Muscle BioAmp Candy

Upside Down Labs

Mar 29, 2024

CONTENTS

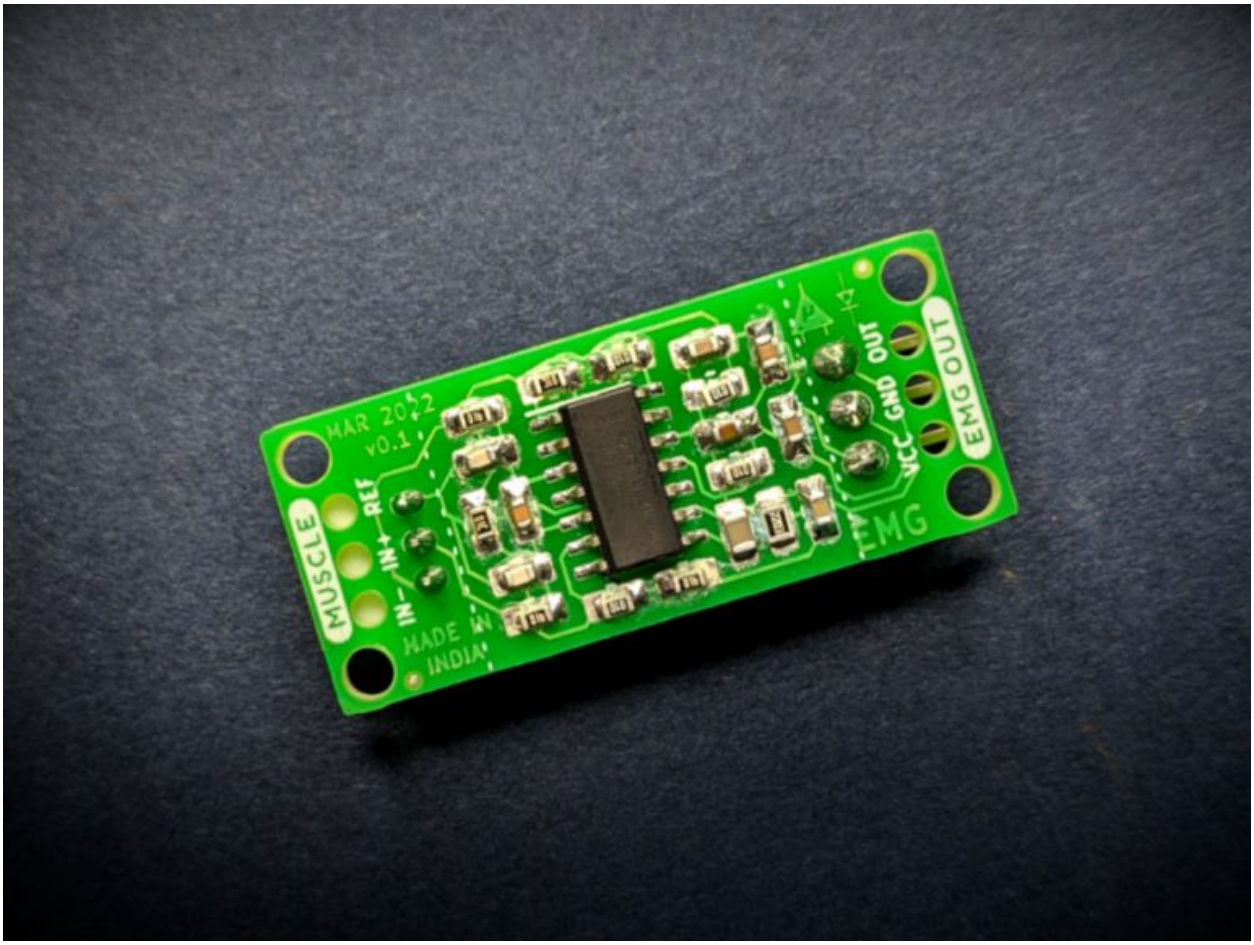
Candy-size affordable muscle sensor for precise EMG sensing.

