**An EMG based cost effective Prosthetic hand**

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**Abstract** In the era of assistive technology, the need for affordable and accessible prosthetic solutions has been roaming around forever. We introduce the solution by making an inexpensive prosthetic arm controlled by electromyographic (EMG) signals obtained from the upper arm muscles of amputees. This project addresses a major global issue which is, in an estimate over 100 million individuals worldwide require prosthetic limbs due to limb damage or amputation. Unfortunately, a large portion of these individuals (especially those from lower economic backgrounds) face problems accessing due to the high cost of traditional prosthetic options, which can range from Rs70,000 to Rs3.5 lakh for imported prosthetic hands. But this project is Remarkably cost-effective. The overall system costs around a few thousand rupees significantly reducing expenses compared to market alternatives . This project solves the solution by using cost-effective technologies in the most efficient ways. The key component in this prosthetic arm is the Muscle EMG sensor. The noise reduction and the amplification of the Bio-Potential signal is done in the IC of the EMG sensor, which helps in precise signal acquisition. By integrating this sensor into the prosthetic arm design, the component can accurately capture muscle signals and translate them into commands for prosthetic hand movements. The brain of this prosthetic arm is a microcontroller, which serves as the central processing unit for signal processing as Band-Pass Butterworth IIR digital filter and responsiveness. Through confined algorithms and real-time data analysis, the microcontroller reads EMG signals captured by the sensor, enabling full control of the prosthetic hand. This integration of hardware and software makes the project's goal of affordability without compromising performance possible . Beyond the technical aspects, this project solves the topmost prioritized problem which is affordability with efficiency. In third world countries where a large portion of people are suffering through poverty, surgery on amputation is nowhere near possible, let alone installing prosthetics. This cheap but effective alternative which costs around 1-3% of the market's product cost, can be affordable to the mass population with disabilities and enhance their quality of life.

**Keywords:** EMG Signal, Bio-Potential Amplifier, Band-Pass Butterworth IIR digital filter