**Eye based wheelchair guidance**

In this study, we propose a wheelchair guidance system based on EOG signals, Electro-oculogram (EOG) signals are measured using electrodes placed around the eyes six electrodes including the ground electrodes are placed on the forehead. The two channels are arranged vertically and horizontally. The effect of noise in EOG signals is eliminated especially, eye blink artifacts by band pass filter. Signals are classified into six classes: left, right, up, down, center and double blinking using deep learning models as Convolution neural network(CNN), INCEPTION-V1, INCEPTION-V2, INCEPTION-V3, VGG16, VGG19, RESNET and RESNET-50 which achieved the best average accuracy 95.83%. Finally, these movements are used to send a command to the wheelchair by the direction of movement. Our goal is to achieve high interaction speed in real time.

**Electro-oculogram (EOG) signals**

An Electro-oculogram is a bio-potential signal that measures the potential difference between the retina and the cornea. The eyeball can be modeled as a dipole with the positive cornea in the front and the negative retina in the back, positive or negative pulses will be generated when the eyes roll upward or downward. The amplitude of pulse will be increased with the increment of rolling angle, and the width of the positive (negative) pulse is proportional to the duration of the eyeball rolling process. Simultaneously, the EOG is recorded in the two directions horizontal and vertical using five electrodes (two vertical, two horizontal and one for ground) placed around the eyes.

Diagram

Description automatically generated

**Stages:**

Diagram

Description automatically generated