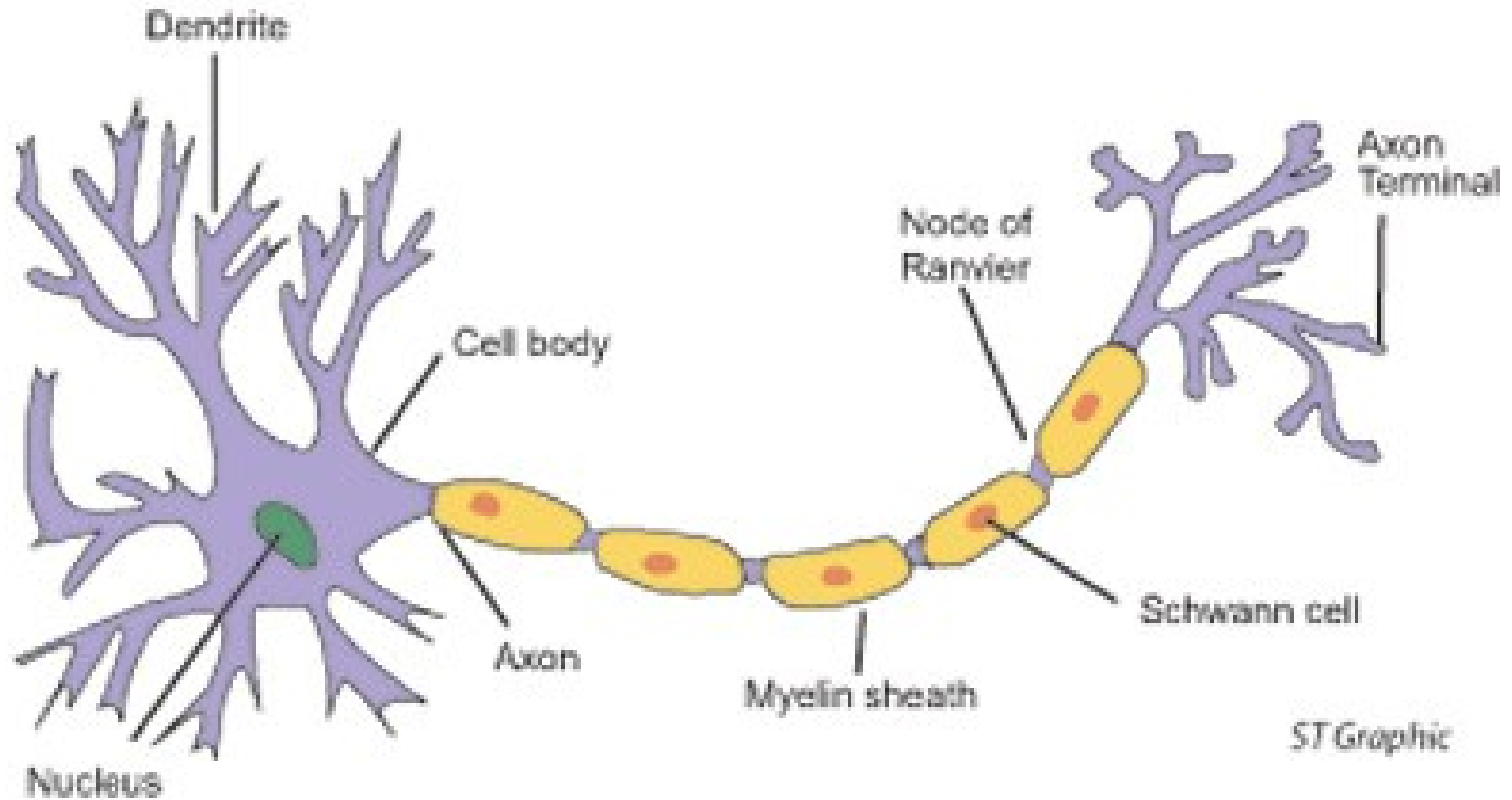


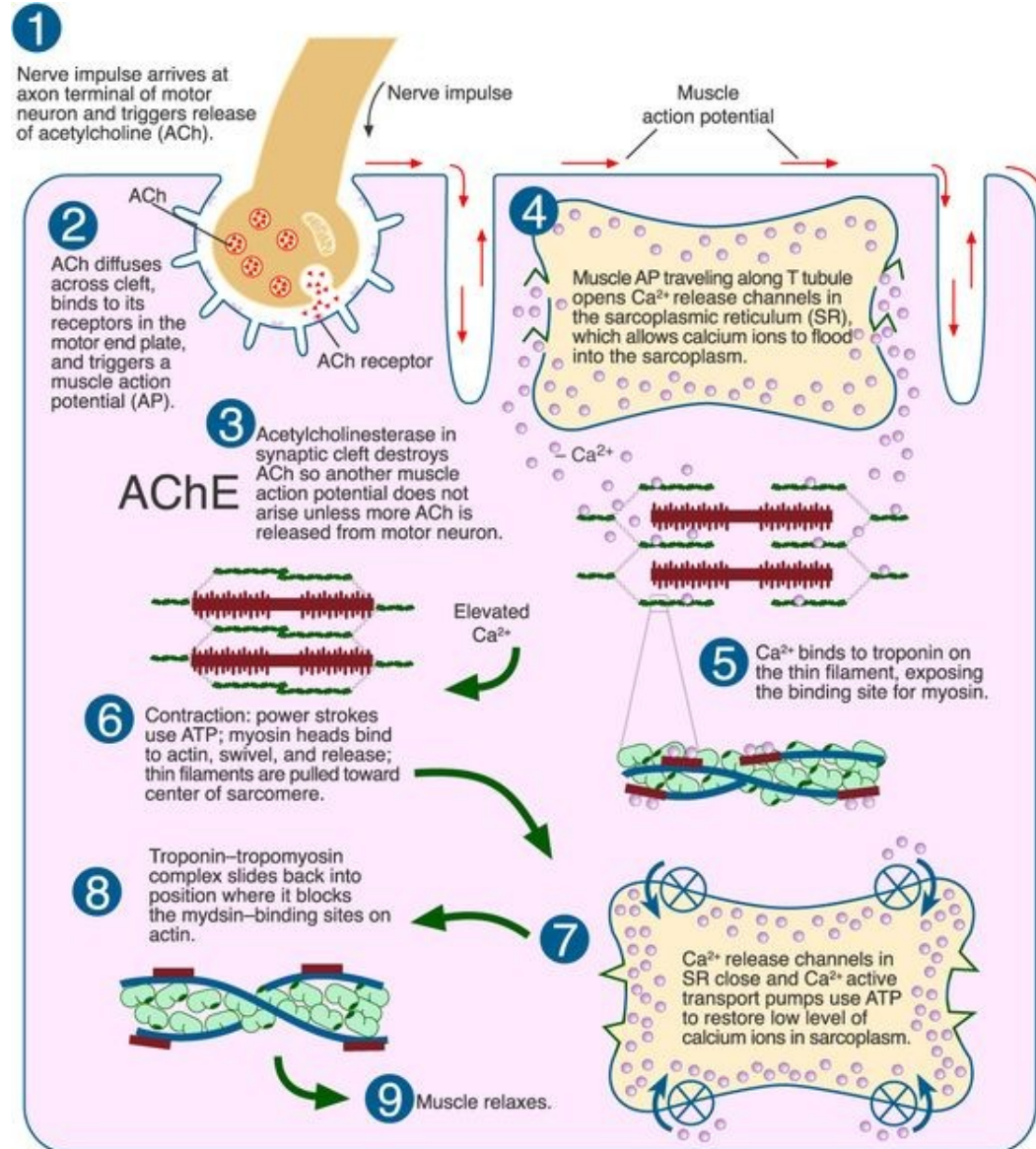
Measurements of Muscle Activation – Brandon Mai

