UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF INTELLIGENT MULTIPURPOSE ELECTRONIC CANE TO ASSIST PHYSICALLY CHALLENGED INDIVIDUAL

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor's Degree in Electronics Engineering Technology (Industrial Electronics) with Honours.

by

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APPROVAL

This report is submitted to the Faculty of Electrical and Electronic Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Electronics Engineering Technology (Industrial Electronics) with Honours. The member of the supervisory is as follow:

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ABSTRAK

Berbillion rakyat di dunia mempunyai cabaran fizal dari pelbagai segi, terutamanya dari segi penglihatan. Individu seperti ini sukar untuk bergerak dari suatu tempat ke tempat yang lain tanpa bantuan. Projek ini terutamanya untuk membimbing golongan yang cacat penglihatan untuk meneruskan kehidupan seharian mereka dengan bantuan tongkat yang ringan dari segi beratnya. Tongkat yang digunakan pada masa kini tidak lengkap dari pelbagai segi dimana ianya secara tidak langsung membawa pelbagai masalah dari segi mengesan halangan dan mengenal pasti kedudukannya dan mengesan asap di kawasan sibuk yang membahayakan kesihatan.Oleh itu, tongkat elektronik ini direka untuk mengatasi masalah dan mengubah tongkat tradisional menjadi tongkat teknologi moden yang terdiri daripada pelbagai peranti yang mampu berfungsi untuk pelbagai tujuan. Pelbagai penyelidikan dibuat untuk mengetahui penggunaan aplikasi arduino nano dan pelbagai peranti dalam tongkat elektronik. Projek ini terutamanya menggunakan pelbagai jenis perkakasan dan perisian. Pelbagai komponen yang digunakan seperti sensor ultrasonik, sensor kelembapan, sensor LDR, pengesan asap, buzzer, pembesar suara, motor DC getaran, kawalan jauh tanpa wayar Rf, Mp3 Player dan Arduino nano yang berfungsi sebagai pusat sistem serta Arduino IDE adalah perisian yang digunakan untuk program. Ujian untuk setiap komponen telah dilakukan selepas semua komponen digabungkan dimana pengesanan sensor ultrasonic dari 5cm hingga 25cm tepat. Walau bagaimnapun, ia mampu mengesan jarak yg lebih jauh tetapi bacaan tidak stabil. Disamping itu, kepekaan sensor gas dianalisis di mana jarak 5cm jauh lebih berkesan. Oleh itu, perkembangan ini dapat membantu orang yang bermasalah fizikal dari segi penglihatan Akhirnya cadangan diberikan untuk meningkatkan prestasi dan fungsi tongkat dengan penambahan imej pemprosesan serta bateri yang mampu dicaj semulasa pada masa akan datang mengikut had.

ABSTRACT

Billions of people in the world are visually challenged and mainly visually disabled people has increased. This particular people find hard to explore and need assistance to move. This project is mainly guided with an objective whereby it is light in weight and capable to guide the visually disabled people to proceed with their daily live. The present cane is incomplete which has many faultiness in detecting head level obstacles and smoke in the hectic area which is harmful. Hence this multipurpose electronic cane is design to overcome the faultiness and change the traditional cane form a latest technology cane which consist of multiple devices which able to work for multiple purpose. A number researches been made in order to get familiar with the application of using arduino nano and multiple devices installed in the electronic cane. This project particularly utilises many kinds of hardware and software. Various components being uses such as, ultrasonic sensor, moisture sensor, LDR sensor, smoke detector, buzzer, speaker, vibration DC motor, Rf based wireless remote control, Mp3 Player and Arduino nano which act as heart of the system as well as Arduino IDE is the software been used to program. The testing of each components been done right after all the components been collected. The performance of the sensors and devices on the cane is tested where it performs various function according to the surrounding. The tested result is tabulated and shown whereby by the best detection of ultrasonic is from 5cm to 25cm. However it able to do detect more distance but the measurement is instable. Besides, the sensitivity of the gas sensor was analysed where the distance 5cm is much reliable in detecting the concentration of gas. Thus, this development is much reliable to assist the challenged people. Finally recommendation for this project is by adding the image processing system and also rechargeable battery in order to develop the current cane in future according to the limitation.

DEDICATION

Specially to my beloved parents Mr & Mrs Vincent Praboo, supportive Supervisors Puan Nurliyana Abd Mutalib & Mr Shahrizal bin Saat, My faithful panels, lectures of FTK and My BEEE Cohorts 6 classmates who strongly supported throughout the journey.

