

UNIVERSITI TEKNOLOGI MARA

**DEVELOPMENT OF A PROTOTYPE
TENNIS BALL LAUNCHER USING
TWO ROTATING WHEELS
POWERED BY DC MOTOR**

CZYRUZZIKRY BIN CZYRELL

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ABSTRACT

This project called a tennis ball launcher is made to propel tennis balls at high speeds in an imitation of a player hitting the ball. It is frequently used for workouts, tennis practice sessions, and even for leisure activities. This summary aims to give a general understanding of the essential elements and operation of a conventional tennis ball launcher. The launch mechanism, the ball feeding system, and the control system are the three primary parts of the launcher. The force necessary to drive the tennis ball is produced by the launching mechanism. It often uses a motor-driven mechanism to compress and release energy, transferring it to the ball upon release, such as a flywheel or a pneumatic piston. In order to evaluate the prospects for its technical realization, the study offers the mathematical analysis for the creation of a new tennis ball launcher. The description of traditional launchers comes first. Then, a number of new specifications that might improve these machines' training potential are offered. The tennis ball's motion equation is formulated and numerically solved. This makes it feasible to examine the ball's trajectory under various initial conditions, including elevation and heading angles as well as the angle of the rollers. The launcher with two counter-rotating rollers is next mathematically analyzed and displayed. Experimental measurements have been made to determine the normal tennis ball's stiffness (Young's) modulus and friction coefficients. Tennis balls can be automatically launched by a mechanical device called a tennis ball launcher for a variety of training and recreational uses. It makes use of a variety of technical concepts and processes to launch balls efficiently and with precise control over their speed, trajectory, and distance. An overview of the main elements and functioning of a standard tennis ball launcher is given in this abstract.

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CHAPTER ONE

INTRODUCTION

1.1 Background of Study

Tennis players frequently use ball launchers, and there are numerous varieties of these training devices on the market. The primary distinction between them is the number of controlled parameters and the ranges that can be used to change them. Tennis ball launchers can generally be categorized into two classes based on how the ball is launched. The pneumatic launchers, often known as compressed air machines. The rotating roller machines also known as wheels and also known as mechanical launchers.

In this project, we are focusing on pulling the ball between two counterrotating rollers which is how mechanical launchers shoot the ball. The rotating speed of the rollers affects the ball's initial velocity. By rotating the entire machine, or just its launching mechanism, left or right (yawing the rollers), the heading angle can be altered. Similar to the launching mechanism, the elevation angle can be altered by pitching the rollers up or down. By altering one (or two) rollers' rotational velocities, the spin can be added. The only potential positions for the rollers in the provided launcher model are horizontal (or vertical), which limits the range of rotational planes for the ball.

Mechanical launchers can be utilized on courts without a mains supply or in the event of a malfunction because they are often powered by accumulators. Accumulators' limitation on the duration of the uninterrupted operation, however, could potentially be a drawback. The rollers offer more accuracy and a larger variety of possible strokes when compared to pneumatic devices. They enable one to exert greater effort and put more sophisticated training regimens into practice.

1.2 Problem Statement

The launcher is designed to send the ball projected to a certain distance. Average tennis launcher online costs more than monthly expenses. So, it is significant to make this prototype to balance out the market pricing of this tennis launcher and mainly to save our economical state in the future. Next, it is useful for coaches to demonstrate specific techniques or set up drills tailored to individual players' needs. The launcher also gets the main source of power from AC and DC power supply connected to nearby socket plug. The launcher is intended to be used outdoor mostly, then it should be lightweight, compact, allowing users to conveniently carry or store the device.

1.3 Objectives

The main objectives of this project are: