ArmOrQol

A bionic prosthesis based on electrical muscle signals

Aim of the project

In Kazakhsta, there are

12794

people with upper and lower limb amputatations

Approximately

5000

prostheses are purchased by the government annualy

Most of them are mechanical, where one's price exceeds

700,000 KZT

A Russian company that manufactures bionic prostheses

bebionic

Germany

11,100 $

600 g

touch bionics BY ÖSSUR

England

от 33,000 $

515 g

Michelangelo

Germany

60,000 $

420 g

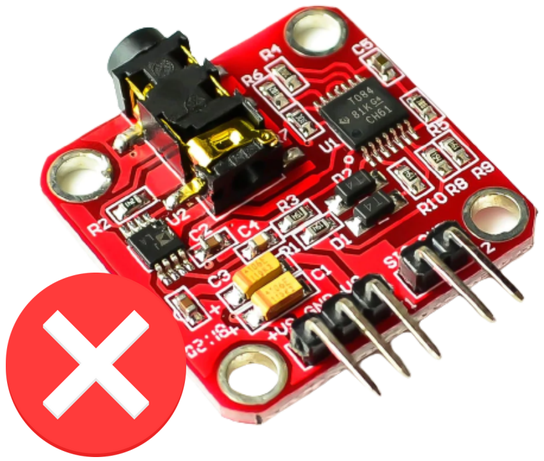
MOBIUS bionics

England

100,000 $

1400 g

Muscle sensor kit v3



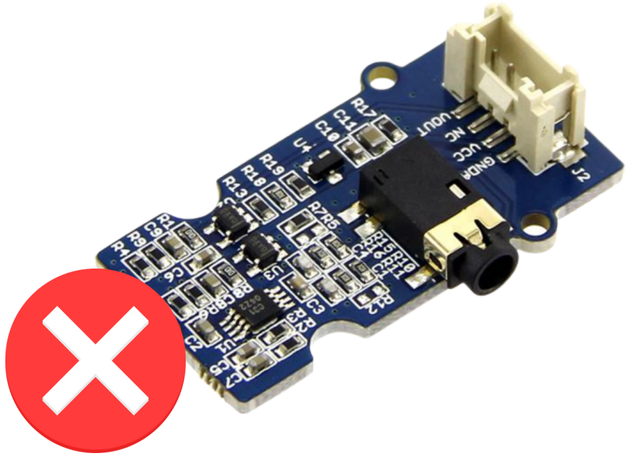
8,000 KZT

By

25

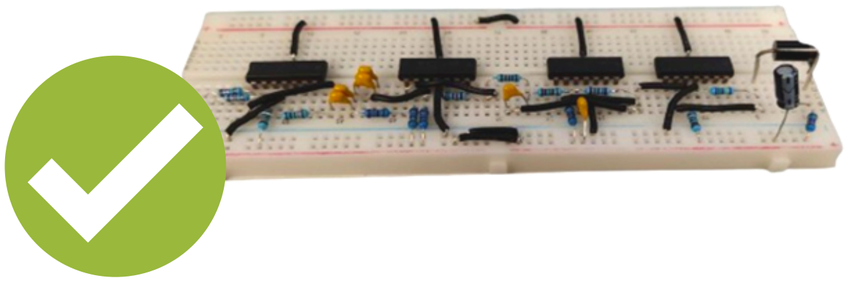
times less expenses

Grove EMG detector



56,000 KZT

DIY muscle sensor



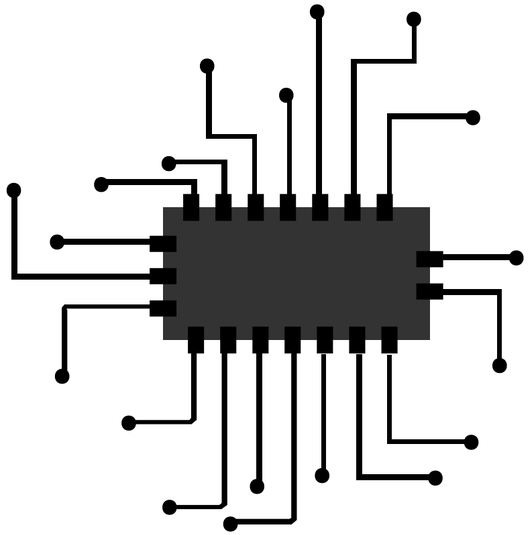
- Prosthesis
- Exoskeleton
- Robot arm, wheelchair control