CHAPTER

ONE

OVERVIEW

A candy-size single-channel ElectroMyography (EMG) sensor for precise recording of muscle signals at an affordable cost. It is an SMD version of Muscle BioAmp BisCute that can be used to make amazing Human-Computer Interface (HCI) projects. To record the EMG signals you can use any standalone ADC like ADS1115 or any microcontroller development board with an ADC of your choice like Arduino UNO/Nano.



CHAPTER

TWO

FEATURES & SPECIFICATIONS

Minimum Input Voltage	3.3-30 V
Input Impedance	10^11 ohm
Fixed Gain	x2420
Bandpass filter	72 – 720 Hz
Compatible Hardware	Any development board with an ADC (Arduino UNO & Nano, Espressif ESP32, Adafruit QtPy, STM32 Blue Pill, BeagleBone Black, Raspberry Pi Pico, to name just a few)
BioPotentials	EMG (Electromyography)
No. of channels	1
Electrodes	3 (Positive, Negative, and Reference)
Dimensions	3.5 x 1.5 cm
Open Source	Hardware + Software

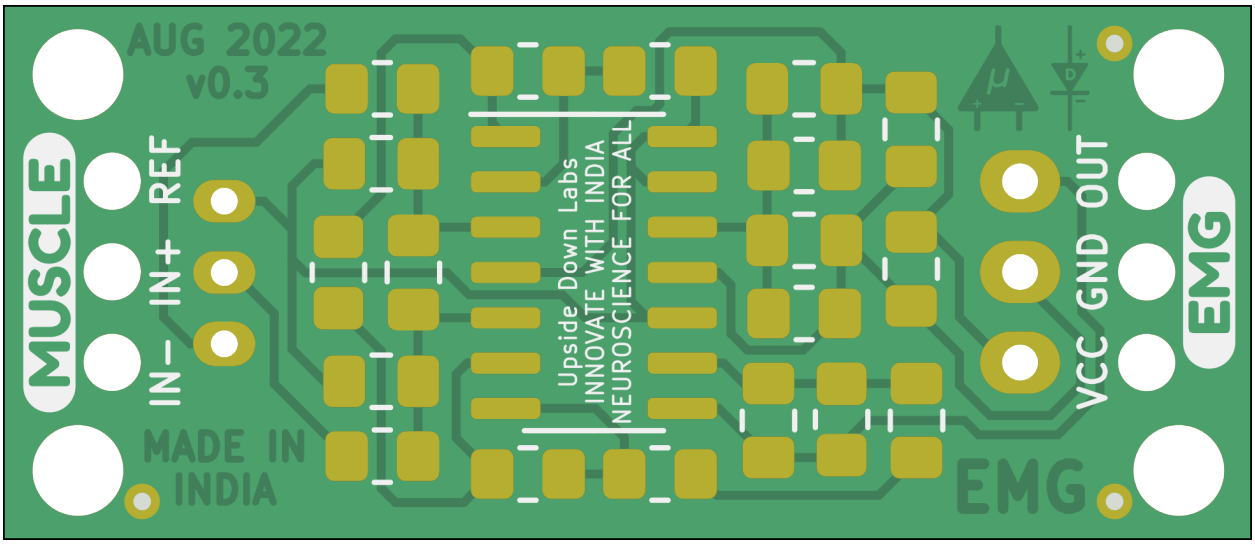
CHAPTER

THREE

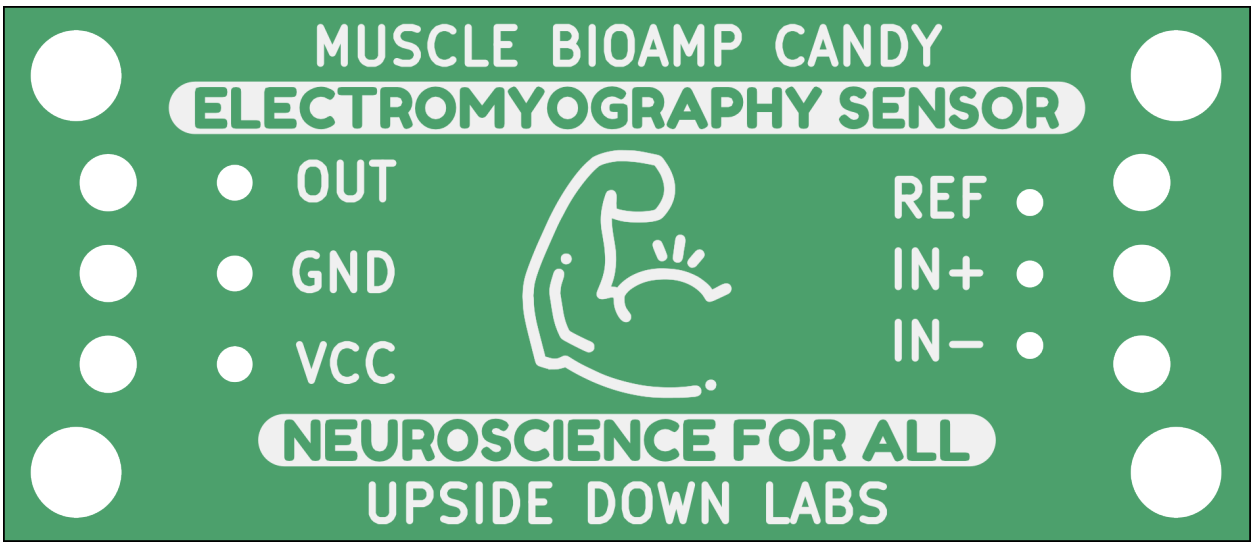
HARDWARE

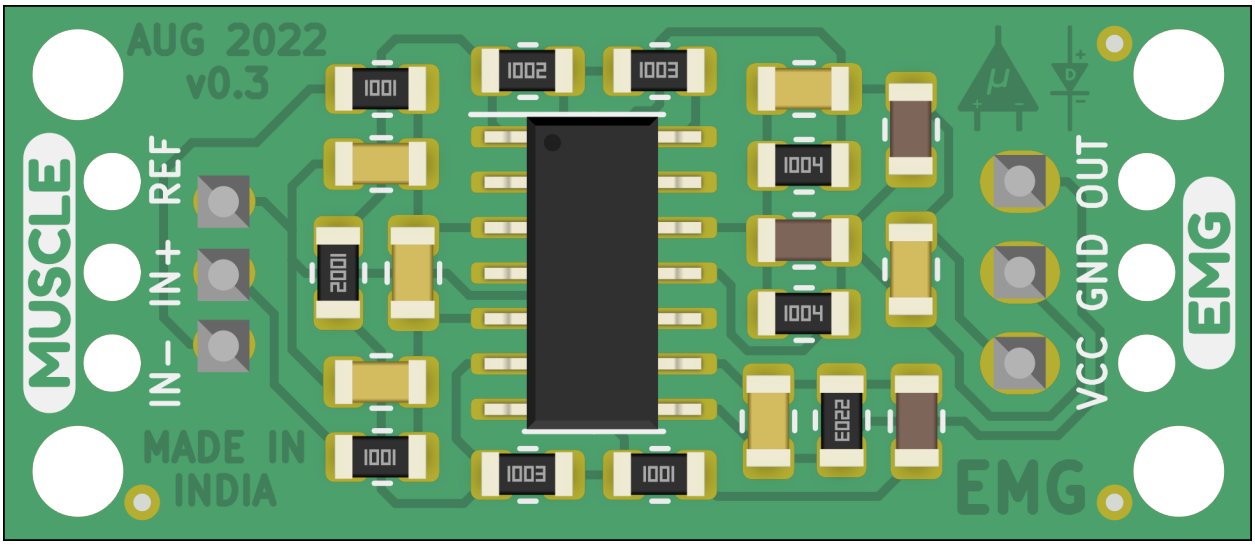
Images below shows a quick overview of the hardware design.

