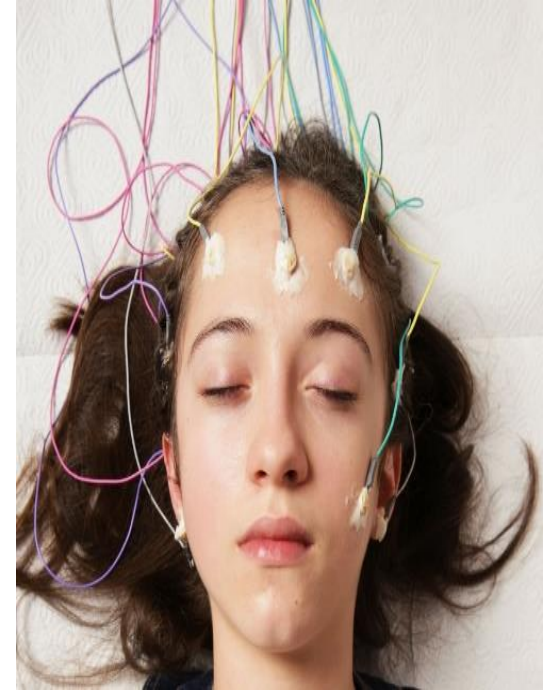# S-EEG Sensor

The dsesign of eeg circuit in multism +breadbroad +PCB

EEG Sensor

(electroencephalography)
1. It is a test used to evaluate the electrical activity in the brain.

2. Brain cells communicate with each other through electrical impulses.

3. Scalp EEG recording displays the difference in electrical potentials between two different sites on the head

EEG compared to other brain imaging techniques

PET Scan

FUNCTIONAL MAGNETIC RESONANCE IMAGING
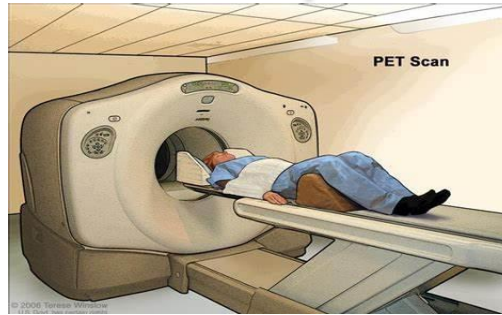
EEG Advantages
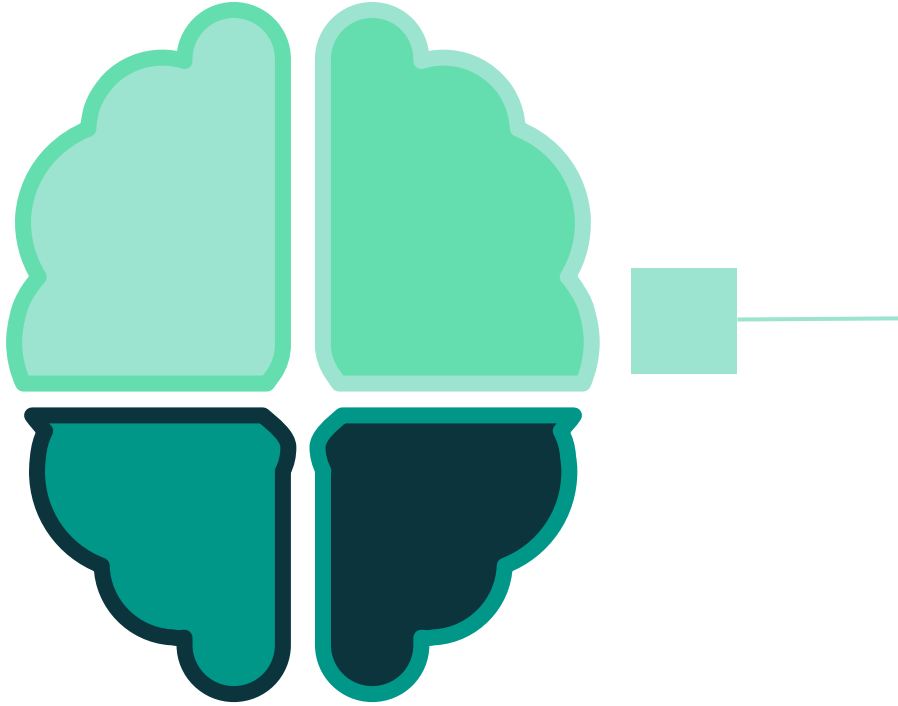
Choose EEG techniques despite the existence of better devices than other techniques.
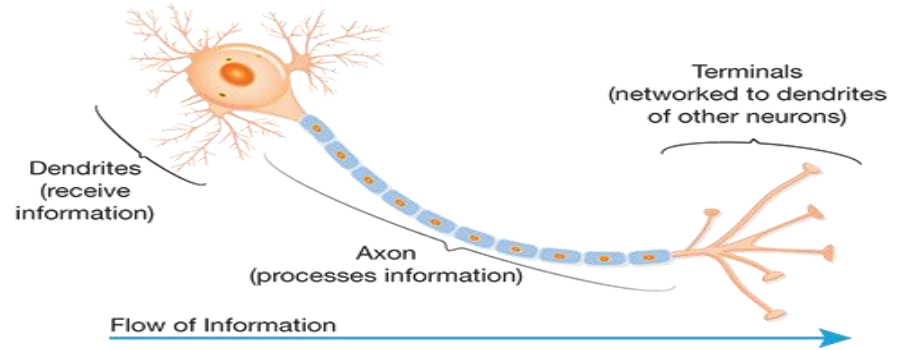
The Brain and Biological Neural Network