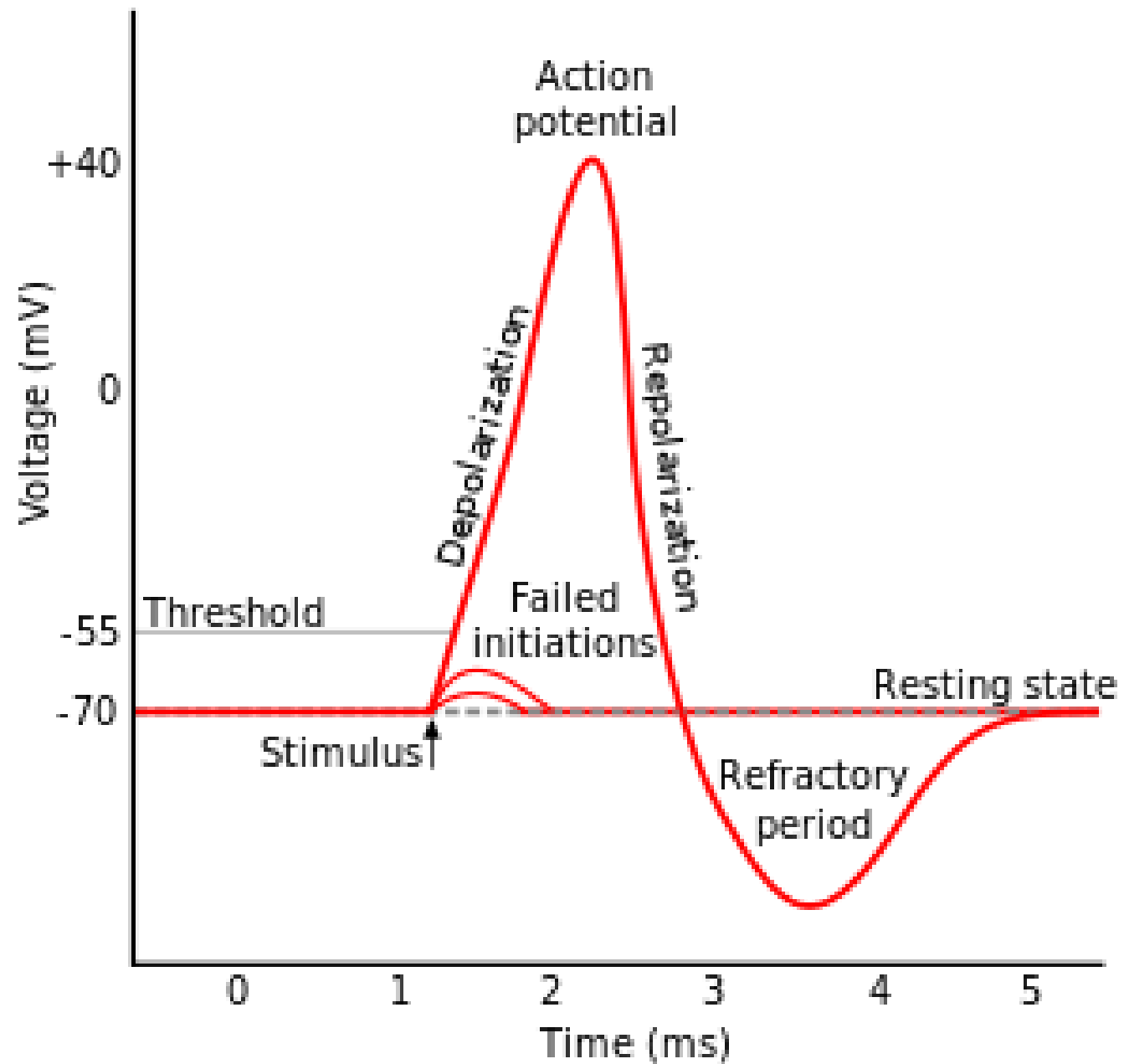
Background Information

Motor neurone



ST Graphic





The background features three overlapping circles in two shades of blue (a darker medium blue and a lighter sky blue) arranged horizontally. A solid white horizontal band cuts across the middle of the circles. The text "Our Experiment" is centered within this white band.

Our Experiment

1. Introduction

This document is an accompaniment to the *Shimmer3 EMG Unit* (called *EMG Unit* in the rest of this document). Its purpose is to aid the user in getting started with EMG measurements.

The *EMG Unit* can be configured to measure electrical signals from the skin, including EMG (Electromyograph). Any user who wishes to use Shimmer hardware to record ECG (Electrocardiograph) signals from the skin should refer to the *Shimmer3 ECG User Guide*, which is available for download from <http://www.shimmersensing.com>.