Principle of work

1 Acquistion

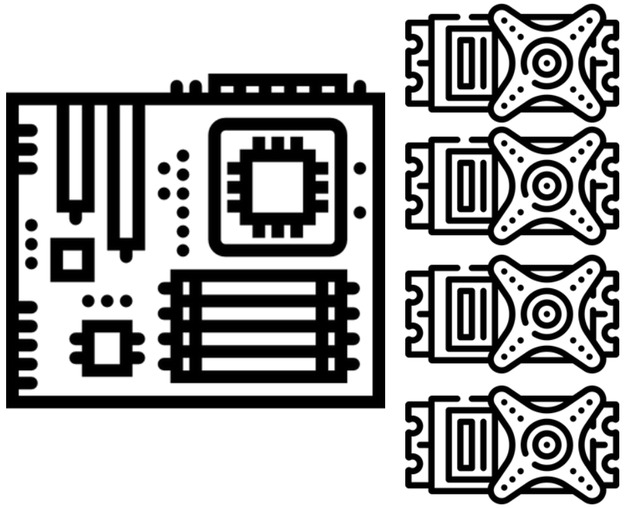
- Two sEMG channels on two muscle groups

2 Sensor Circuit



- Two stage amplification
- Filtering
- Rectification

3 Programming

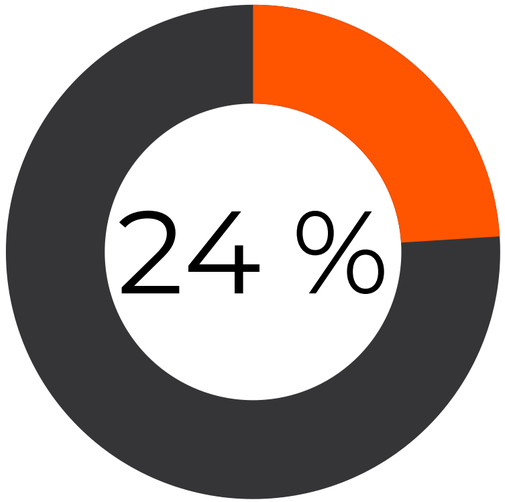