01 The billions of neurons in the human brain have highly complex firing patterns

02 Every interaction between these active neurons creates a minimal electrical discharge, which creates different amplitude and frequencies
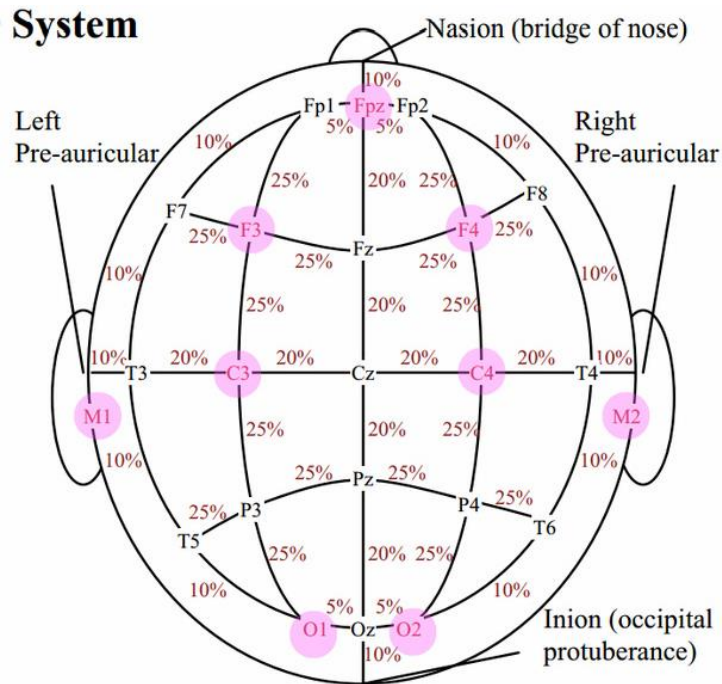
03 Action potential

Dendrites (receive information)

Terminals (networked to dendrites of other neurons)

Axon (processes information)

Flow of Information

The Ten-Twenty System

The international ten-twenty System of Electrode Placement uses on the Scalp to take signal.

Each Channel name begin

It begin with one or two letters indicating to the general brain region

Each Channel name end

It is ended by the numbers that indicating the distance between channel and middle of the brain
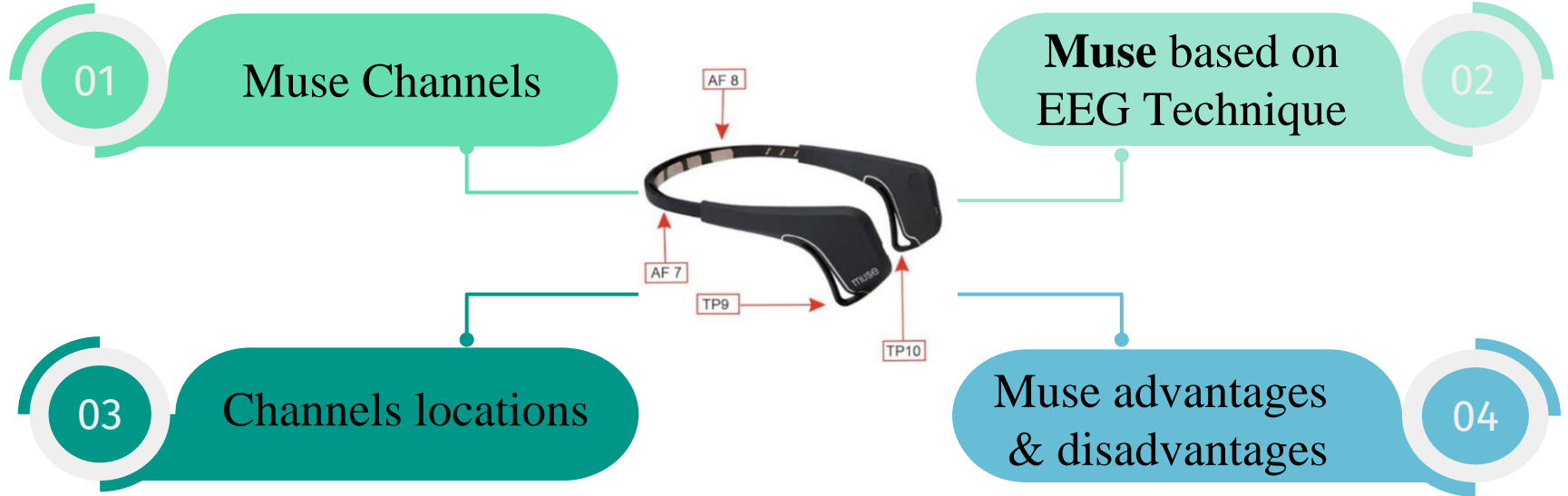
Muse & S-EEG Sensor

