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# labjack-controller: Robust and Easy Data Collection with Labjack T-Series DAQs in Python

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**Software**

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## Summary

The ability to accurately collect and computationally process data from sensors in both a logging and interactive sense is crucial to many scientific experiments. Researchers in many field are results driven and want to be able to easily and inexpensively gather data at high speeds with uniform sampling rates without having to invest weeks of time learning a complicated API. Common (expensive) paid solutions are found in Digital Acquisition Devices (DAQs) provided by companies like National Instruments (NI). These pre-built DAQs are generally understood to be tied to proprietary analysis software or languages, such as NI's paid language LabView. In light of this, there has been a recent surge in DAQ offerings from multiple manufacturers to capture the market. These solutions tend to have cost-effective, versatile hardware, but interfaces that are poorly designed or immature ("Model 301/302 developer application software," 2017), which makes it difficult for non-specialists to use. Current offerings from Labjack ("Labjack," 2019) are one such example; their hardware is used in major industrial applications, but the interface is exceedingly nuanced and provides little in the way of error recovery.

`labjack-controller` is a Python package for Labjack's most recent DAQs, the T-series devices, and serves a similar overall purpose as NI's nidaqmx-python ("Nidaqmx-python," 2017) data collection package for NI devices. It focuses on providing thread-safe functions that abstract and automate data collection, error handling, and configuration procedures that are normally exceedingly nuanced or complex. Care was given to writing efficient code for streaming data from and communicating to these devices, and using as many optimized tools as possible, such as Labjack's provided low-level C interface. In the interest of versatility, `labjack-controller` fully supports Linux, OSX, and Windows, along with any connection method or protocol supported by any of the T-series devices.

`labjack-controller` is designed to be used by anyone who has at least an introductory knowledge of Python and intends to involve a computer in the process of reading sensor data, from data backup purposes to live reaction to sensor readings. We emphasize that this package is a huge time saver for researchers interested in gathering data so that they can focus on the science rather than losing valuable time in development or being forced into expensive proprietary options. It is currently used in upper-level undergraduate physics laboratory courses and a research lab at the University of Southern Maine for the purposes of reacting to live data, most notably with a torsion pendulum with dynamic electromagnetic damping. We expect that the speed, error handling abilities, and parallelization support of this library will make robust and reliable data collection one of the least challenging aspects of experimental science.

## Acknowledgements

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## References

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