Electromyographic Bot
ITSP 2015
Team Id- 33

Electronics Club
Team Name - Transformers

Team Members

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Motivation :

- After searching few ideas on internet we chose our project based on concept of Electromyography(EMG).
- Click below to see video of our motivation
  https://www.youtube.com/watch?v=QyDIMp4U0j0

Introduction :

- Electrical Activity produced by hand muscles are recorded and processed.
- Using this data Gesture of hand is recognised.
- To implement this concept we created our own EMG circuit, and used Arduino for processing.
- To have more control of motion of bot, we created Accelerometer and Gyroscope.

Project Detail :

- We used the electrocardiogram(ECG) electrodes to pickup the potential from different parts of the muscle.

- We measure potential from 3 points of hand.
- One is set as ground and with respect to this point, potential difference of rest of two points is measured.
- Obtained values are generally of the order of millivolts. so we have to amplify it.

Signal Acquisition :

- We amplified obtained values by 10 times using UA741 IC and resistors.

Signal Conditioning - Rectification :

- As values vary between positive and negative peaks, detected value will be zero hence we have to full wave rectify this signal.
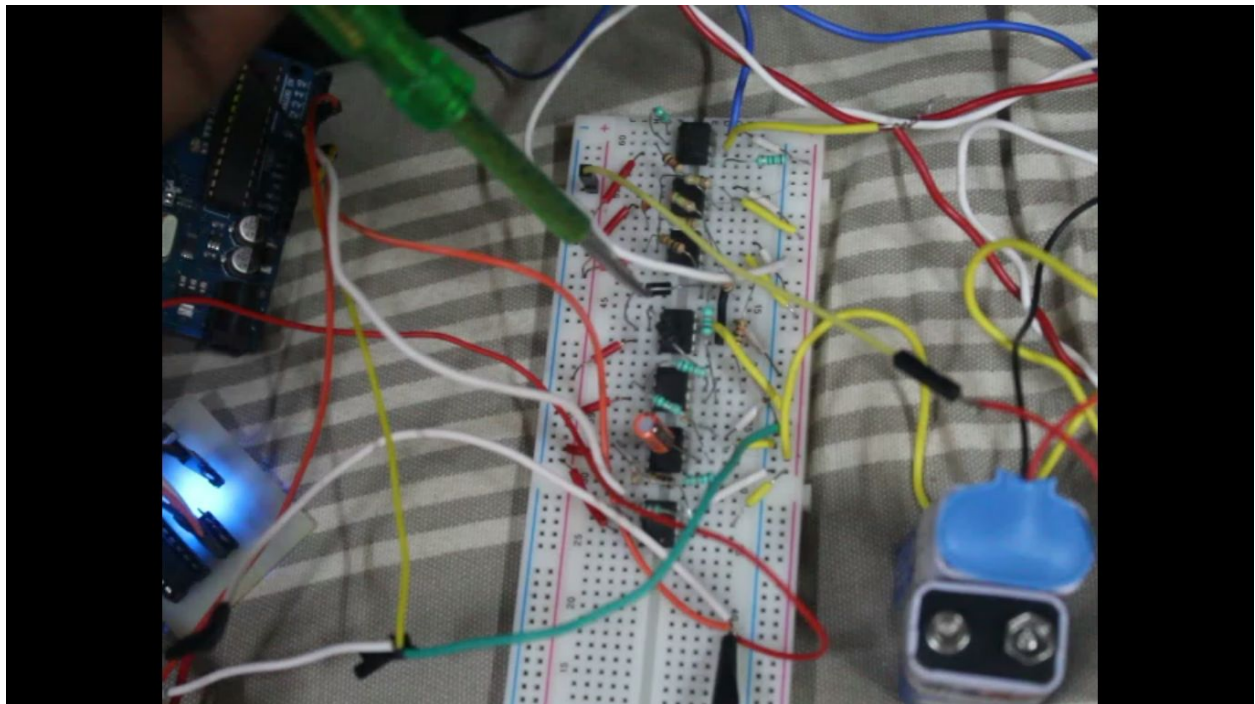
Smoothing and Amplification :

- This signal is analogue, so to convert it in DC we "smooth" it using capacitor.
- To recover lost of signal because of attenuation , we amplify it.

High pass filter :

- To remove noise of frequency less than 50 Hz

Post Amplification :

- Arduino works in order of few volts so we have to amplify further 100 times.

Obtained value	Gesture of Hand
0-1.25 V	Relaxed straight hand
1.25 - 3.75 V	In between
3.75 - 5 V	Tight and folded hand

Processing of Data :

- Arduino is used.
- If value obtained is less than threshold value (1.25 V) it means hand is in relaxed position. Setting this gesture for reverse moving of bot.
- If value obtained is greater than 3.75 V it means hand is in folded position. Setting this gesture for moving bot in forward direction.
- If value is obtained is in between 1.25 and 3.75 V bot stops.

