UNIVERSITI TEKNIKAL MALAYSIA MELAKA

AUTOMATIC HEIGHT ADJUSTABLE ROSTRUM

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Manufacturing Engineering (Robotics & Automation) with Honours

by

SAMUEL CHAN IAN DIAN

B050710164

FACULTY OF MANUFACTURING ENGINEERING

2011

DECLARATION

I hereby, declared this report entitled “Automatic Height Adjustable Rostrum” is the results of my own research except as cited in references.

Signature :

Author’s Name : **SAMUEL CHAN IAN DIAN**

Date :

APPROVAL

This report is submitted to the Faculty of Manufacturing Engineering of UTeM as a partial fulfilment of the requirements for the degree of Bachelor of Manufacturing Engineering (Robotics & Automation) with Honours. The member of the supervisory committee is as follow:

……..

ABSTRAK

Innovasi dalam produk-produk harian adalah satu proses yang berterusan dan tidak akan berhenti selagi ada permintaan untuk membuat sesuatu dengan lebih baik dan lebih cekap. Projek ini menumpu pada suatu aspek innovasi dalam mimbar iaitu aspek kawalan ketinggian. Mimbar merupakan suatu perabot yang digunakan oleh penceramah untuk meletak barang-barang atau dokumen yang penting semasa berucap. Dalam pengajian ini, satu sistem kawalan ketinggian yang automatik akan direka bagi mimbar untuk mengawal ketinggian mengikut bentuk badan dan ketinggian. Merujuk kepada hasil kajian daripada rekabentuk mimbar yang dahulu, ketinggian dikawal secara manual di mana seseorang itu perlu menetapkan ketinggian atau mengubah ketinggian secara fizikal. Konsep rekabentuk akan dibuat berpandu kepada rujukan yang telah dibuat dan satu rekabentuk akan dipilih. Proses fabrikasi rekabentuk adalah untuk merealisasikan sistem kawalan ketinggian automatik dalam projek ini. Hasil kajian projek ini akan dibincang secara terperinci dalam pelbagai aspek untuk menganalisasi fungsi sistem tersebut. Projek ini diharapkan dapat memberi keselesaan dan kesenangan bagi penceramah semasa berucap.

ABSTRACT

The innovation on the many daily products is an on-going process and is never going to end as long as there are demands for better and more efficient method of doing something. The project focuses on a particular innovation of the rostrum which is the height adjustment. Rostrum is a rigid body furniture that are used for speakers to place important documents during speeches. The study intends to produce an automated height adjustment system for the rostrum so that different body statures of speakers could be adjust accordingly. Studies have been made on previous rostrum designs and the height adjustable mechanisms that were apply in the rostrum designs. The height adjustments in the rostrum designs are usually manually-controlled which requires a person to pre-set the height or manually adjust it. From the references, few conceptual designs are generated and selected. The fabrication of the project takes place to create the desired automated height adjustment mechanism. The results of the project will be discussed in depth to determine the functionality of the system. The project hopes to provide better comfort and efficiency when the speaker is giving his or her speech.

DEDICATION

To my mother,
for her love and support

To my sister,
for constantly reminding me about my studies

To the ones that I love,
for the joy and laughter that carried me throughout this period

ACKNOWLEDGEMENT

First of all, I would like to take this opportunity to say thank you to my family for a lifetime of love and support. My mother, thank you very much for holding firm to me through things that made me nervous and taught me the value of perseverance. Thank you my sister, for being my best friend and letting me blabber about around. Thank you for the intelligent and creative feedbacks that deserve my upmost gratitude at time of need.

A big thanks to my supervisor, Dr. Zamberi for the guidance, encouragement, advice and inspiration for the completion of the project in my final year of studies. He made me realize the value of time and the importance of getting things completed way before the deadline. The help and the encouragement you did to help me throughout this period will never be forgotten. Sorry for the inconveniences and difficulties caused throughout this period that I may have made happen.

A special thanks to my friends for sharing their experiences through the course of the year, which without it I would felt so mundane. They have been a great help to ease the passing of the days when assignments and tasks seem endless. I would like to thank my university for providing me the place to pursue my studies in which I have learned and experienced a lot.

And, finally, thank you to my love one for the encouragement and support. The love and the trust, kept me going on throughout my studies. Thanks.

