UNIVERSITI TEKNOLOGI MARA

PROSTHETIC ARM FOR INDUSTRIAL AND MEDICAL FIELD

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ABSTRACT

In various fields, such as open surgery in the medical domain and industrial work encompassing construction sites and factory operations, the demand for precision and accuracy is paramount. These professions entail tasks that require meticulous attention to detail, as even the slightest error can pose significant risks to individuals and those in proximity, including patients and coworkers. Unfortunately, the occurrence of injuries in these settings is often attributed to human error, stemming from factors like fatigue, diminished focus, tiredness, and the inevitable impact of age-related limitations. The perpetual challenge lies in addressing these human limitations, as they persist across generations without comprehensive solutions. The absence of a foolproof method to counteract the impact of human fallibility poses a substantial drawback in fields where precision is crucial. The repercussions of inadequate precision extend beyond individual practitioners, affecting the safety of patients, buyers, workers, and even the professionals themselves. Recognizing this pressing issue, our project endeavours to tackle the pervasive problem of human error by implementing precision control mechanisms. By doing so, our objective is to create a secure working environment that mitigates the inherent risks associated with these high-stakes tasks. The proposed system aims to eradicate human error, thereby ensuring that operations can be conducted with enhanced safety measures and a significant reduction in the potential for injuries. Through the implementation of this innovative solution, we aspire to revolutionize the approach to precision-dependent tasks, fostering a safer and more reliable working environment for all stakeholders involved.

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INTRODUCTION

1.1 Research Background

The rise in impairments in recent years, driven by factors such as population growth, aging, and prevalent chronic illnesses, has sparked interest in bio-signal controlled prosthetics. These devices are crucial for aiding doctors and those with motor impairments to interact with their surroundings. However, the affordability of commercially available bionic hands poses accessibility issues, especially in less developed nations. While prosthetic arm technology stands as a noteworthy engineering feat, it faces constraints hindering its efficiency and user-friendliness. Further innovations are necessary to enhance prosthetic arm technology, addressing challenges and providing individuals with missing or non-functional arms better mobility, dexterity, and functionality. The exact figures regarding the demand for prosthetic arms in the medical and industrial sectors are not disclosed. Nonetheless, online research suggests widespread use of prosthetic arms in industrial settings. It's vital for engineers to harness the inherent design of a hand, drawing from disciplines like Medical, Electronic and Mechanical.

The limitations of prosthetic arms stem from their inability to replicate the intricate and natural movements of a biological hand impeding their primary goal. Real-world challenges, arising from the complexity of mimicking biological hand movements, present obstacles. However, ongoing research offers hope for developing technology capable of accurately mimicking hand gestures, though associated costs remain high. To address cost challenges, the proposal advocates for using Arduino Uno, aiming to substantially reduce expenses and make prosthetic arms more affordable. Hand movements are essential for basic actions like pushing, pulling, grasping objects, and other activities. The objective is to create a prosthetic arm capable of replicating these movements for both medical and industrial applications. Recent research highlights the potential of robotic arms to duplicate and memorize hand movements, focusing on achieving independent movement for each finger through flex sensors in real-time. Targeted gestures include grasping, holding objects, and simulating tasks relevant to medical and industrial work. This project aims to establish an efficient work environment, saving time