms. During the summer of 2023, Iowa has had multiple cases of unhealthy air quality levels due to particulate matter from fires in Canada. Southern states have experienced extreme heat indexes, pointing to the need to consider the effects local environments have on weather aspects such as temperature. The PocketLab devices are very useful in displaying data in real time that can be used to help educate the general population on these real-life issues. Using the PocketLab devices as a tool to guide their learning, I have created and conducted three camps this summer with middle school and high school students on the concepts of air quality and weather.

Goals

- Collaborate with UNI's interior design department to incorporate PocketLab devices into interior design classes
- Establish expertise on the PocketLab devices
- Figure out any problems and troubleshooting tips for the PocketLab devices and PocketLab notebook
- Create lessons for the PocketLab devices and give those lessons to gauge interest and ease of use in a class setting
- Explore using the PocketLab devices as research tools

In-Progress Projects

- Incorporating PocketLab devices into interior design classes
- Producing a living PocketLab use and troubleshooting document
- Statistically checking the PocketLabs against themselves
- Creating a temperature map of campus

PocketLab Devices

PocketLab Thermo:

Measures: Two temperature probes simultaneously

Sample Experiment: Collect temperature of two different surfaces (grass vs concrete or rug vs wood) at the same time

PocketLab Devices

PocketLab Air Measures:
- Carbon dioxide (0-5000 ppm)
- Particulate Matter (PM1, PM2.5, PM10 -0-500ug/m^3)
- Ozone (0-20 ppm)
- AQI (0-500)

PocketLab Voyager Measures:
- Acceleration
- Angular Velocity
- Magnetic Field
- Rangefinder Position
- Rangefinder Velocity
- Temperature Probe

PocketLab Air

PocketLab Voyager

Air, Weather and Voyager Measure:
- Dew Point
- Heat Index
- Ambient Temperature
- Barometric Pressure
- Light Intensity
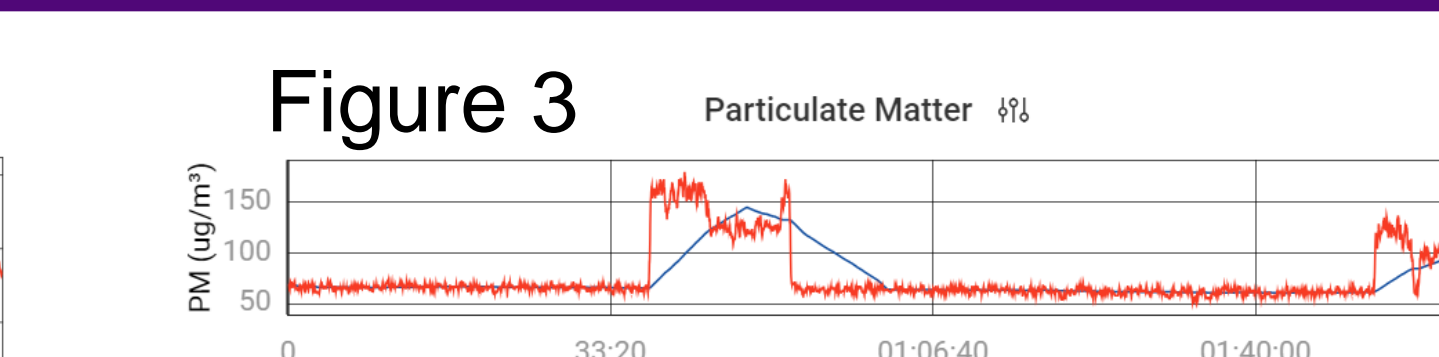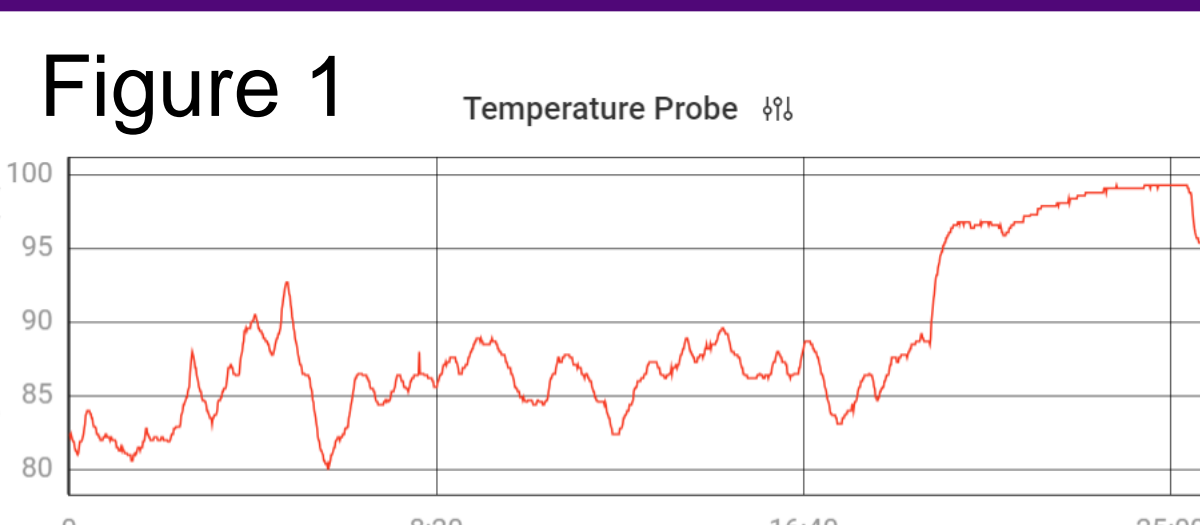- Humidity
- Altitude