- Servomotor rotation proportional to the sEMG signal amplitude

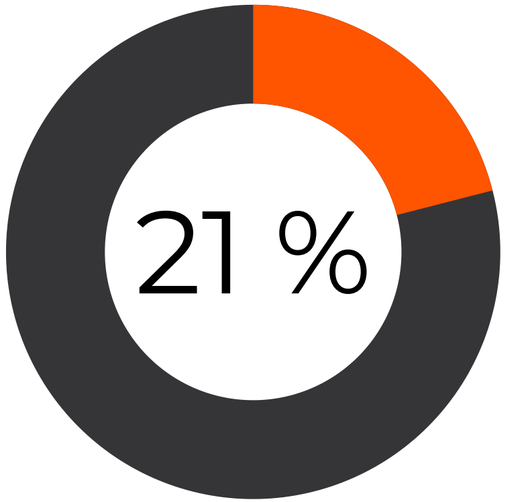
4 Control

- Five finger flexion (simultaneous)
- 90 degrees wrist rotation

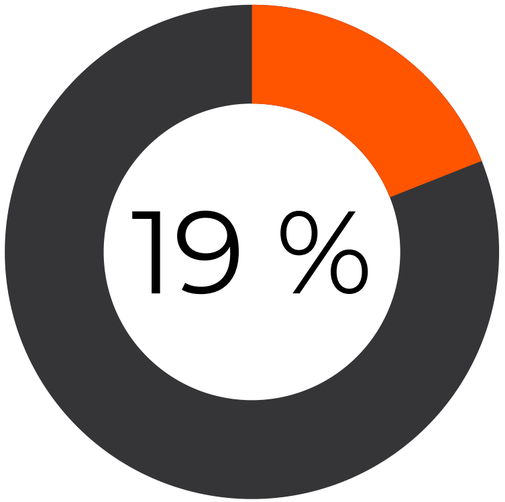
Cost price: 47,459KZT



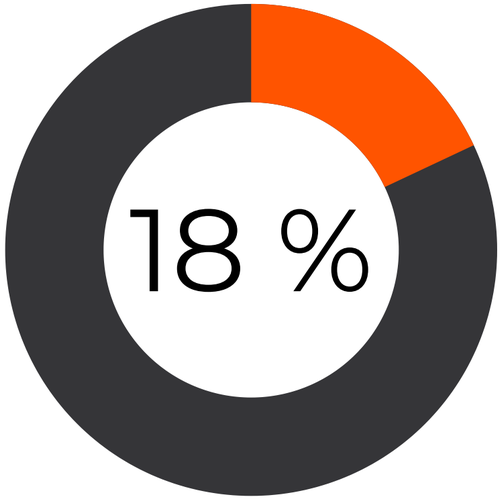