The five-wire *EMG Unit* can be configured to record the electrical activity associated with skeletal muscle contractions; this can be used to analyze and measure the biomechanics of human or animal movement. The *EMG Unit* is non-invasive, measuring surface EMG and, therefore, the activity it measures is a representation of the activity of the whole muscle or group of muscles whose electrical activity is detectable at the electrode site. The *EMG Unit* offers a wireless solution for a host of muscle, gait and posture disturbances in an easy to integrate and ergonomically valuable arrangement. Signals are collected from the skin via five wires, which are connected externally to the *Shimmer3 EMG Unit*, and to which should be attached conventional disposable electrodes. The *EMG Unit* uses a low-power, multichannel analog front-end especially designed for biopotential measurements, consisting of delta-sigma analog-to-digital converters and programmable gain amplifiers.

3.1. Basic System Overview

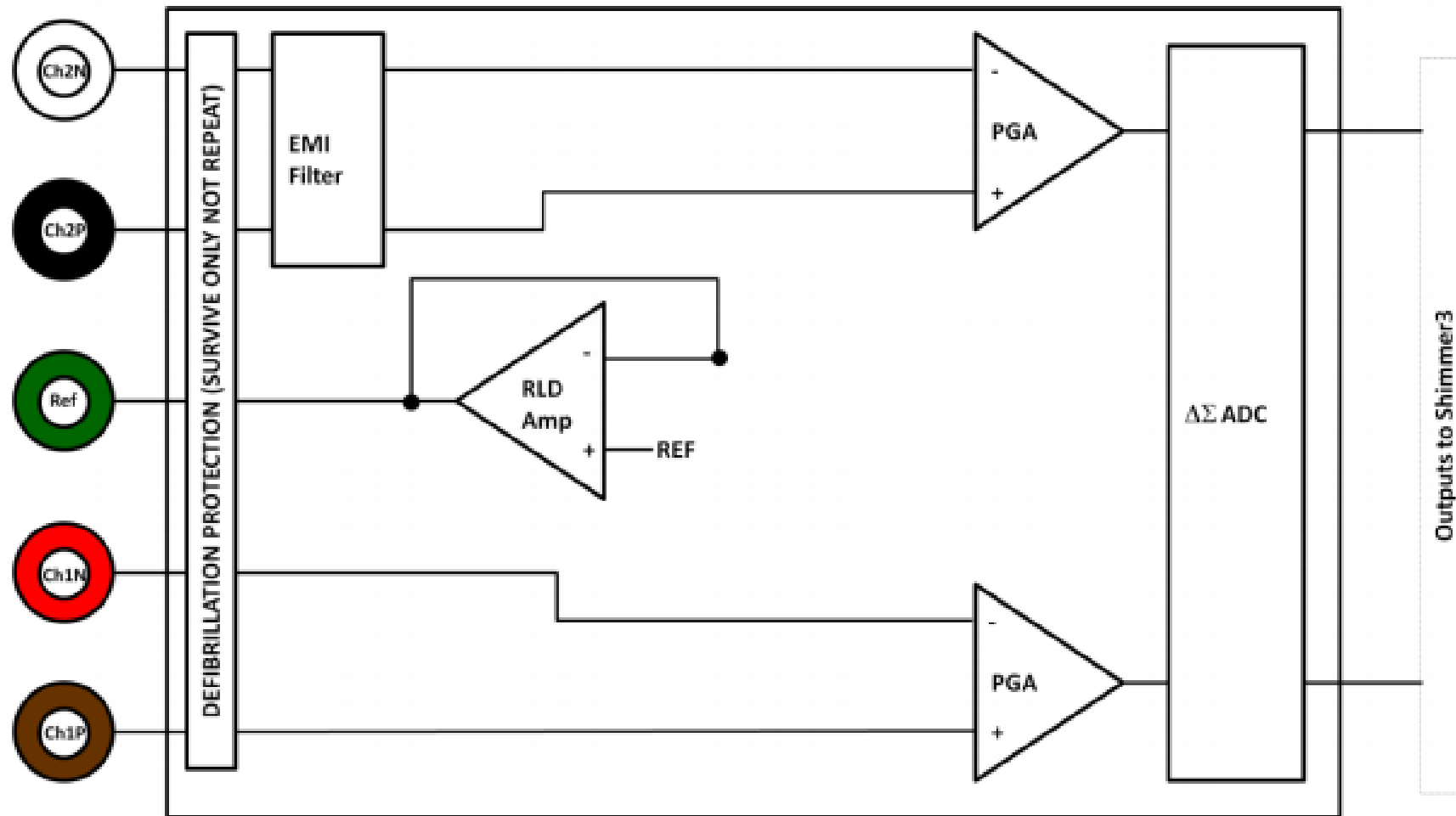


Figure 3-1: Simplified Block Diagram

TRIAL NAME: EMGtest

SHIMMER NAME: id9E0B

SAMPLING RATE (Hz): 100.52

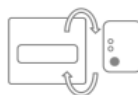
 Reset Shimmer Config

Start/Stop Logging Method

User Button



Undock/Dock



All config options above apply to each of the Shimmers listed in the table below

AVAILABLE SHIMMERS