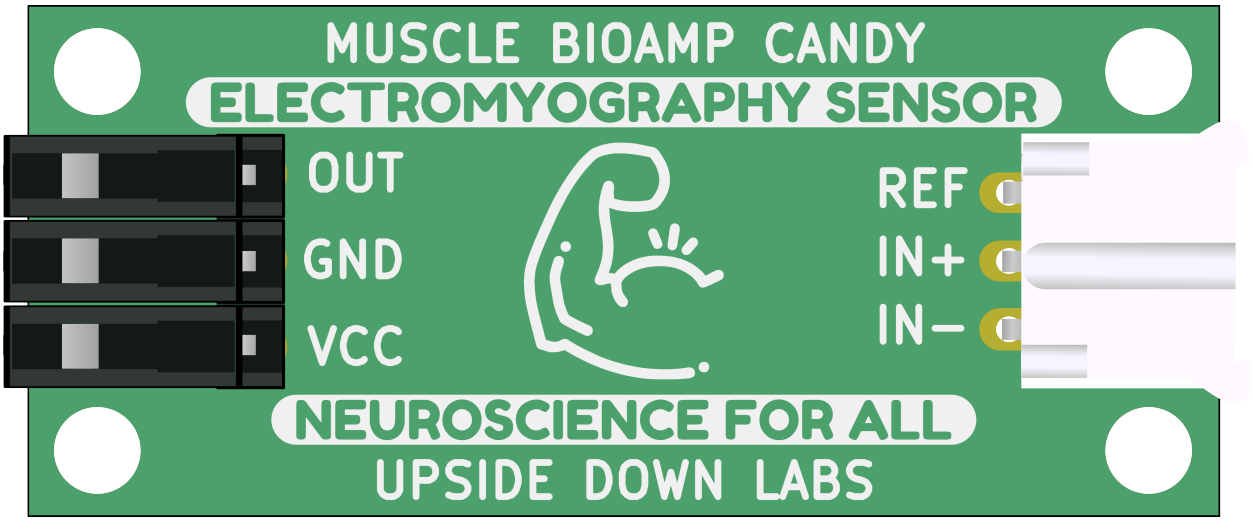
PCB Front



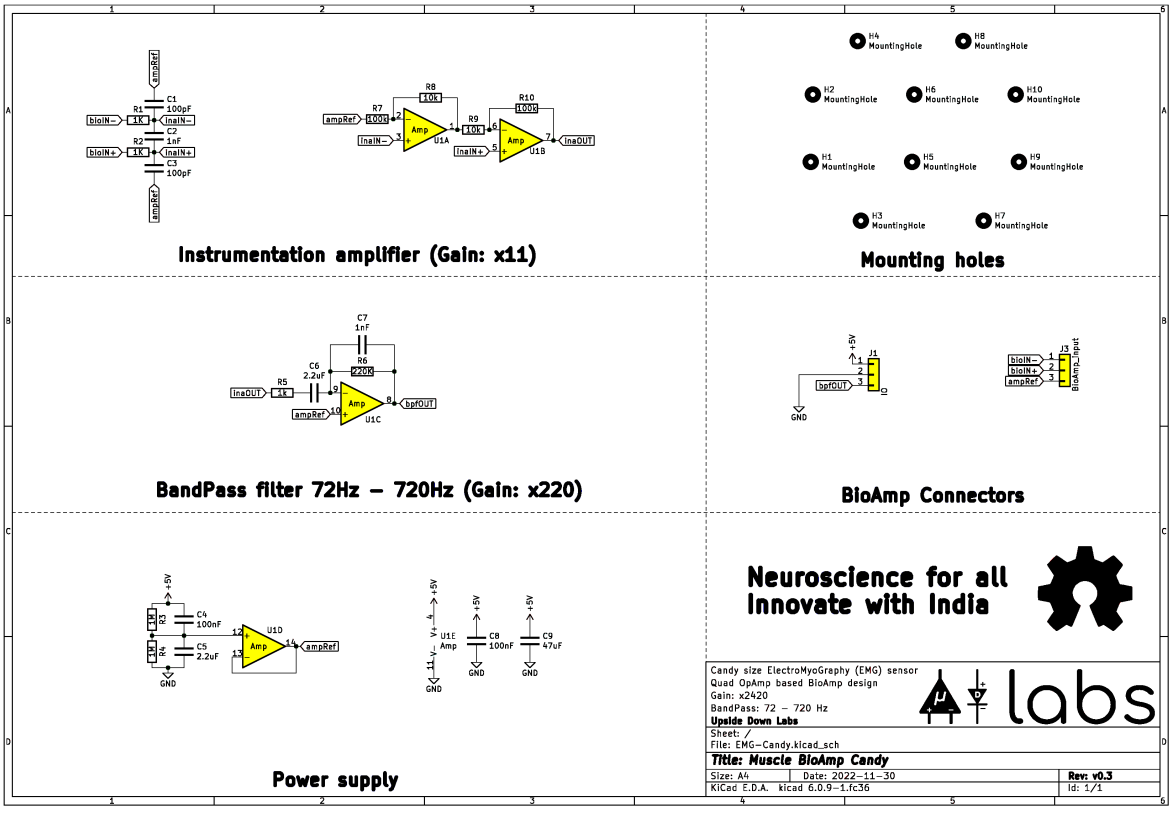
PCB Back




AUG 2022
v0.3
MUSCLE
IN− IN+ REF
MADE IN INDIA
VCC GND OUT
EMG
EMG


MUSCLE BIOAMP CANDY
ELECTROMYOGRAPHY SENSOR
OUT
GND
VCC
REF
IN+
IN−
NEUROSCIENCE FOR ALL
UPSIDE DOWN LABS


35.0000 mm
15.0000 mm
AUG 2022
v0.3
MUSCLE
IN− IN+ REF
MADE IN INDIA
VCC GND OUT
EMG
EMG
GND
+5V


ampRef
C1
100pF
R1
1K
bioIN−
inaIN−
C2
1nF
R2
1K
bioIN+
inaIN+
C3
100pF
ampRef
R8
10k
R7
100k
ampRef
inaIN−
Amp
U1A
R9
10k
R10
100k
inaIN+
Amp
U1B
inaOUT
Instrumentation amplifier (Gain: x11)
H4 MountingHole
H8 MountingHole
H2 MountingHole
H6 MountingHole
H10 MountingHole
H1 MountingHole
H5 MountingHole
H9 MountingHole
H3 MountingHole
H7 MountingHole
Mounting holes
C7
1nF
R6
220K
C6
2.2uF
R5
5k
inaOUT
Amp
U1C
ampRef
bpfOUT
BandPass filter 72Hz – 720Hz (Gain: x220)
+5V
J1
bpfOUT
GND
bioIN−
bioIN+
ampRef
J3
BioAmp_Input
BioAmp Connectors
+5V
R3
1K
C4
100nF
R4
1K
C5
2.2uF
GND
U1D
Amp
ampRef
+5V
U1E
Amp
C8
100nF
C9
47uF
GND
GND
Power supply
Neuroscience for all
Innovate with India
Candy size ElectroMyoGraphy (EMG) sensor
Quad OpAmp based BioAmp design
Gain: x2420
BandPass: 72 – 720 Hz
Upside Down Labs
Sheet: /
File: EMG-Candy.kicad_sch
Title: Muscle BioAmp Candy
Size: A4
Date: 2022-11-30
Rev: v0.3
KiCad E.D.A. kicad 6.0.9-1.fc36
Id: 1/1
labs