Arduino & Servo Shield



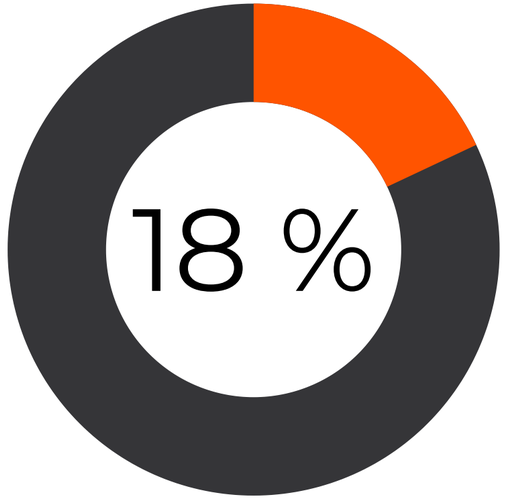
Electronics



PLA plastic

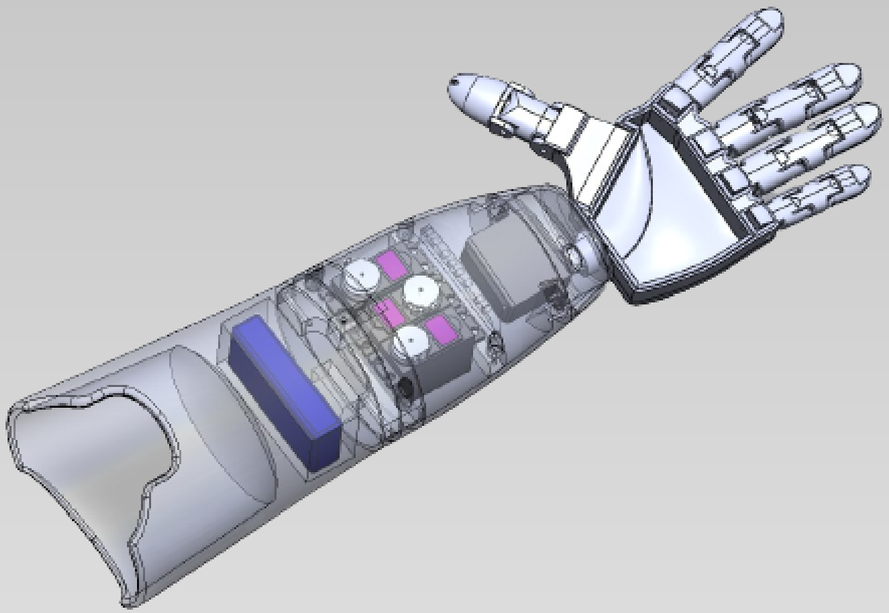


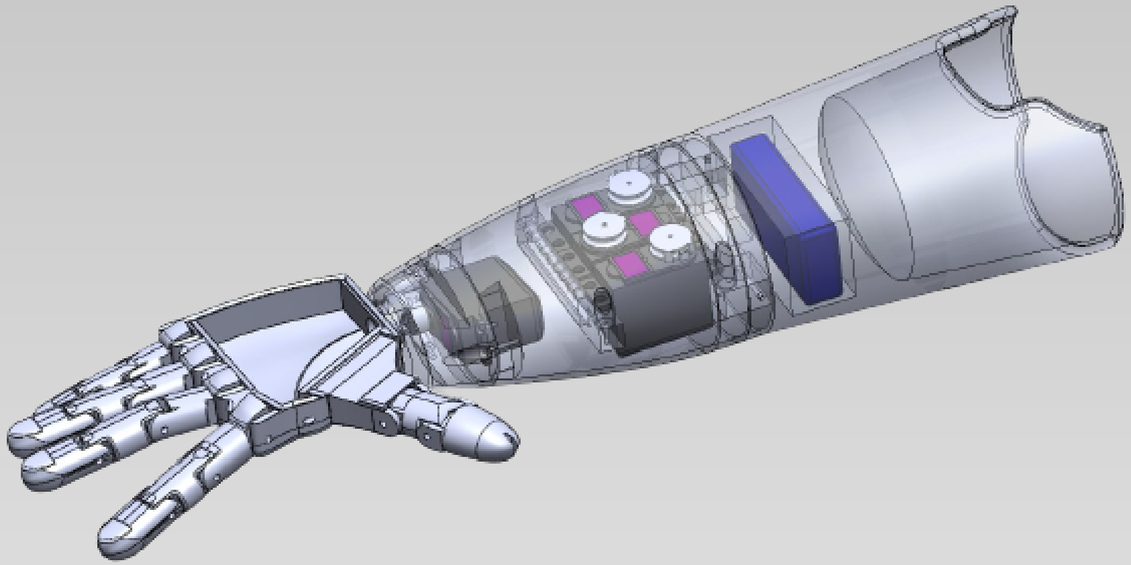
Servomotors



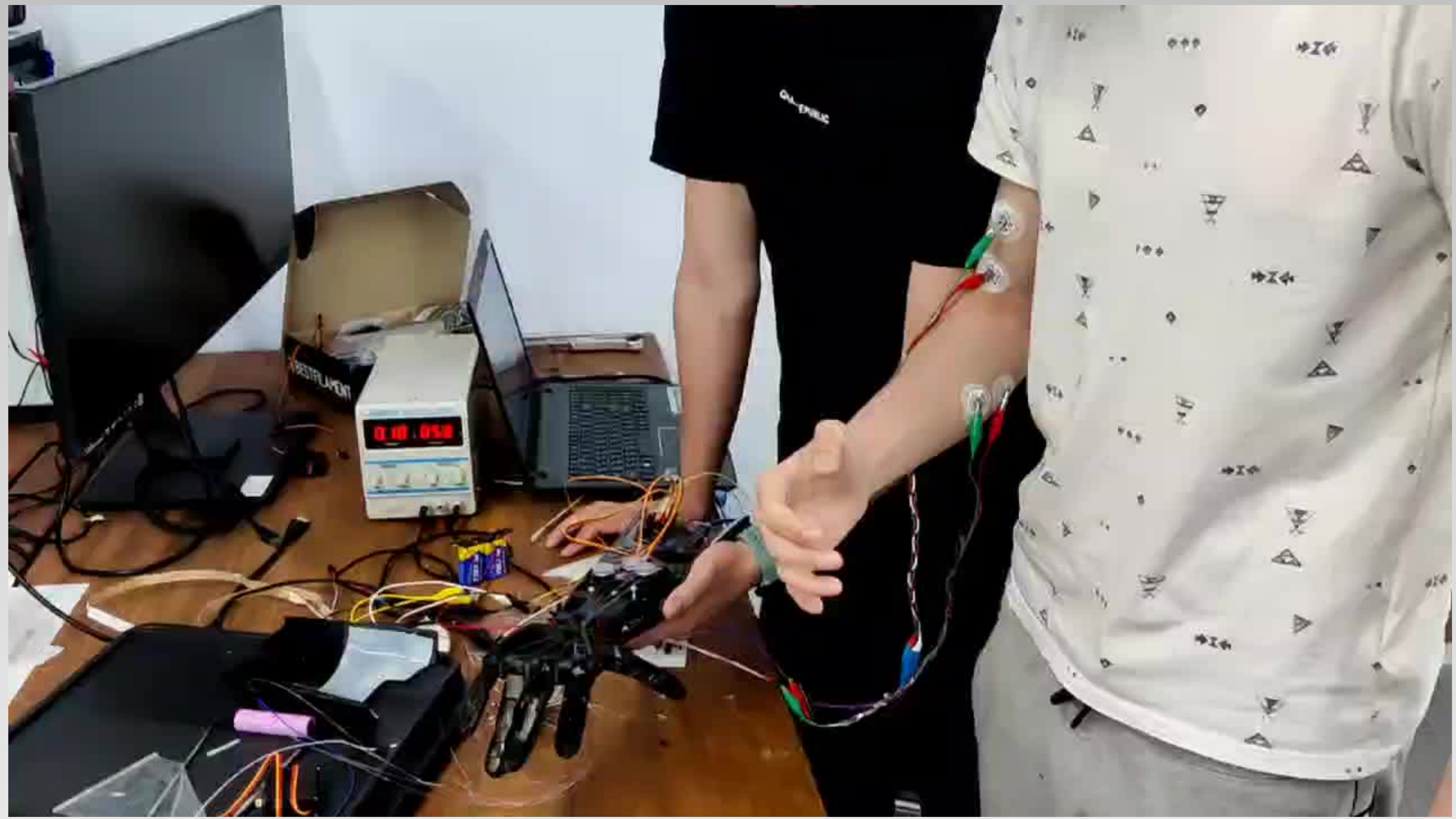
Other (silicon, aceton, bolts и oth.)