LOCATION ^	BT RADIO ID	EXPANSION	SHIMMER NAME
COM6	9E0B	ECG/EMG/Resp	id9E0B

Low-Noise Accelerometer



Wide-Range Accelerometer



Range: +/- 2g

Gyroscope



Range: +/- 500dps

Magnetometer



Range: +/- 1.3Ga

Pressure & Temperature



Resolution: Low

Battery Voltage



External Expansion ADCs

Ext A6



Ext A7



Ext A15



ECG/EMG



Gain: 12



Resolution: 24-bit

BACK























WRITE CONFIG

AVAILABLE SHIMMERS (1/2) (SELECT SHIMMERS FROM THE TABLE FOR BLUETOOTH CONFIGURATION)



DATA VISUALISATION (Active: Plot 1)



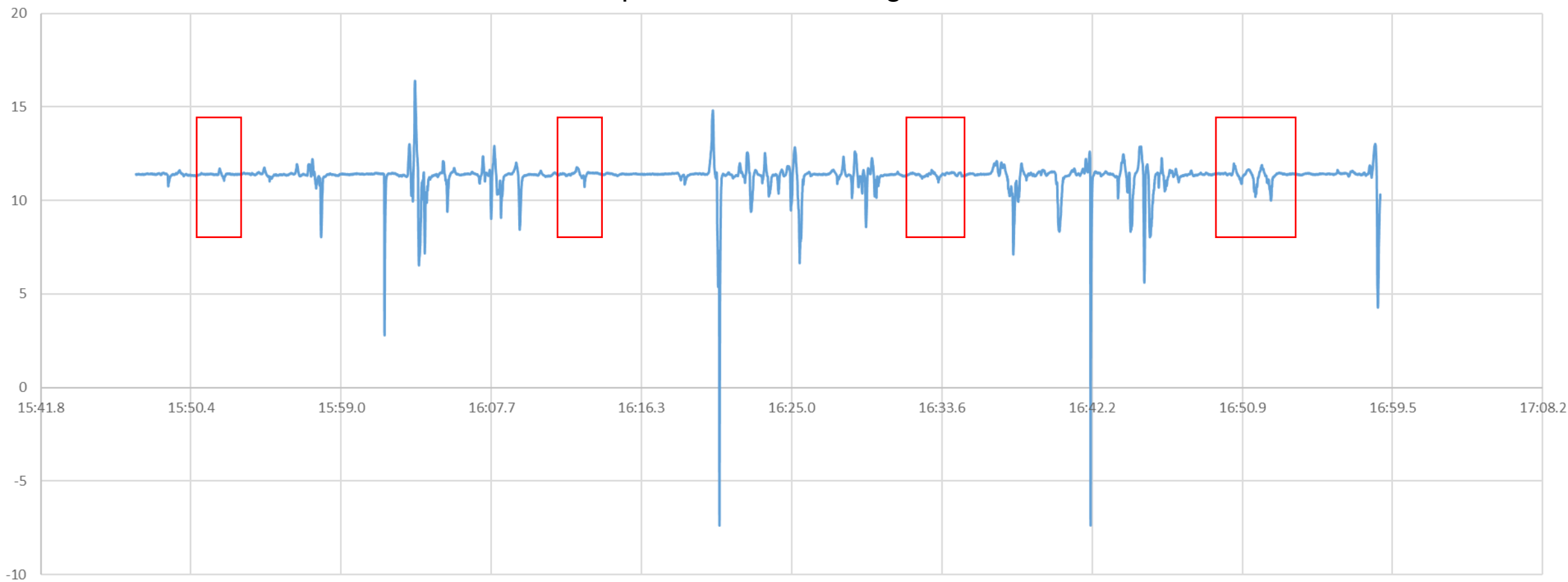
SELECT	DEVICES	RECORDING DETAILS AND STATUS
	9E0B (id9E0B)   Exp: ECG/EMG/Resp Fw: v0.6.0 Fs: 100.51Hz State: Ready %Packets: N/A <div><input type="checkbox"/> Device Properties <input type="checkbox"/> Low-Noise Accelerometer <input type="checkbox"/> Gyroscope <input type="checkbox"/> Magnetometer <input type="checkbox"/> Battery <input type="checkbox"/> Wide-Range Accelerometer <input type="checkbox"/> EMG</div>	   Trial: EMGtest Time: 2018/03/15 11:40:56   Live Session: N/A
	8DC3 (id8DC3)   Exp: GSR+ Fw: v0.6.0 Fs: 51.2Hz State: Disconnected %Packets: N/A	   Trial: default_exp Time: 1969/12/31 16:00:00   Live Session: N/A
<div><div> CONNECTION (1/2)</div><div> CONFIGURE (1/1)</div><div> STREAM (1/1)</div><div> RECORD (1/1)</div></div> <div><div> CONNECT (0/1)</div><div> DISCONNECT (1/1)</div></div>		