01 → Muse

S-EEG Sensor ← 02

Muse **Headset**

01 Muse Channels

02 **Muse** based on EEG Technique

03 Channels locations

04 Muse advantages & disadvantages

AF 8

AF 7

TP9

TP10

S-EEG Sensor

S-EEG Sensor channel TP10, FPZ

S-EEG Sensor Advantages

S-EEG Sensor output

Sensor Components

01 amplifer
Because the signal is very small in mv

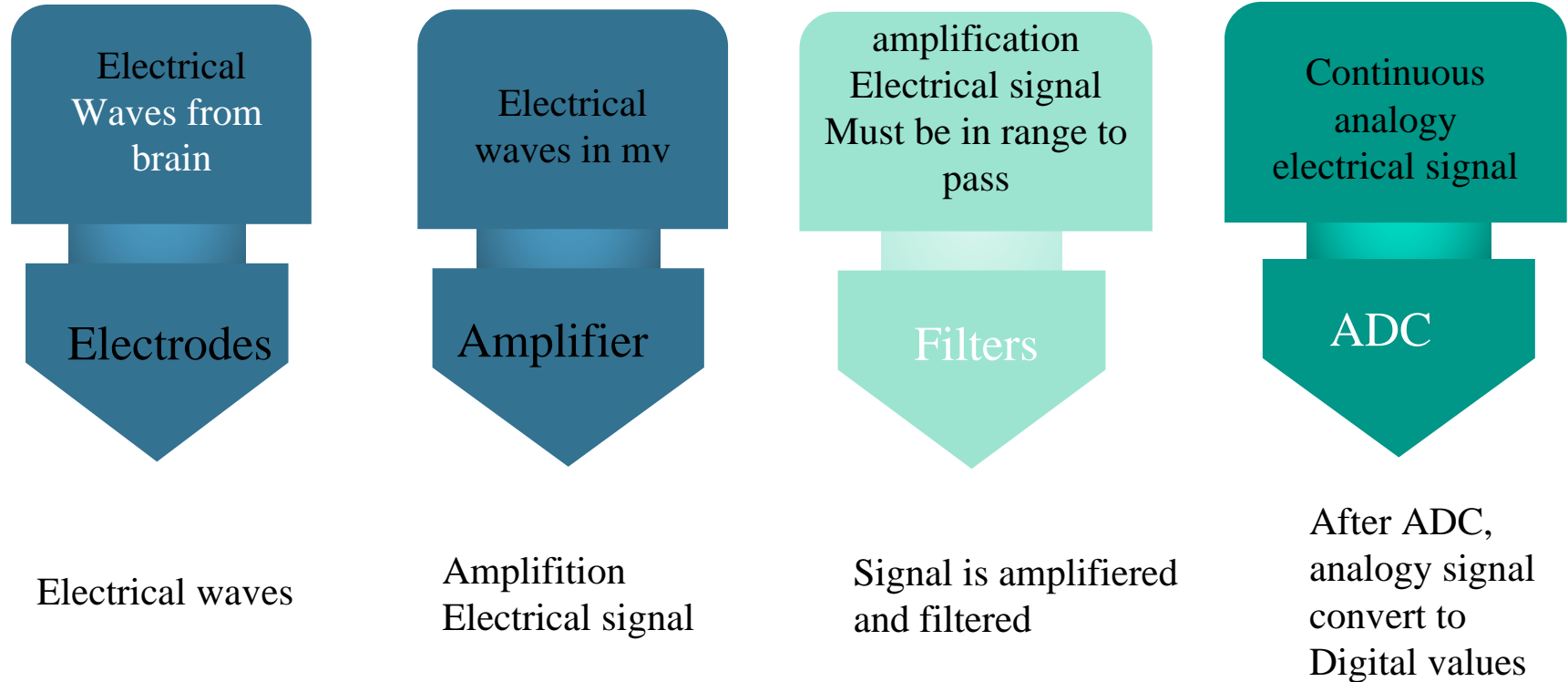## 02 Filters
Because the signals is very noisy.