3D model of the prosthesis





Project demonstration



Appendix

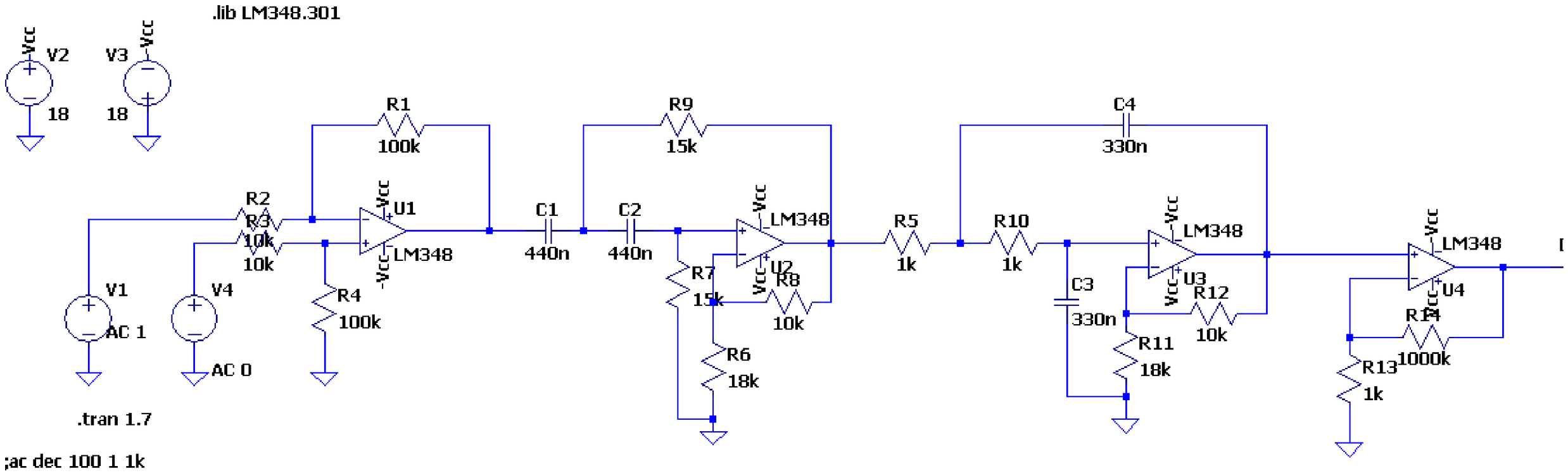


Figure 1. The EMG sensor circuit in LTSpice XVII

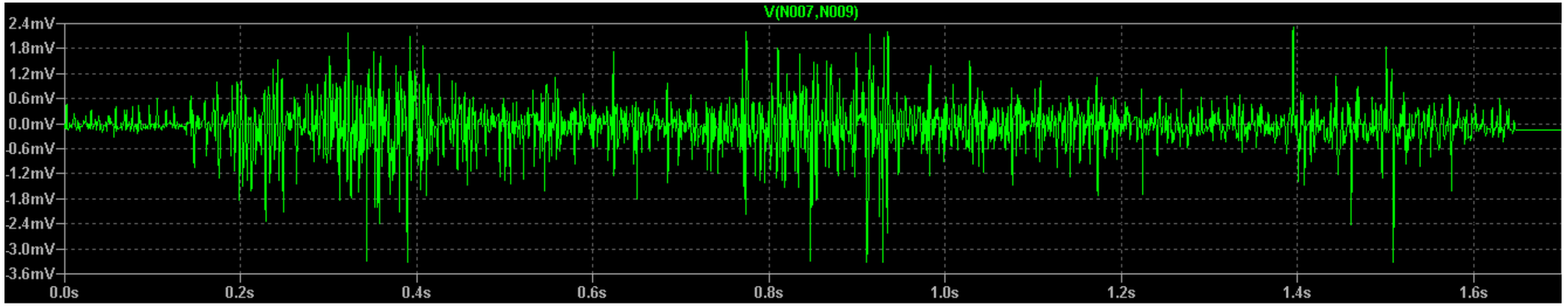