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LIST OF SYMBOLS

I	-	Current
A	-	Ampere
Hz	-	Hertz
mm	-	Mili meter
V	-	Voltage
cm	-	centimetre
mV	-	milivolt
HEX	-	Hexadecimel
PPM	-	Part Per Million

LIST OF ABBREVIATIONS

2D	Two Dimensional
APP	Application
GPS	Global Positioning System
GSM	Global System for Mobile Application
RFID	Radio frequency identification
DC	Direct Current
LDR	Light Dependent Resistor
LED	Light Emitted Diode
ITS	Intelligent Transportation System
TRV	Vehicle Traffic Rule Infringement
PIC	Peripheral Interface Controller
ERM	Eccentric Rotating Mass
AC	Alternating current
IDE	Integrated Development Environment
RF	Radio Frequency
IOT	Internet of things
IR4.0	Industrial Revolution 4.0

CHAPTER 1

INTRODUCTION

1.1 Introduction

About 2.2 billion of the world's visually challenged individual lived in developing nations whereby majority of individuals with disabilities are in creating world. Specifically, 1 billion individual got blindness that can be prevented. The increase in the number of individuals with vision disabilities in the world attracts the concern to develop various innovations, hoping that these advancements can help the disabled individuals in organizing their tasks in everyday lifestyle like an ordinary people. Physical parts are the most vital piece of human physiology as 83% of human information being get from surrounding. Physically visually challenged individuals causes issues in acquiring information and new experience, communicate with the environment, and the capability to move to another place. They rely upon their families for guidance and financially. Their mobility prevent them from associating with individuals and other activities. Thus, efficient way must be taken in order to assist physically visually challenged individual.

1.2 Project Background

The fundamental plan of this project work is to study and develop an intelligent multipurpose electronic cane to assist the physically visually challenged individuals. Based on the development, analysis and studies been carried out so that it could replace with an alternative solution and way on how to refine and upgrade existing technology so that the physically challenged individual able to move freely. A study is presented by revising and analysing the performance of multipurpose electronic cane over the visually challenged individual. Besides, electronic cane is tested in order to prove the effectiveness of the performance and the ability to assist the physically challenged individual. This project essentially eliminates the disadvantages of the current project and additional device is placed which will be much efficient in assisting the disabled individual. Moreover, various sensor is been used in order to assist the challenged people efficiently. Mainly, ultrasonic sensor and moisture sensor been used to detect the obstacles and moisture area with holes. Thus, when the ultrasonic sensor and moisture sensor detects the obstacle ahead, it will alert the motor to vibrate according to the sensor which detects. Furthermore, the LDR sensor and smoke detector is used whereby the LDR sensor able to detect the light intensity as well as the smoke detector sense unwanted smoke that would be harmful to health. The system has been developed with much more advanced feature integrated to contribute the physically challenged people to find their cane if they have misplaced it. Therefore, a wireless RF based remote is used whereby pressing the remote button able to cause sounds from buzzer on the cane which helps the physically challenged people to find their misplaced cane. Last but not least, the Mp3 player been used as it is mainly for playing audio and songs through speaker. Two push buttons with a voice

recorder is developed for the visually impaired individual to approach the public easily.

1.3 Problem Statement

There are several major problems faced based on findings ways to assist the physically challenged individual and produce an efficient solution. The solution is a must to be solve in order to overcome the arising problems.

The common problems arise is the difficulty for the visually challenged individual to move freely without assistance and hardly realise the object above the head. The current cane has the capability to detect object located at distance equal to the cane length. Due to the current hectic lifestyle, everyone is busy with their own work whereby those physically challenged people are being neglected. This includes the older generation which not able to reach the outside world as they are physically could not support themselves. An alternate solution to be developed in order to overcome this problem by providing assistance. The development of intelligent multipurpose electronic cane is to overcome the disadvantage that occurs in the existing project as it will be a complete safety device to assist the challenged individual. Consideration should be taken that the development of intelligent multipurpose electronic cane should be parallel to the aim of the project which is more effective and able to assist the challenged individual safely.

Besides, the physically challenged people find hard to communicate with the surrounding as well as asking help from the public. At times, the public couldn't understand the message being delivered by the physically challenged individual due to

certain factors. Therefore, an intelligent system needs to develop in order to overcome the problem. This system able to communicate with the surrounding which able the physically challenged individual to deliver message through voice projection by using MP3 player. Besides, most falls and health issue is due to the unawareness of the existence of water and smoke in the surrounding. Due to the limitation on the current system, the visually disable people able to fall and cause health problem. By this, a user friendly can be created between the challenged individual and the society.

Finally, the development needs a lot of research and finding of lab works to prove that development of intelligent multipurpose electronic cane alternately able to assist the physically challenged individual more effectively than the methods used before.

1.4 Objectives

The objective of this thesis in completing this project will be the guidance for developing the project.

i. To study the current features of the multipurpose physical cane
ii. To develop a light weight device of intelligent multipurpose electronic cane to assist the physically challenged blind Individual
iii. To analyse the performance of electronic cane with various function in assisting the physically challenged blind individual