03 Notch Filter
To block 50 Hz

04 ADC
To deal with the signal

Input & output of each step

Electrical Waves from brain

Electrodes

Electrical waves

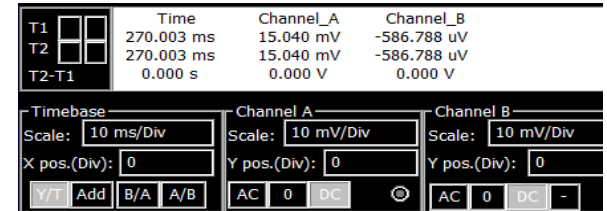Electrical waves in mv

Amplifier

Amplifition Electrical signal

amplification Electrical signal Must be in range to pass

Filters

Signal is amplifiered and filtered

Continuous analogy electrical signal

ADC

After ADC, analogy signal convert to Digital values

Electrodes
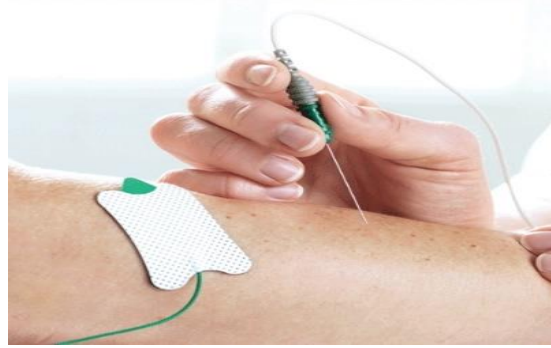
Amplifier

The Final Output of instrumentation Amplifier
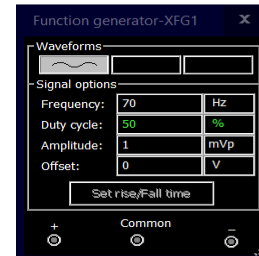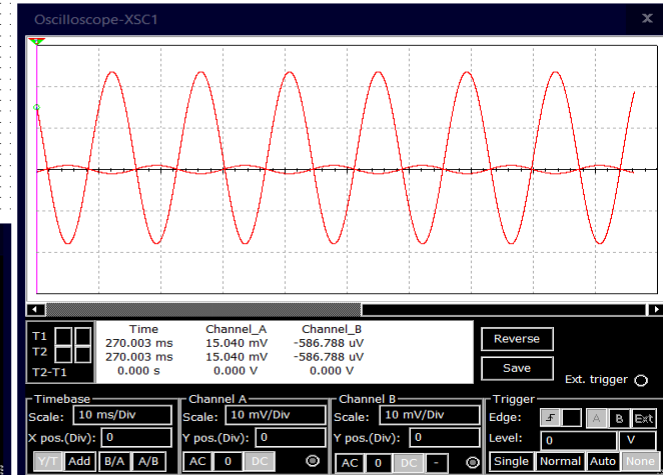
The instrumentation Amplifier that is extension of the difference amplifier in that it amplifies the difference between its input signal

Filters

Band Pass Filter:
To control in range
that we need

From 1.5 hz to 318 hz

01

02
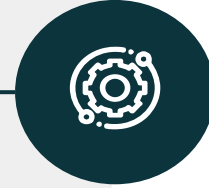
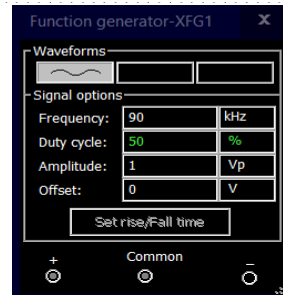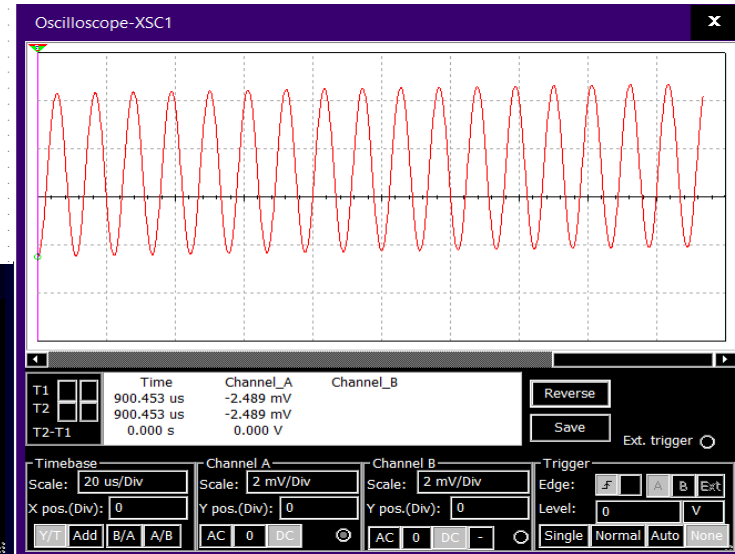Notch Filter:
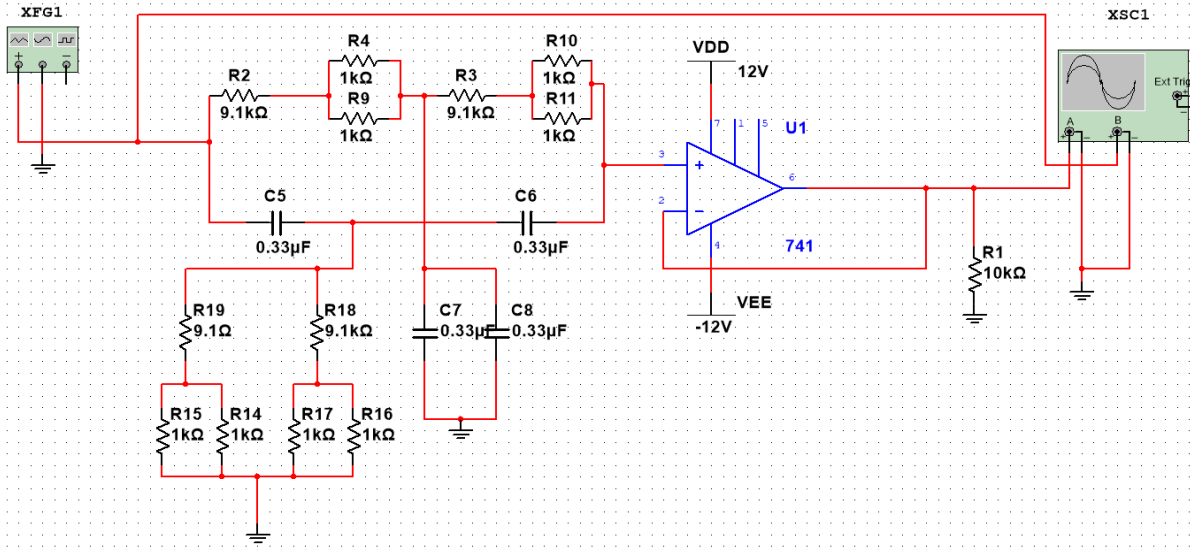To block 50 Hz from
our frequencies
band

