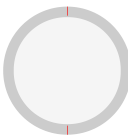



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Content Checked For Plagiarism**2. Methodology**

The initial step involves using dry surface electrodes to gather EMG data from the patient's hand. For EMG sensors, three electrodes are employed: two for recording the signal and one as a reference. When targeting specific muscles like the forearm, one electrode is placed at the muscle's center, and the other at a distance of 1.5 inches. The reference electrode is positioned on the bony side or the back side of the forearm.

To minimize electrode-to-skin impedance, the electrodes are pre-gelled. Before applying the electrodes, the skin is sanitized. The collected EMG data are then analyzed to detect forearm movement and distinguish between hand states such as flexion and extension.[15]

2.1 Acquisition of signal using Muscle BioAmp Band

Three electrodes are used here to capture the EMG signal from the muscle of the forearm. Two of them are bipolar surface electrodes and one is a reference electrode. Then the signal is sent to the Muscle BioAmp Candy through BioAmp Cable and then to the Arduino Nano for further processing.

Fig. 1 Electrodes placement for signal acquisition

2.2 Control of The Prosthetic Hand

The prosthetic hand was designed to assist the hand's elbow motions by using signals derived from wrist motions. The EMG signals were processed and then delivered as control signals to an Arduino Nano. Wrist flexion is the signal that is obtained if the person closes their hand or flexes their forearm muscle.

This results in the motor rotating in an upward and downward direction, enabling the hands of individuals who are amputated to open and close, and grasp objects. The Arduino Nano's PWM ports are connected to the motor's control input, which is powered by an external source.

Consequently, the prosthetic hand was successfully operated using EMG signals that were recorded from the healthy hand. [15]

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