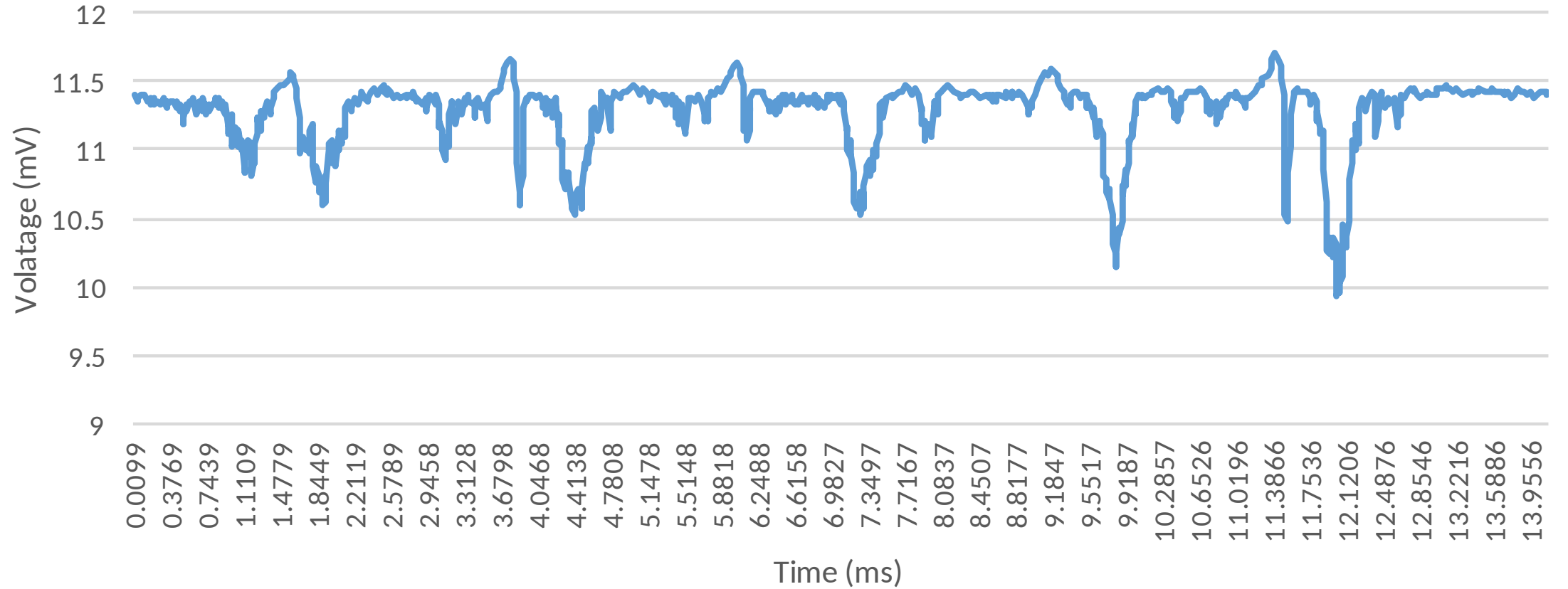


Our Findings

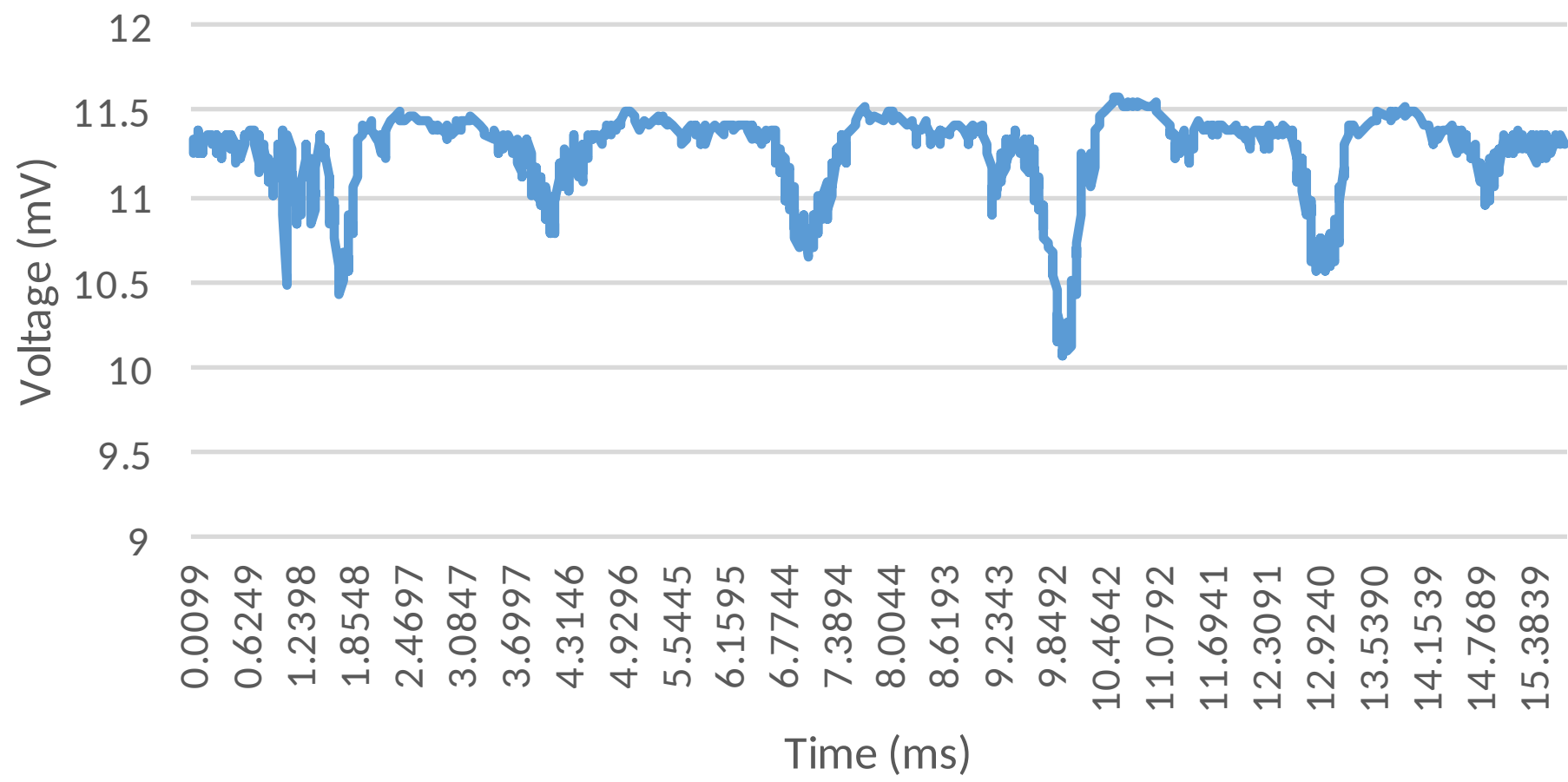