PocketLab Weather Measures:
- Temperature Probe

PocketLab Weather

Pictures from the Boys and Girls Club Teen Visit

Class Graphs

Figure 1

Figure 3

Figure 2

Figures 1 and 2 show data collected by middle schoolers in a grassy area and then a concrete area.

Figure 3 plots PM data collected by middle schoolers on a bad air quality day indoors and outdoors.

Classes on UNI's Campus

Hosting visiting groups of middle and high school students provided a foundation for future activities. A middle school group hypothesized air quality between different buildings. Creating hypotheses allowed the middle schoolers to collect data to test their hypotheses (Figures 1 & 2). The original project proved challenging for middle school students, so we revised the activity for clarity and simplicity. A group of high schoolers analyzed the temperature and relative humidity between a grassy and concrete area on UNI's campus. These students also made hypotheses and collect data to test their individual ideas. The final group of middle schoolers also analyzed local weather conditions between a grassy and concrete areas, in a similar structure to the high school level activity (Figure 3).

Class Discussion

These activities lead to discussions of indoor and outdoor air quality and its relation to public health, climate change, urban heat islands, and potential mitigation strategies.

Future Goals/Uses

- Create a dog walk temperature event
- Incorporate PocketLab devices into UNI's air quality and weather classes
- Collect air quality data from an art classroom, classrooms with chalkboards vs whiteboards, and/or classrooms with or without artifacts, where dust may accumulate
- Design self-guided environmental tour of campus
- Check the accuracy of the devices against professional devices
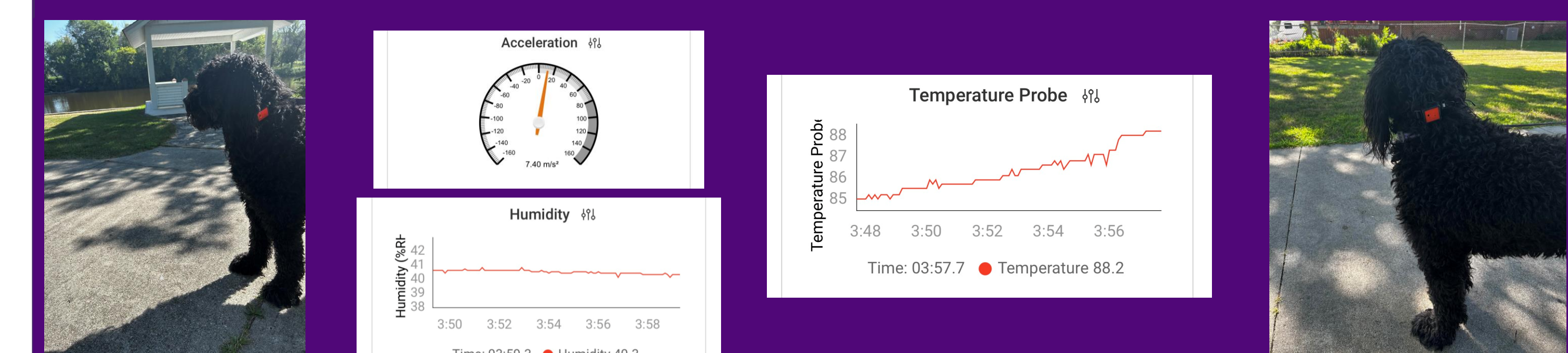
Pictures of Dog Walking Data Collection First Trial

Conclusion

The PocketLab devices had some issues, especially with charging. However, they were successful in being handled by the general populace and are still a great tool to get real-time data. This summer of 2023 was very successful in getting a more thorough understanding of the devices, the issues they have, and how to troubleshoot those issues. They worked very well in a classroom setting. There was only one actual issue with the devices during the summer lessons given on campus and that issue was solvable. In the future, these devices can be used for events, lessons, and research.

References

PocketLab. (n.d.). PocketLab Sensors. PocketLab by Myriad Sensors, Inc. https://www.thepocketlab.com/sensors
PocketLab. (n.d.). PocketLab Sensors. PocketLab by Myriad Sensors, Inc. https://support.thepocketlab.com/knowledge/pocketlab-sensors

Acknowledgements