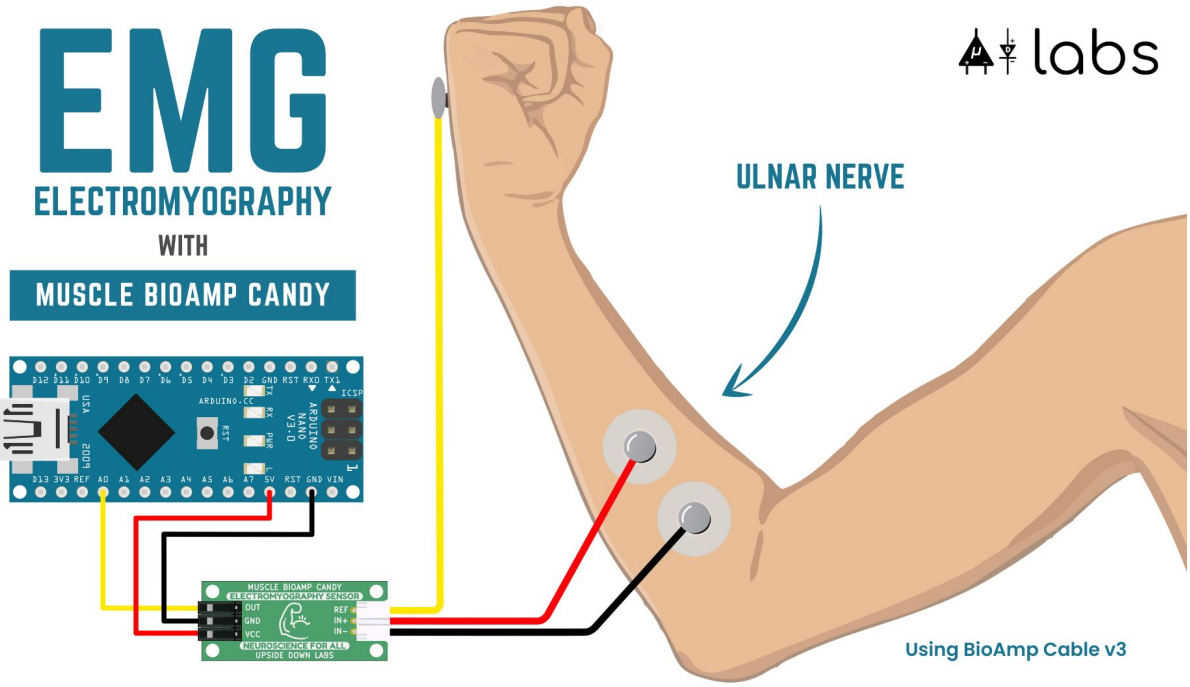
CHAPTER

FOUR

CONNECTING WITH ARDUINO

To get started, you can pair Muscle BioAmp Candy with any development board with an ADC (Arduino UNO & Nano, Espressif ESP32, Adafruit QtPy, STM32 Blue Pill, BeagleBone Black, Raspberry Pi Pico, to name just a few) or any standalone ADC of your choice.

To measure the EMG signals, connect BioAmp Cable v3 with your muscle sensor as shown in the image below:



CAUTION: Make sure to follow the above diagram while making the connections between your Muscle BioAmp Candy & Arduino (or any other ADC of your choice), especially the GND and VCC else it may damage the muscle sensor.

CHAPTER

FIVE

USING THE SENSOR

https://youtu.be/lPX2TGBcHOA

CHAPTER

SIX

SOME PROJECT IDEAS

We have curated a playlist for you which consists some awesome project ideas for you to get started with your next HCI project.