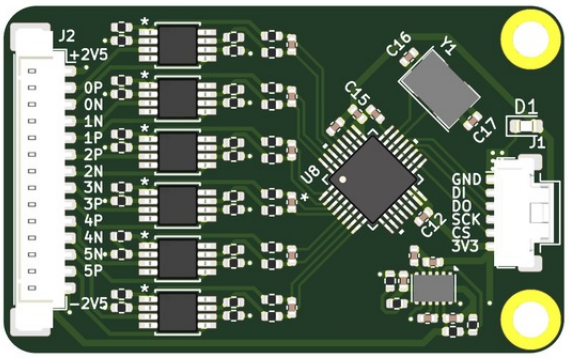
INNOVATION PARTNERSHIPS
UNIVERSITY OF MICHIGAN

OSL Electronics: Data Acquisition Board

TECHNOLOGY NUMBER: 2025-438



Technology ID

2025-438

Category

Robotics

Engineering & Physical Sciences

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OVERVIEW

A Data Acquisition System (DAQ) to collect multi-axis load cell data for the Open Source Leg, a robotic prosthetic hardware and software platform.

- Improves data quality with high-resolution and adaptable signal processing options

BACKGROUND

High-precision robotic applications, such as wearable robotics, require low-noise and high-resolution information about the physical world to inform their behavior. This information is obtained using various sensors, including the load cell, which converts physical stimuli like forces and moments into analog signals. These analog signals are processed using Data Acquisition Systems (DAQ) that filter and amplify them and perform their analog to digital conversion.

However, selecting an appropriate analog-to-digital converter (ADC) and designing signal conditioning circuits for the DAQ are complex and iterative tasks that need to be tailored for each specific application. Many off-the-shelf solutions are prohibitively expensive or inadequate as they fail to meet the noise, resolution, or size requirements for space-constrained wearable robotics applications, underscoring the need to develop specialized solutions.

INNOVATION

The Neurobionics lab has developed a DAQ to collect multi-axis load cell data for the Open Source Leg, a robotic prosthetic hardware and software platform. The DAQ integrates a high-resolution (24-bit) 6-channel ADC (Texas Instruments: ADS131M06) with an anti-aliasing filter and a positive and negative output charge pump. The ADC supports communication over SPI along with programmable gains and data rates between 1-128 and 250 Hz - 32 kHz, respectively. The positive and negative output charge pump generates positive and negative voltages from the input voltage to power the load cell. Although the DAQ is designed for load cell measurements, its application can be extended to other bridge measurement circuits as well.

ADDITIONAL INFORMATION

LICENSING INFORMATION:

When you place an order, you will be asked to choose a donation amount ($5, $10, $15, or $20) that will go towards the Open Source Leg (OSL) project. Community support in the form of donations helps the OSL team maintain and update the project. If you have questions about the donation or would like to donate a higher amount, please reach out to Elliott Rouse (ejrouse@umich.edu).

Once you place an order, the amplifier will be shipped to you by the OSL team. Delivery will take 3-6 weeks. If you have questions about the order, please reach out to Kiara Vasquz (kiv@umich.edu).

Shipping costs

US shipping costs - $11/amplifier

International shipping costs - $40/amplifier