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**MEC 299**

**TRI-WHEEL TROLLEY**

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# CHAPTER 1

## INTRODUCTION

### 1.1 Research Background

Nowadays simple mechanical devices, such as hand trolleys with single and dual wheels, are finding widespread usage in a variety of businesses and households. However, its use is confined to transporting products from one position to another across the floors. There are no established designs on the market that meet the demand for assistance in moving the load oversteps. To overcome this challenge, stair wheels with three wheels are utilised as an alternative, reducing the effort of lifting. The current work focuses on the design and fabrication of a tri-wheel stair climbing hand trolley to move through uneven surfaces and transfer significant weights upstairs with the enhanced wheel arrangement while requiring significantly less human labour and manufacturing expense. The design considerations are explored, including the steepness of the steps, the stability and speed of the trolley while mounting the stairs. Hybrid trolleys, such as tri-wheeled trolleys, can be used to transport several things in places where mechanical elevators cannot be constructed [1].

A trolley is a small transport device used to move heavy loads from one location to another [2]. Hand trolleys are commonly used in most industries to transport completed objects or raw materials. There are various types of trolleys, and the type used is commonly chosen based on the type of material it will move [3].

In the early 2000s, a research group has come up with a rover type of vehicle [4] with a rhombus layout, one wheel mounted on a fork in front, one wheel in back, and two bogies joined on either side. Chang Hsueh-Er devised/proposed a five-wheeled trolley that may be controlled manually [5]. Anastasios et al. and D. Helmick et al. created a robotic carrier that had no wheels and was powered by a belt [6]. Serious research has been conducted to redesign such processes to make them more efficient and affordable.

A few devices are available to carry heavy objects on the stairs during typical working activities. However, while moving onto the stairs, these devices frequently slide. [7].

In many nations, development leads in structurally congested structures in rural locations where access to elevators is problematic. Stair climbing trolleys serve as a substitute in situations when human labour appears to be the only option, reducing human effort. People are intended to carry heavy things more than 150 kg, such as refrigerators, washing machines, cabinets, water cans, books, tiny containers, food grains, and poisonous materials, from the ground floor to the top floor and opposite [1].

The main objective here is to design and build a multi-purpose trolley that can move around the floor and climb the stairs. Earlier designs could only move the vehicle on level ground with a single or two wheels on each side. The modelling is done in such a way that tri-wheels are present on each facet, allowing the weight to be transferred up and downstairs. It consists of two sets of three wheels connected to a frame at the bottom of the trolley that functions as a single unit. Handles are designed to support the frame and to use human effort to push or pull the trolley.

## 1.2 Problem Statement

- Design stair climbing ability

Nowadays, most of the people live in the apartment. As known that the apartment has more than one level and it might be difficult for people to carry their things. It would be inconvenient when the broken lift suddenly happens. People now forced to be nomadic and need to rent in the apartment because of their jobs and not everyone have enough money especially in these economic now. So, they need to climb the stairs and carry their things to reach their home.

- Moving heavy objects in large quantities at one time

Storekeepers who haul products must transport significant volumes of things while working. They must lift large crates and deposit them in storage. This will cause them to take a long time to finish their duty, particularly if the distance between the offloading location and the storage location is long. Furthermore, the location is spread across multiple stories.