

Hardware Development for the JPL BioSleeve

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Robotics research is progressing at an exponential rate and following close behind this rapid growth must come novel methods for humans to interact with their machine counterparts. One response to this rapid growth was the development of the first version of the JPL BioSleeve, an intuitive, wearable surface EMG-based gesture recognition system. The first version of the BioSleeve used sixteen surface EMG electrodes and tethered its users to a computer via a 16-channel analog-to-digital (ADC) converter that required one cable per electrode. The second version of the BioSleeve, developed this summer, uses 32 surface EMG electrodes, a 16-bit ADC, and utilizes wireless communication via Bluetooth. The heart of the new BioSleeve is a custom designed data acquisition (DAQ) device; this device was designed around a PIC32 microcontroller. This project focused on developing the DAQ's embedded software and debugging the DAQ's hardware. This project also focused on fabricating and debugging the BioSleeve's electrodes, as well as designing tests to validate hardware functionality. The new BioSleeve will collect a larger quantity of EMG data with greater precision without the need for an umbilical cord tying the user to a computer. Furthermore, the BioSleeve's improved data acquisition will allow for the classification of more gestures with higher accuracy.