

UNIVERSITI TEKNOLOGI MARA

**DESIGN AND ANALYSIS WHEEL
AND MOBILITY SYSTEM FOR
ROBOTIC ARM CAR**

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ABSTRACT

This project is to design and construct a wheel and mobility system for a robotic arm car to improve the mobility of the conventional robotic arms. The earlier models of robotic arms are usually static; this limits the area in which they can work. This project solves these issues by coming up with a strong and portable mobility system that can work on different terrains. The basic idea is to make a structure that will bear the weight of the robotic arm and make it stable so that it can be used in any area like kindergarten which can help the caregivers as well as be of educational importance.

The phases of the project are concept development, designing with the help of SolidWorks, and engineering evaluation. This paper also identified initial concepts which were analyzed using a morphological chart and a Pugh chart to select the best concept. Therefore, stress, strain, and displacement analysis were performed to ensure the structural efficacy of the design. The structure construction include laser cutting, and assembling of various elements from affordable materials such as acrylic and aluminum.

The expected outcome is a versatile, and can operate seamlessly on any surface and in the process perform useful tasks in the day life and have educational value. This project also seeks to enhance the working of the robotic arms while at the same time encouraging young students to engage in robotics and engineering to enhance STEM education.

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CHAPTER ONE

INTRODUCTION

1.1 Background of Study

A robotic arm car refers to a mobile vehicle equipped with the abilities of the robotic arm aimed to move on various terrains to achieve functions such as the pick-and-place function [1]. Conventional robotic arms are immobile and are used especially in secured environment such as industries [2]. These are good for performing repetitive operations with the excellent accuracy but the problem of these arms is that they cannot move about. New opportunities that mobile robotic platforms provided, enabled robots to operate in environments that are dynamic and different from those in the past [3]. The objectives of this project are to develop a robust yet lightweight wheel and mobility system through which the robotic arm car shall be able to move on a variety of terrains without much complicity. This will make it more versatile to be used in various approaches, especially in kindergartens where besides assisting the caretakers during their everyday work they will also create and educational tool to introduce children to robotics and engineering basics [4]. Modifying robotic arms by integrating mobility will help these arms to be used in actual scenarios in real circumstances thus making them more useful in our daily lives.

Based on the identified objectives and requirements, the primary task of this project is to construct the wheel and mobility system of a robotic arm car. Another issue that arises with a mobile system as opposed to a fixed robotic arm is that it has to adapt to various ground types; from floors inside a building to the rugged soil outside [5]. This calls for a well-designed wheel system that has to be strong enough to support the stably and at the same time should be mobile enough to enable the changing of direction and movement in the desired manner. The mobility system must be strong enough to bear the structure of the robotic arm and any load that it can pick including balancing it throughout its movements [6]. Thus, based on the choice of materials and the design of the wheels and their constructive base, it is possible to develop a solid mobility complex to improve the robotic arm car.

The mobility wheel and system play an essence to this project success. Wheels are required to be developed with different terrains in mind while giving required easy and safe control. This will entail aspects such as good grip, cushioning, and balance in