

UNIVERSITI TEKNOLOGI MARA

**ED_ARM 4X: DESIGN, ANALYSIS
AND FABRICATION OF DUMB
4-AXIS LEFT ROBOT ARM FOR
EDUCATION AIDS**

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ABSTRACT

In the realm of STEM education, this project introduces an innovative 4-axis robot arm designed to revolutionize robotics learning for students in Malaysia. Through hands-on experiences in constructing and programming real-world robotic systems, students will develop essential skills and ignite their passion for STEM disciplines.[1] Students in Malaysia lack hands-on experience in robotics, affecting their understanding of mechanical engineering and STEM concepts. Current teaching methods prioritize theory, leaving students unprepared for practical applications in STEM fields. Furthermore, students in Malaysia can be seen lack the motivation and drives to study based from the recent report on the number of student being absent during the SPM. Students nowadays lost interest in studying especially when it comes to theoretical learning There's a need for innovative tools to provide students with tangible experiences in constructing, programming, and operating real-world robotic systems, enhancing their skills and readiness for future careers in STEM[2]. The project objective is to analyse learning equipment's effectiveness. Therefore, a comprehensive evaluation will assess existing tools. Subsequently, the project focuses on designing an educational robot arm using SolidWorks software, integrating key mechanical engineering principles. Finally, the fabrication and assembly ensure functionality and educational relevance. Thus, completing the project's objectives. The methodologies employed in this project encompass a range of techniques vital for constructing and assembling the robot arm. Glueing will be utilized to secure components, while welding and cutting will be employed for metal fabrication and customization. Riveting will ensure structural integrity, while bending techniques will shape components as needed. Wiring and soldering will be essential for electrical connections, ensuring proper functionality and control of the robot arm. Additionally, coding will play a crucial role in programming the arm's movements and functionalities. Hopefully this project will result in a fully functional and educational robot arm, showcasing proficiency in real-world tasks. It will integrate mechanical engineering principles and coding expertise, enhancing students' understanding of robotics and preparing them for STEM careers.

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CHAPTER ONE

INTRODUCTION

1.1 Background of Study

In Malaysia, robotics education is evolving to equip students with hands-on learning experiences. This project aims to develop an educational robot arm using advanced techniques like welding and coding, enhancing STEM education by fostering critical thinking and preparing students for technological challenges.[1]

Limited access to sophisticated robotics equipment and expert guidance is a prevailing challenge in Malaysian STEM education. Secondary schools and colleges in Malaysia may struggle to provide students with access to advanced robotics kits, components, and equipment required for projects like the 4-axis robot arm [2] This limitation can hinder students' hands-on learning experiences and practical application of theoretical knowledge in robotics.

The current solution involves developing user-friendly robotics technologies tailored to students' needs. Partnerships with experts and institutions facilitate the integration of cutting-edge robotics equipment into school curricula, enhancing students' access to practical STEM learning.[3]

Forming partnerships with experts is not an easy task, and schools may not need high-end machines as learning aids. This project aims to eliminate drawbacks in obtaining learning aids, creating an affordable, educational robot arm. The goal is to enhance students' hands-on learning experiences and readiness for STEM careers.[4][5]

In conclusion, this study aims to develop a cost-effective robot arm for educational purposes in Malaysian STEM education. The project addresses challenges in accessing robotics equipment and guidance, providing a practical learning tool that enhances students' hands-on experiences and prepares them for STEM careers.