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

CCIR	-	Consultative Committee for International Radio
FYP 1	-	Final Year Project 1/Projek Sarjana Muda 1
FYP 2	-	Final Year Project 2/Projek Sarjana Muda 1
HDPE	-	High density polyethylene
ILS12X	-	Intelligent lectern model by the ILS company
LAN	-	Local Area Network
NTSC	-	National Television System Committee
PAL	-	Phase Alternation Line
RS-170	-	Standard black and white video format used in the United States
CAD	-	Computer Aided Design
PLC	-	Programmable Logic Controller

CHAPTER 1

INTRODUCTION

This chapter provides an introduction on the project entitled, "Automatic Height Adjustable Rostrum". Rostrum is rigid column body furniture that provides a place for the speakers to place their notes and other speech material during a speech. The topics include covered the background of the project, objectives, scope, problem statement and organization. In depth discussion on the project will be highlighted in later chapters.

1.1 Background of the Project

Historically, rostrum is a platform used by the speakers in the Roman Forum for public orators, and it was normally decorated with the prows of captured enemy ships. These days, the term rostrum refers to wooden furniture with a base joint with a vertical column up to the desk where the important documents are placed and the microphone is usually located (Figure 1.1). Improving in living standards and the search of new creative and innovative technologies requires better function of this product. In this matter, the values for ergonomic is added to improves aspects of the rostrum and one of

the main idea that can be implemented is to have an automatic height adjustable mechanism, which suits different users characteristics.

Figure 1.1: Rostrum.

(Retrieved from http://www.podiumsandlecterns.ie/images/Lectern51.jpg)

Frequently, at lectures or speeches there will be a number of people that will deliver the lecture or speech to the listening audience and in the event that there is a different in body stature in height of the speakers, the rostrum may be readily adjusted to suit the particular speaker at any one time. The need of this particular technology in the rostrum will be studied can carried out in the project. Height adjustment technology in rostrum is not something new and because of that the study will focus on an innovative idea of making the mechanism automatic.

1.2 Problem Statement

The rostrum is a furniture often used by a speaker to place important items such as reports, speech notes, laptop and others for the purpose of aiding the progress of the speech. Traditionally, rostrum is built with a specific height from the base to where the documents are to place. Therefore, different speakers with different height properties

would have to adjust themselves in order to be as comfortable as possible in delivering their speech. In long speeches or long lectures, this will create difficulties and discomfort to the speaker and a prolong exposure could create a health related problem. For example, a speaker that is too tall for the lectern will have to hunch over to deliver the speech whereas a speaker that is too short will have to strain upwards and the lectern may eclipse the speaker. This causes a lot of discomfort to the speaker throughout the session and may lead health related problem in the long run.

A rostrum with the most fundamental ergonomic value would have a height adjustable mechanism which allows suitable range of height preferences to be achieved. This allows the speech or lecture to be smoothly delivered to listening audience without the need to worry about backache or any health related problem. By attaining this factor, the added value of the rostrum can be the focusing point for future development. It is important that the rostrum is aesthetically pleasing as the audience attention will be focused on the rostrum and the speaker when the speech or lecture is being delivered.

1.3 Objectives

The objectives of this project are:

- To study and design a suitable sensing system for height measurement.
- To design and fabricate the mechanism of the automatic height adjustable rostrum based on effective cost, functionability, weight and ergonomic values.
- To implement the system that is able to synergistically integrate the mechanical, electrical and elements control.
- To experiment the performance of the height adjustable rostrum.

1.4 Scopes of Work

The works commenced within the duration of this project covers the following:

- Design and fabrication the rostrum. Implementation of an electrical motor to actuate the height adjustable mechanism with proximity sensors located at strategic location to sense speaker's body features.
- Design electrical motor control scheme using microcontroller and relay to control vertical movements of the rostrum.
- Perform experimental validation of the automatic system using different control parameters. (eg. height, distance and etc.)

1.5 Organization

The organization of the project is as follow:

a) Chapter 2: Literature Review- In this chapter, the references and relevant details regarding the project are collected and layout, including previous development of similar work, mechanism and detection methods.

b) Chapter 3: Methodology- The chapter discuss on the methods and flows in which the project is going to be carried out. The chapter conveys the steps needed to complete project successfully.

c) Chapter 4: Results- The results of the project are shown with the relevant aspects such as the detection and the mechanism and the result of project is explained.

d) Chapter 5: Discussion- This chapter explores the various analytical aspects of the projects with comprehensive understanding of the issues involved.

e) Chapter 6: Conclusion and Recommendation- The chapter concludes the findings of the project and recommends details for future study.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter presents the literatures and information related to the study of the automatic height adjustable rostrum. The purpose of this chapter is to review the essential and fundamental concept, design and manufacturability of the proposed product. In this chapter, topics that are of importance to the project are highlighted; such as sensors, mechanisms, materials and designs.

