

*Chapter one**Introduction***1.1 Overview:**

Prosthetic arm is a boon for those persons who have lost their arm due to some accident. The main requirement is that its function should be as near to the natural arm as possible. There are various designs of artificial arm that are available in the market, categorized as electrical, mechanical and myoelectric arm. Mechanical prostheses use some motion of the body to provide the force necessary to control the prosthetic component. Electrical arms operate the hand by a motor which is driven by micro switches and relays. Myoelectric arm is stimulated by muscle signal available from the amputee.

1. 1 Problem Statement:

The developed a prosthetic arm is high cost, and restricted in the movement. The proposed system can be controlled by signals from a set of muscles in the body (i.e., EMG signals) and will have a functional elbow and hand with independent functionality. More over the arm will be lightweight and strong enough for daily activities.

1. 1 Objectives:

The main objective is to design and develop a reliable low - cost prosthetic arm control circuit. To achieve this objective:-

- i. A control system circuit using microcontroller will be proposed.
- ii. A Simulation of the proposed system will be run.
- iii. Performance evaluation of the proposed system will be carried out.

1.4 Methodology:

EMG signal detected by sensors or electrodes. The amplitude of the surface EMG signal (SEMG) is varies range. The voltage value for the upper movement of the arm is more than the voltage value for the down movement of arm. Similarly, voltage value for the clockwise movement of the arm is more than the voltage value for the anticlockwise movement of arm. Based on this a microcontroller was programmed to perform up/down and clockwise/anticlockwise movements in steps depending on the dc voltage level. The levels of the dc voltage corresponding to the EMG signal were taken.

1.5 Evaluation:

The design will be evaluated for functionality, ease of use and safety, easily controllable and extremely useful for basic needs.

1.6 Simulation tools:

Different simulation tools can be used to simulate the proposed system, such as:

- i. Proteus software will be used to simulate the control system with microcontroller.
- ii. Bascom will be used for editing and compiling microcontroller program.
- iii. Multisim software will be used to simulate the muscle signal.

1.7 Chapters organization:

This research contains 6 chapters and they are organized as below:

Chapter 1: This chapter explains the introduction that includes objectives, problem statement, and methodology, evaluation, and simulation tools of this system.

Chapter 2: This chapter describes the revision about literature review and types of prosthetic arms and its classification.

Chapter 3: This chapter provides description the main components are used in this dissertation such as microcontroller, dc motors, motor drivers and electrodes and also describes software program used in this system.

Chapter 4: This chapter describes the design of system that which is describes the connection between components.

Chapter 5: This chapter discusses the simulation of system and the results of the program.

Chapter 6: This chapter summarizes the overall conclusion and explains about features recommendation for this project.