Filter(Band Pass Filter)
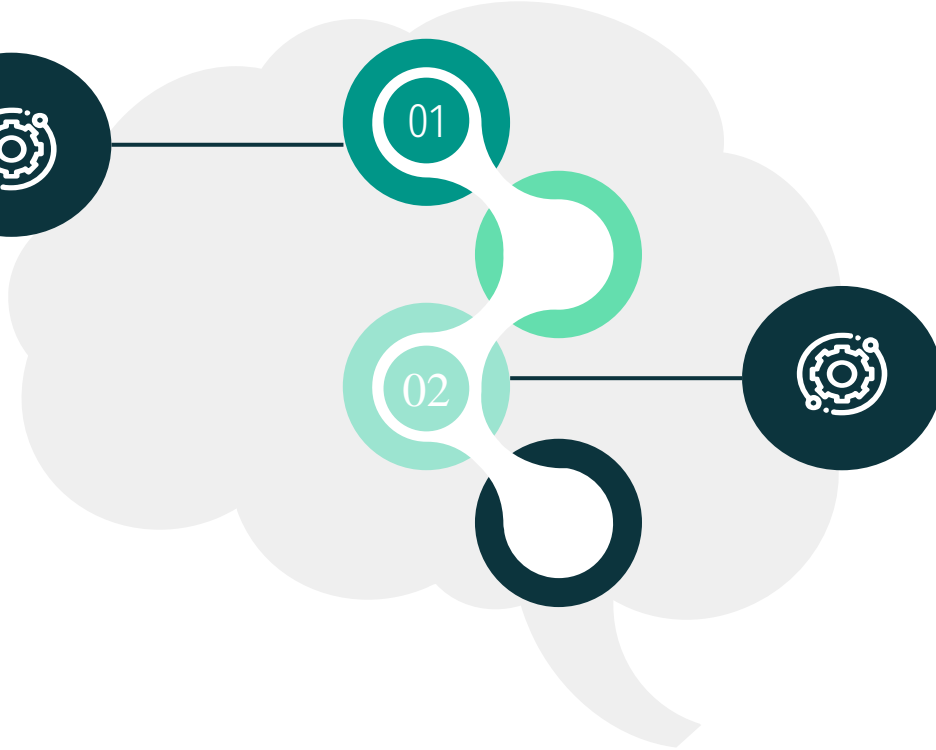
The Final Output of Band pass Filter
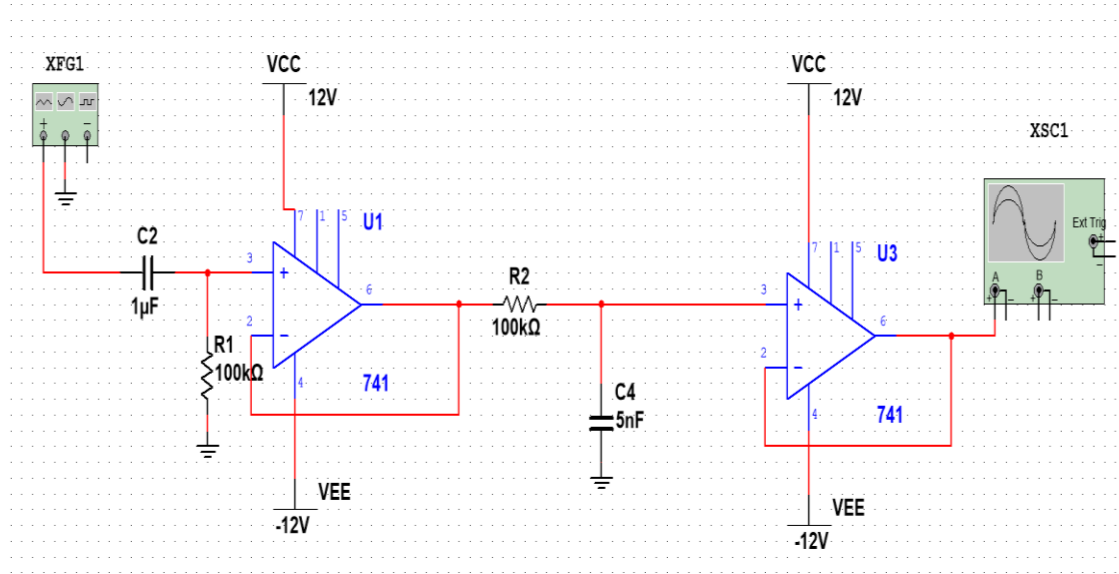
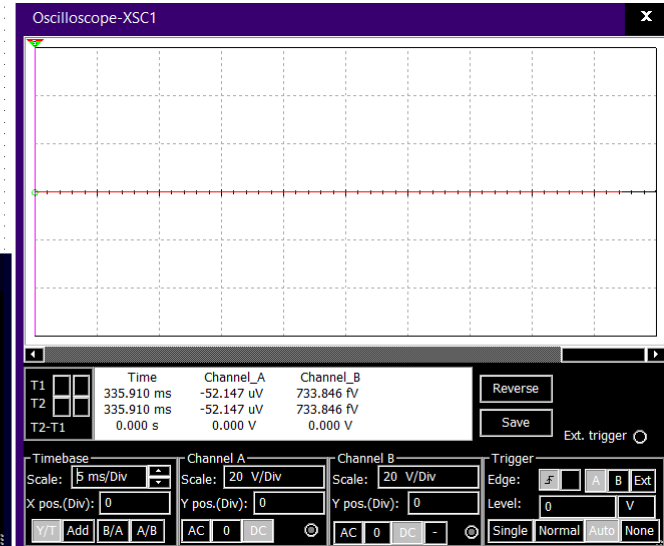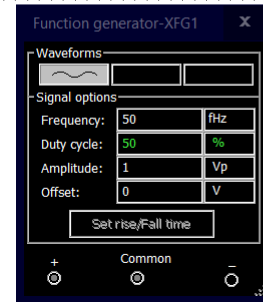