Gyroscope :

- To have more control of bot
- Measures angle of palm with respect to horizontal.
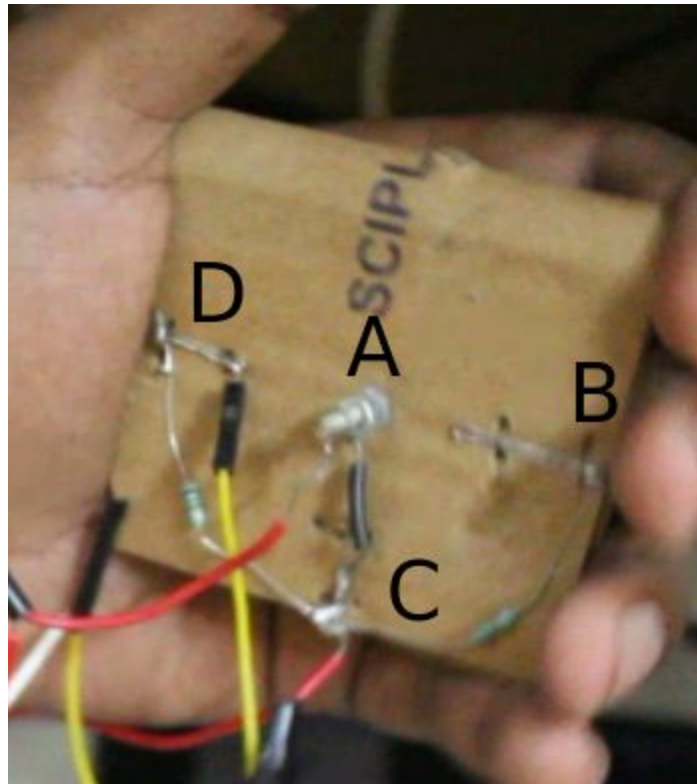
- We give potential difference of 5 V across A and D.
- We measure potential difference between point C and D say it is V1 volt

| Value of V1	Gesture of Palm
2.5 V	vertical downward
5 V	horizontal
0 V	otherwise

- Hence using value of V1 we know gesture of palm using which we turn the bot.
- If V1 is 2.5 V bot will turn left.
- If V1 is 5 V bot will turn right.
- Otherwise bot will move as it was moving.

R F circuit (Radio Frequency Circuit) :

- It is used to transmites instructions of how to move to bot from arduino.
- This makes bot wireless.

Bot :

- From receiver of R F Module, bot receives data of motion from arduino.
- Using L293D IC we amplify obtained voltage values. such that 5 V amplifies to 12 V and 0 V remains same.
- This voltage is passed to motors of bot.
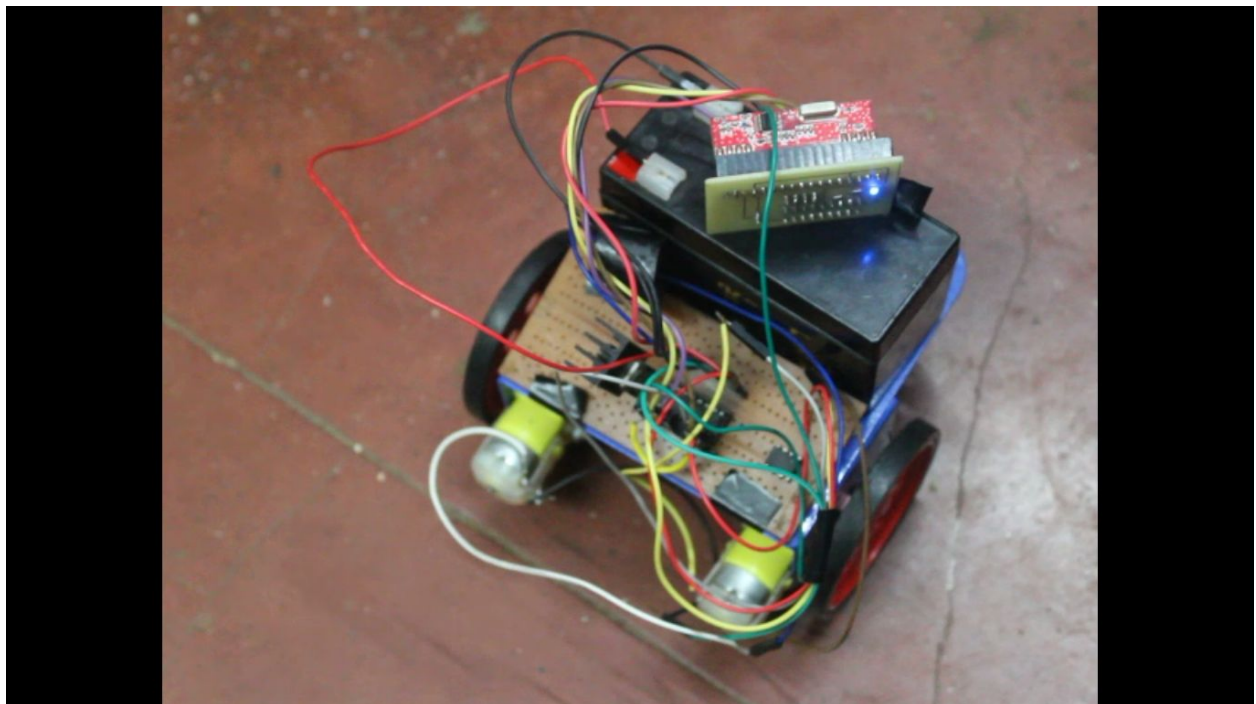
Conclusion :

- Motors, hence bot moves as per hand gestures.