Bicep Curl with Multi Weights



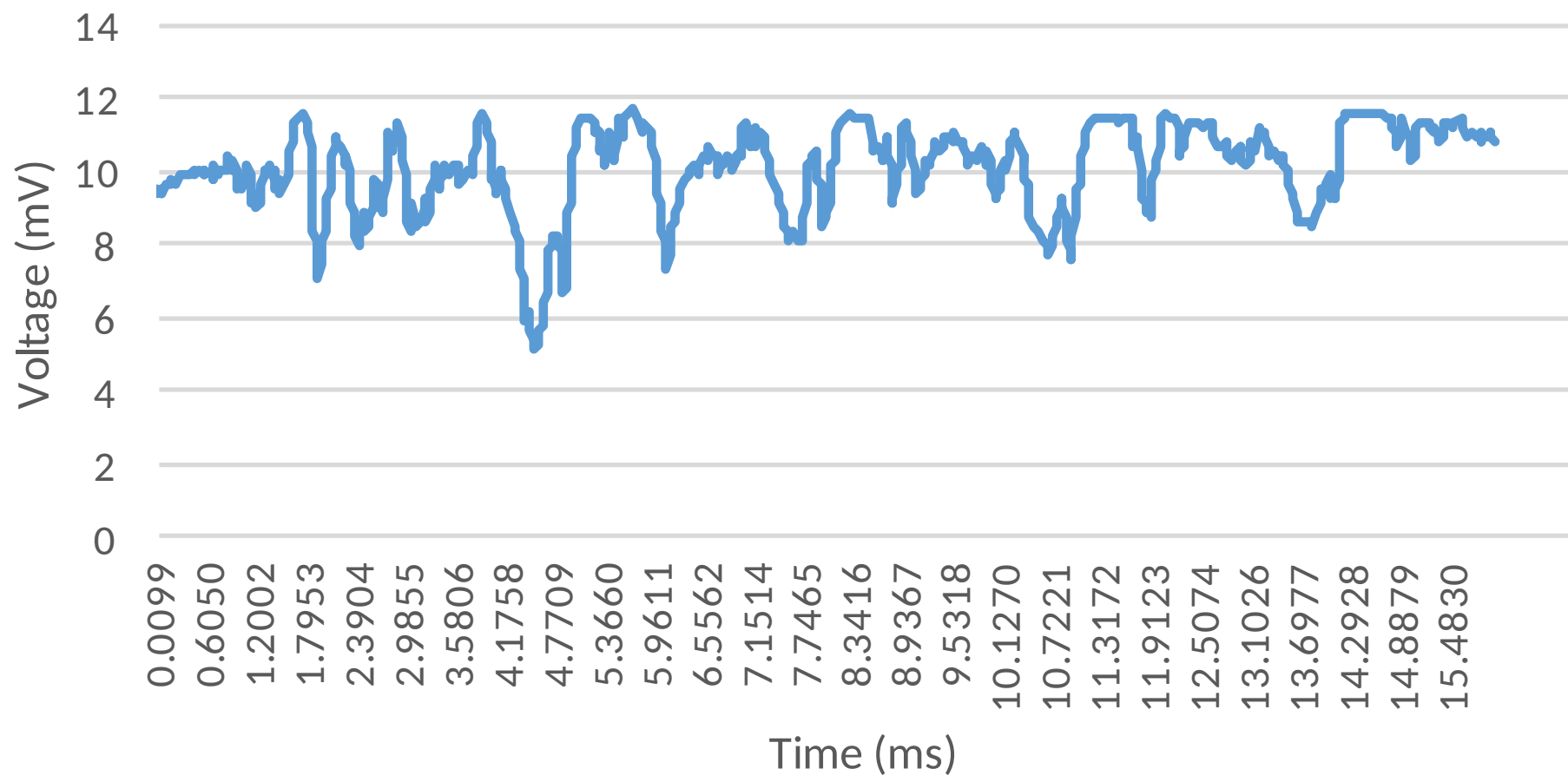
Bicep Curl With No Weight



Bicep Curl With 10lbs



Bicep Curl With 15lbs



Bicep Curls With 20lbs