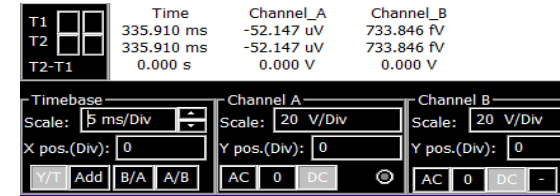Band Pass Filter is used to detect range that we need From 1.5 HZ to 318 HZ
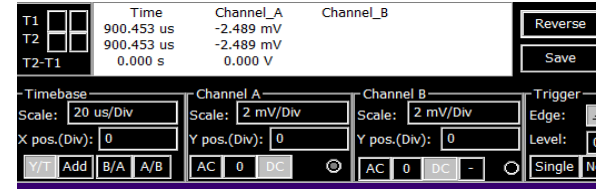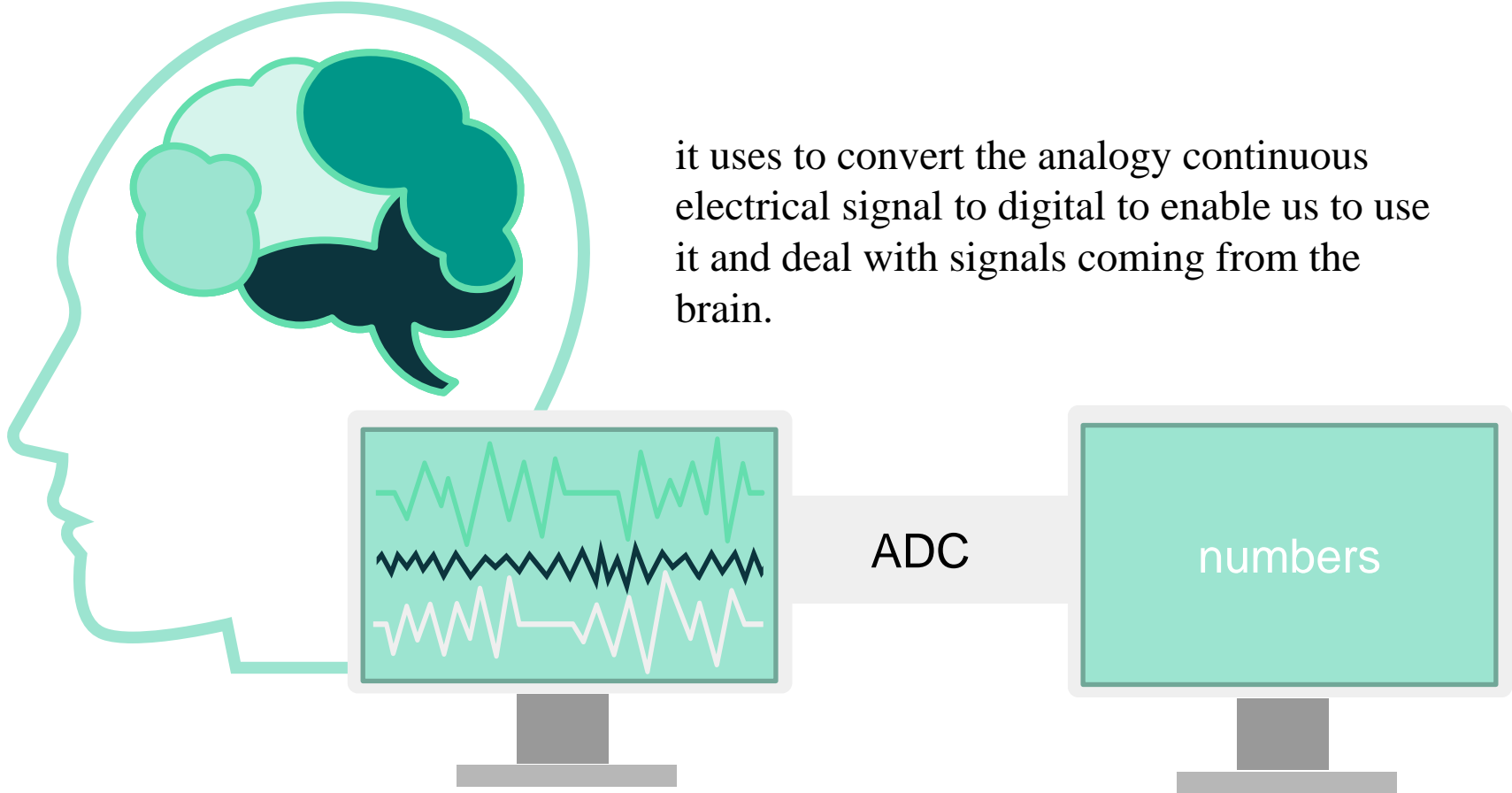
Notch Filter