Figure 2. The input signal of 2-3 millivolts

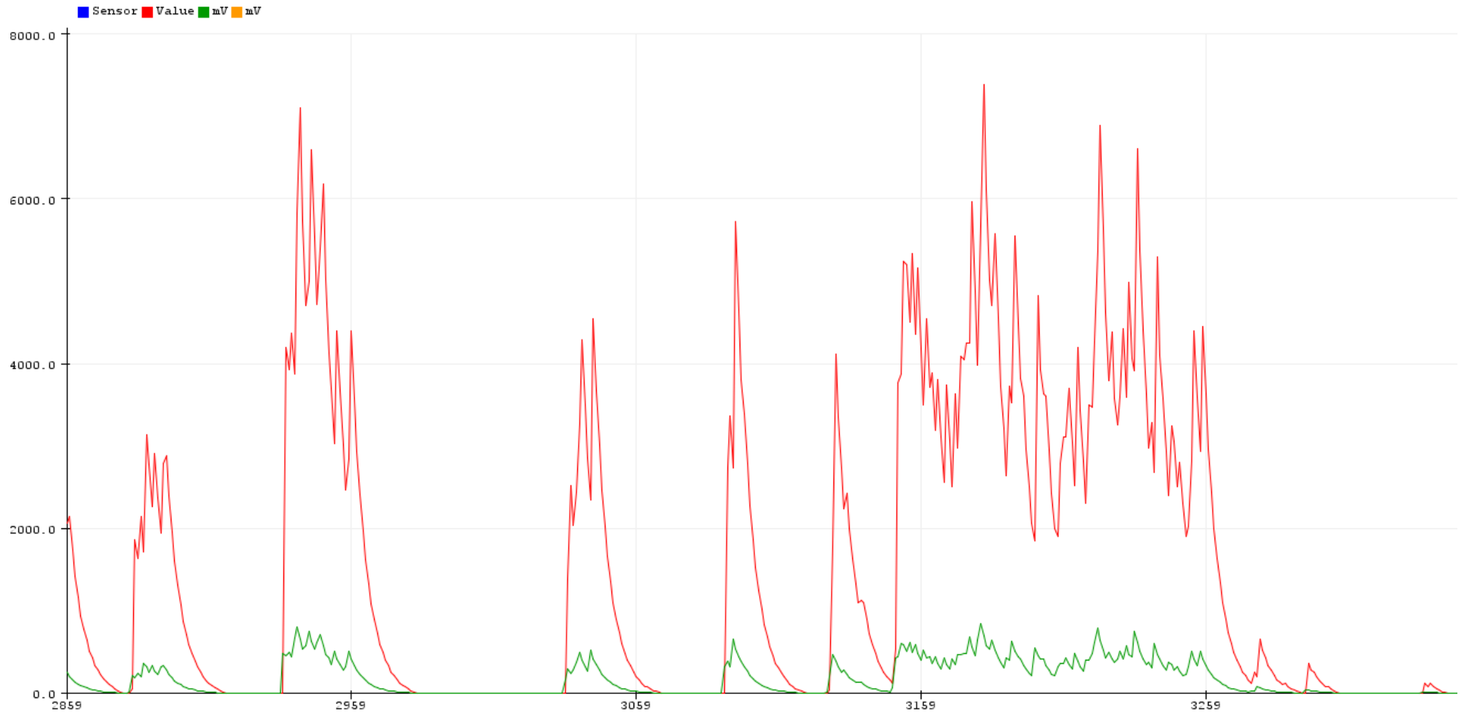


FIgure 3. The amplified, rectified and filtered output EMG signal of 4-6 volts