

**DEVELOPING A MECHANICAL AND ELECTRICAL SYSTEM THAT ENABLES
SMOOTH AND NATURAL GAIT MOVEMENT IN A LEG EXOSKELETON**

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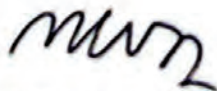


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STATEMENT BY THE AUTHOR

I hereby declare that this submission is my own work and to the best of my knowledge, it contains no material previously published or written by another person, nor material which to a substantial extent has been accepted for the award of any other degree or diploma at any educational institution, except where due acknowledgement is made in the thesis.

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ABSTRACT

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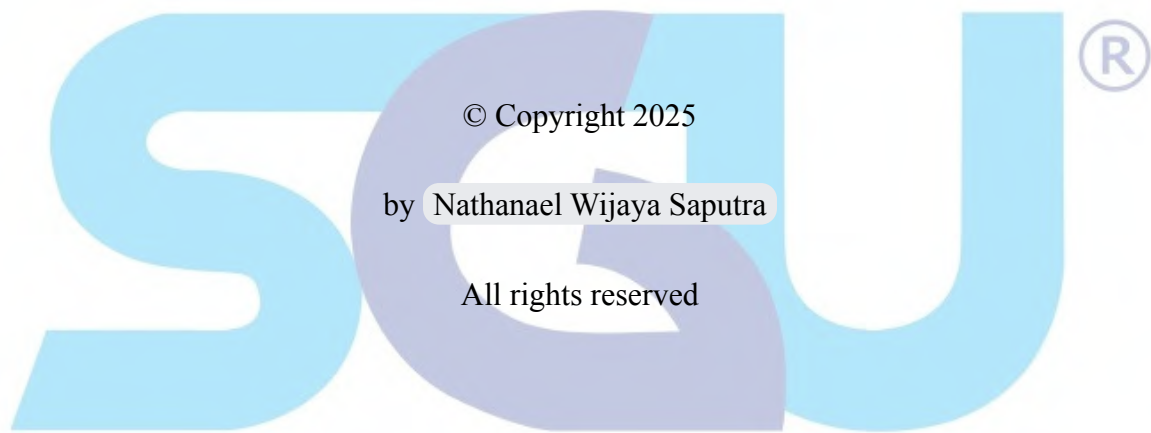
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The purpose of this thesis is to present the knowledge regarding the research and development of a lower limb exoskeleton that aims at assisting individuals with mobility impairments, particularly children and teenagers with cerebral palsy. The primary objective is to design a modular, robust, and comfortable exoskeleton system that mimics the human gait cycle, which would promote faster rehabilitation and greater independence of recovery compared to traditional therapy.

The methodology focused on mechanical design and electrical systems. Mechanically, the exoskeleton is engineered to be durable yet comfortable, using adequate motors with proper gearing system to actuate joint movement. The modular design supports adjustability for various users. Electrically, it provides a safety electrical operation system to provide real-time feedback, ensuring smooth, and synchronized gait.

Research findings showed the design of a lower limb exoskeleton could enhance mobility rehabilitation. The key parameters of human gait were analyzed and calculated to select motors that would be able to replicate natural walking. The design also incorporates a proper gearing system for smoother motion with minimal backlash and a modular adjustable mechanism for users customization. The results indicate that leg exoskeleton effectively mimics the human gait cycle while offering a robust and adaptable solution for mobility impairments, In conclusion, the study confirms that a modular, robust, electrical actuators leg exoskeleton can enhance mobility rehabilitation by offering a more natural gait experience and increased adaptability, ultimately improving recovery rate with great independence for patients with mobility impairments.



DEDICATION

I dedicate this research to the patients that suffer mobility impairment especially cerebral palsy. I also dedicate this research to contribute the knowledge and the advantage of biomechanical systems and healthcare robotics in Indonesia. I also dedicate this project to be helpful and could assist patients in the foundation that was held by Mrs. Lydia Anggraeni Kidarsa ST., MSc., MA(RCA) DIC.



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I have found my coursework throughout the Curriculum and Instruction program to be stimulating and thoughtful, providing me with the tools with which to explore both past and present ideas and issues.

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