Notch Filter used to block 50 HZ

The Final Output of Notch Filter
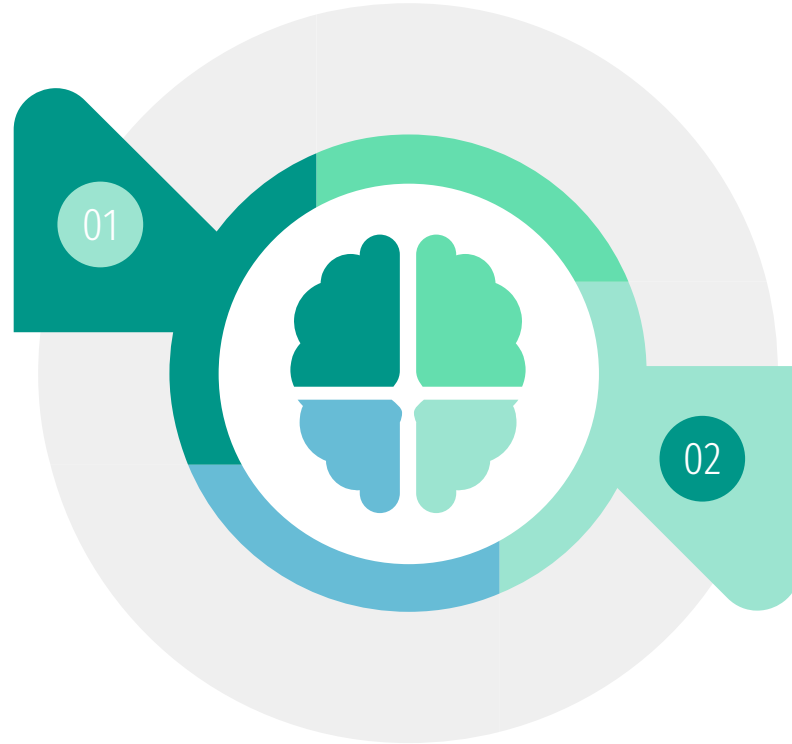
ADC

it uses to convert the analogy continuous electrical signal to digital to enable us to use it and deal with signals coming from the brain.