2.2 Rostrum

According to the Concise Oxford English Dictionary (Eleventh Edition), a rostrum is defined as a raised platform on which a person stands to make a public speech, play music or conduct an orchestra. Rostrum is a vertical stand used for holding important documents on the top when a speech is being delivered (Figure 2.1). Beyond holding notes, rostrum provides a leaning surface for speaker and provides a security barrier between the speaker and the audience. It provides the place for the speaker to organize

the materials related to the speech and sometimes to amplify the voice of the speaker through a microphone.

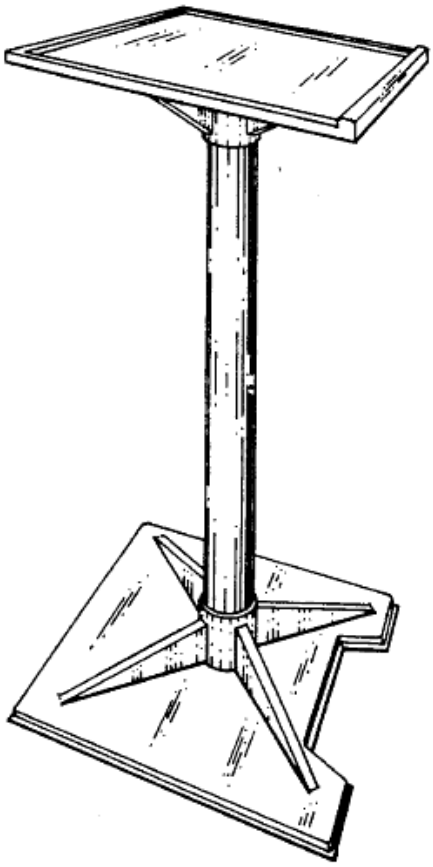

Figure 2.1: Old fashion rostrum.

(Retrieved from Waters United State Patent, et al., 1979)

The word "Rostrum" is derived from the term "Rostra" (plural for rostrum). According to William Smith (1875) in his publication of, *A Dictionary of Greek and Roman Antiquities*, rostra was the name applied to stage in the Roman Forum, from which the orators addressed the public. The name of Rostra was obtained after the conclusion of the great Latin war, when it was adorned with the beaks (rostra) of the ships of the Antiates. When the Romans captured an enemy galley, the Rostrum of the boat was

ravaged and returned to Rome as a war prize and these Rostra were then used to decorate the speakers' platform in the Roman Forum.

Rostra is situated between the Comitium or place of meeting of the curies and the forum or place of meeting for the tribes, so that the speaker may address both sides. The shape of the Rostra took the shape of a circular building with raised arches and a stand or platform on the top bordered by a parapet. The Rostra can be accessed by steps, one on each side alike the churches in Rome where the preacher ascends on the east side and descent on the west side. This enables the orators to walk to and fro while addressing his audience. The following figure shows the illustration of the Rostra Vetera, as derived by Einar Gjerstad, a Swedish archaeologist of the ancient Mediterranean.

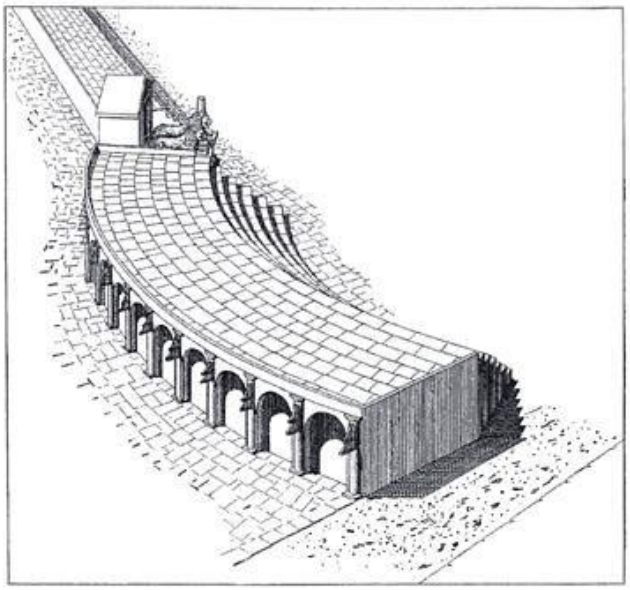

Figure 2.2: The Rostra Vetera.

(Retrieved from http://en.wikipedia.org/wiki/File:Rostra_Vetera.jpg)

Lectern is derived from the Latin word "lectus", past participle of "legere", which means to read. A lectern is a stand upon which a speaker would place books or notes to allow