# DESIGN AND DEVELOPMENT OF A ROBOTIC TAPE APPLICATOR

A Thesis presented in partial fulfilment of the requirements for the degree
of
**Master of Technology**
in
**Manufacturing and Industrial Technology**
at
**Massey University**

**Murali Guntur**
**1996**

To

# Saeid

## my *guru*

*Guruh Brahma  Gurur Vishnuhu  Gurur Devo Maheshwaraha*
*Gurur sackshat parah brahma  Tasmai sri gurave namaha*

***Hindu mythology*** says
Guru is Creator (*Brahma*), Donor (*Vishnu*),
Protector (*Maheshwara*) and the ultimate person (*parah brahma*).
Hence I falicitate (*namaha*) him.

## Murali

# ACKNOWLEDGMENTS

There are so many people who have contributed to the successful completion of this study. I would like express my hearty appreciation and gratitude to the following:

My supervisor **Dr Saeid Nahavandi**, for his guidance, encouragement, support and unending patience. Without him this research would never have been possible.

Prof Don Barnes, Barrie Lord, Len Chisholm, Farshad Nourozi, Tom Look and Ken Mercer, for the discussions, advice and suggestions.

The Department of Production Technology, for the financial assistance rendered by way of casual work as well as assignment marking.

My fellow postgraduate students Matt Harris, Matt Jolly, Dennis Wai, Nigel, Kim, Jeff, Vivienne, Tammi Tan, Paul Solomon, Dilip, Madhu, Venkat, Uday, Srinivas Rao, Chaturanga and all, for their friendship and encouragement.

My flatmates Rajesh, Ajay, Subba Rao and Vishnu, for their support, companionship during the course time.

My friends and their families, Sridhar & Gayathri, Ganesh & Padma, Venkat & Jyothi, Partha & Lavanya, Srinivas & Aparna, Prabhakar & Anitha, Somashekar & Aruna, Ram Kumar & Ashraya, Ananth & Sharada, Vishnu & Lakshmi, Uday & Vani, Rajesh, Srinivas Reddy for their continuous motivation, support, and companionship during my stay in Palmerston North.

My ***parents*** and ***sisters*** for their affection, love and support, without which I would not have stayed here for long to complete my course.

My wife, ***Sirisha***, for her pull, push, force, patience and encouragement. If not for her, I wouldn't have completed my course in time.

# TABLE OF CONTENTS

## Chapter 3 Packaging



## Chapter 4 Robot - 'EziStick'

## Chapter 5 Components of 'EziStick'



## Chapter 6 Modules of 'EziStick'

## Chapter 7 Experiments & Results

# ABSTRACT

The work described in this thesis is on the design, operation and testing of a programmable adhesive tape applicator 'EziStick'. The system demonstrates a mechatronics system comprised of mechanical, electronic and computer systems. 'EziStick' is capable of identifying any tape edge and then initialising and loading the tape over the applicator foot for successful application of tape. The tape tension monitoring system will allow continuous monitoring of the tape tension during its application. 'EziStick' is currently attached to the end of a robot arm to enhance its work envelope. The system is controlled via a low cost microcontroller and it is highly modular and transportable. 'EziStick' may be attached to the end of any robot (machines) with various degrees of freedom. In this way the cost of the system is adjusted by the complexity of the application. The experimental results showed that there is a relationship between the tape application speed and the quality of its application. Although the current prototype is designed for the application of aluminium tape, tests have indicated that other types of tape can be used in 'EziStick'.