ADC

numbers

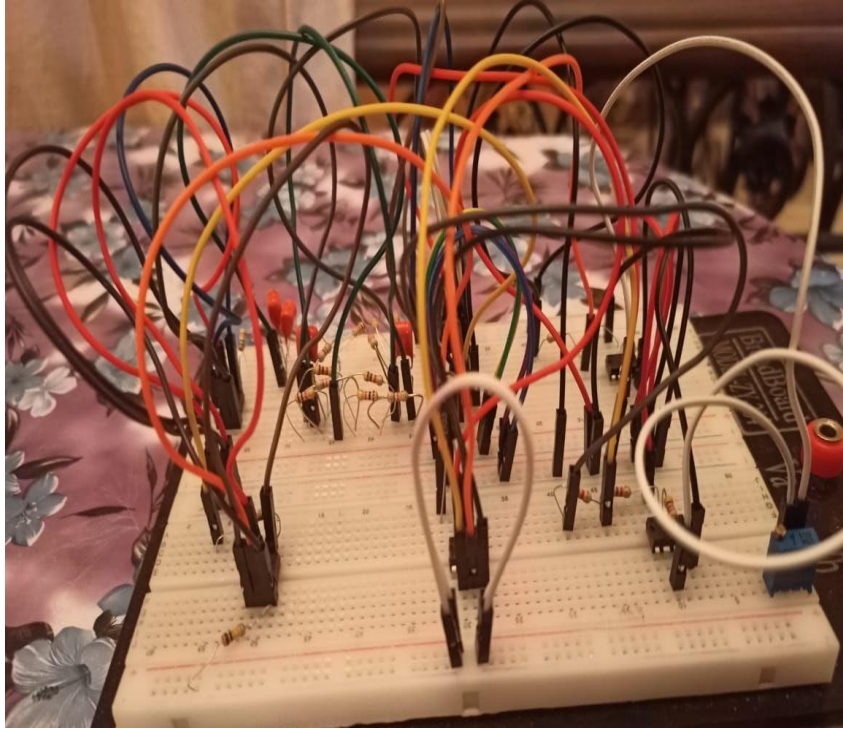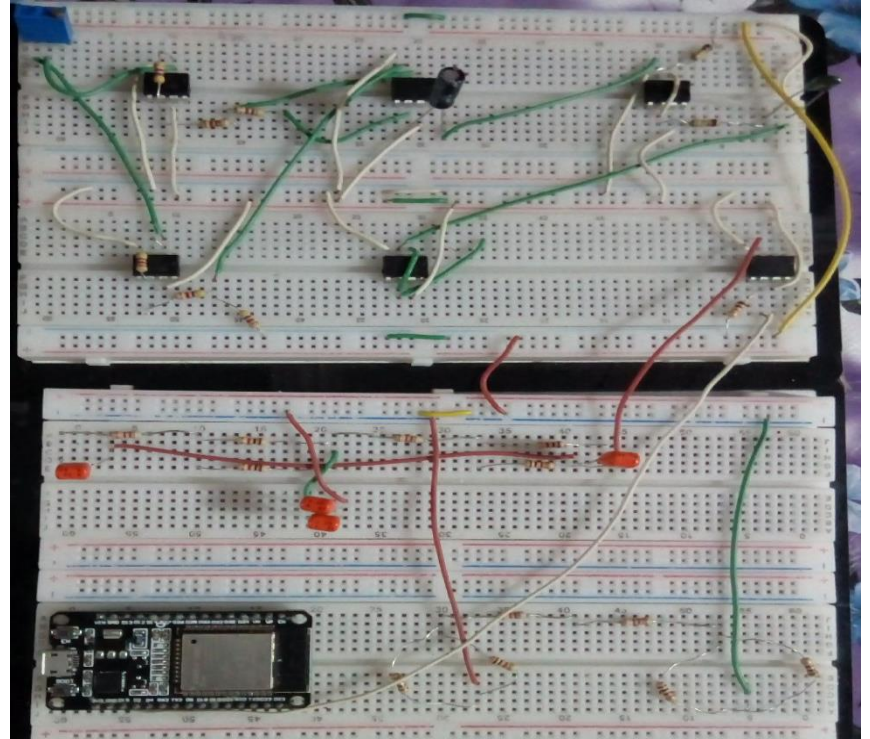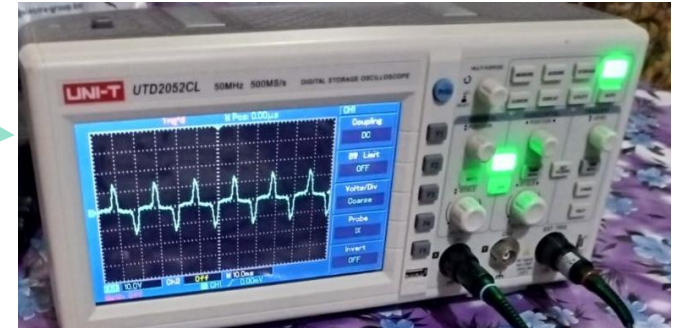# Brain Infographics

BreadBroad

01
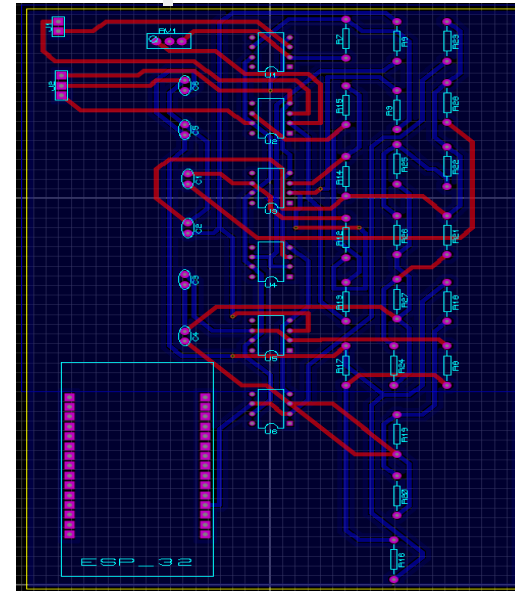
02

PCB

BreadBroad:

The output of S-EEG Sensor

The output of eyes blink

The Design of PCB and The rooting of PCB

01 Proteus design

02 Proteus design

03 PCB