



**Faculty of Electrical and Electronic Engineering Technology**

**DEVELOPMENT OF SPECTICAL FOR THE SPECIAL NEEDS WITH  
VOICE AND NAVIGATION TOOLS**

**VELU NAVINITHAN A/L LEKSHMANAN**

**Bachelor of Computer Engineering Technology (Computer Systems) with Honours**

**2021**

**DEVELOPMENT OF SPECTICAL FOR THE SPECIAL NEEDS WITH VOICE  
AND NAVIGATION TOOLS**

**VELU NAVINITHAN A/L LEKSHMANAN**

**A project report submitted  
in partial fulfillment of the requirements for the degree of  
Bachelor of Computer Engineering Technology (Computer Systems) with Honours**

**Faculty of Electrical and Electronic Engineering Technology**

**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

**2021**



UNIVERSITI TEKNIKAL MALAYSIA MELAKA  
FAKULTI TEKNOLOGI KEJUTERAAN ELEKTRIK DAN ELEKTRONIK

BORANG PENGESAHAN STATUS LAPORAN  
PROJEK SARJANA MUDA II

Tajuk Projek : DEVELOPMENT OF SPECTICAL FOR THE SPECIAL NEEDS WITH  
VOICE AND NAVIGATION TOOLS

Sesi Pengajian : 2021

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## **DEDICATION**

*To my beloved mother, Mrs. Amudha D/O Arumugam, and father Mr. Lekshmanan S/O*

*Velu,*

*and*

*My talented supervisor*

*Ms Nurliyana Binti Abd Mutalib and*

*My beloved siblings*

## **ABSTRACT**

The special need mainly visual impaired people will face difficulty to get used to surrounding environment. The current environment challenges this group, the inconvenience to adapt to their natural places could be held by new technology invented to able assist them. The ‘Development of Spectical for The Special Needs with Voice and Navigation Tools’ is mainly offering a wearable eyeglass with an ultrasonic sensor to assist the blind in comfortably navigating alone while preventing from obstacles. This project may already exist and the modification and originality on this current project are based on earlier study. This process made use of an Arduino Nano and Arduino Uno as microcontroller to control the activities of a device, ultrasonic sensors to detect an obstruction in the predefined surrounding, and an Arduino DF player module to generate voice audio. Rf module to communicate between microcontrollers. GSM is functioned to send a message to caregivers about his present location module and lastly GPS module to get real time location. This may allow the user to move more freely. This device is inexpensive, quick, and simple to use, and it is an innovation to aid the blindness and low vision in overcoming daily activities. Thus, this project implies both warning and action given to the user to ensure the safety and will be user friendly without cause any distress to circumstance surrounding it.

## ***ABSTRAK***

Keperluan khas terutamanya orang cacat penglihatan akan menghadapi kesukaran untuk membiasakan diri dengan persekitaran sekeliling. Persekitaran semasa mencabar kumpulan ini, kesulitan untuk menyesuaikan diri dengan tempat semula jadi mereka boleh ditahan oleh teknologi baru yang dicipta untuk membantu mereka. 'Pembangunan Spektikal untuk Keperluan Khas dengan Alat Suara dan Navigasi' terutamanya menawarkan cermin mata boleh pakai dengan penderia ultrasonik untuk membantu orang buta dalam menavigasi dengan selesa bersendirian sambil menghalang daripada halangan. Projek ini mungkin wujud, pengubahsuaian dan inventif pada penyelidikan berasaskan projek semasa ini yang dijalankan pada kajian terdahulu. Proses ini menggunakan Arduino Nano dan Arduino Uno sebagai mikropengawal untuk mengawal aktiviti peranti, penderia ultrasonik untuk mengesan halangan dalam persekitaran yang telah ditetapkan, dan modul pemain Arduino DF untuk menjana audio suara. Modul Rf untuk berkomunikasi antara mikropengawal. GSM berfungsi untuk menghantar mesej kepada penjaga tentang modul lokasi sekarang dan terakhir modul GPS untuk mendapatkan lokasi masa nyata. Ini mungkin membolehkan pengguna bergerak dengan lebih bebas. Peranti ini adalah murah, pantas dan mudah digunakan, dan ia merupakan satu inovasi untuk membantu buta dan rabun dalam mengatasi aktiviti harian. Oleh itu, projek ini membayangkan kedua-dua amaran dan tindakan yang diberikan kepada pengguna untuk memastikan keselamatan dan akan menjadi mesra pengguna tanpa menyebabkan sebarang kesulitan kepada keadaan sekelilingnya.



## ACKNOWLEDGEMENTS

First and foremost, I would like to express our gratitude and appreciation to all those who gave us the possibility to complete this report. A special thanks to our final year project coordinator, Ms Nurliyana Binti Abd Mutalib whom help us stimulating suggestions and encouragement, helped me to coordinate my project especially in writing this report. I am also indebted to Universiti Teknikal Malaysia Melaka (UTeM) which enables me to accomplish the project.

I would also like to acknowledge with much appreciation the crucial role of the colleague that guide me from start in case need help to complete the Development of Spectical for The Special Needs with Voice and Navigation Tools. Special thanks go to Mr & Mrs Lekshmanan, whose have given their encouragement and support through financially to maintain our progress in track. Their love and prayer during the period of my study and motivation.

I want to appreciate the guidance given by other supervisor as well as the panels especially in our project presentation that has improved our presentation skills by their comment and tips. Finally, I would like to thank all the staffs, fellow colleagues and classmates, the faculty members, as well as other individuals who are not listed here for being co-operative and helpful.

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## LIST OF SYMBOLS

$\delta$	-	Voltage angle
$^{\circ}\text{C}$	-	Celcius
$\mu\text{s}$	-	Microsecond

## LIST OF ABBREVIATIONS

V	-	Voltage
ms	-	Millisecond
IDE	-	Integrated development environment
Mhz	-	Mega hertz
dBm	-	decibel milliwatts
mA	-	Milliampere
GSM	-	Global System for Mobile communication
GPS	-	Global Positioning System
RF	-	Radio Frequency
DC	-	Direct Current
Kb	-	Kilobytes
g	-	Gram

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## CHAPTER 1

### INTRODUCTION

#### 1.1 Background

There are numerous types of disabilities which might be seemed in this day world. As an example, those who have physical disabilities, suffering hearing-impaired, low vision such as visually impaired, and many more. Visually impaired whose people that facing more risks in comparison to different disabilities. The eyes is the most important element of the body for avoiding obstacles and playing with minimal cognitive effort. The visually impaired must usually rely on both auditory and visual signs to compensate for their loss of vision. The difficulty with the visually impaired is that most of their bodily integrity has been compromised. Bouvrie (Bouvrie *et al.*, 2007) proves this claim in an experiment dubbed "Project Prakash." The purpose of this study was to see if blind people could use their thoughts to recognize groups of objects.

According to the World Health Organization (WHO), roughly 314 million pupils worldwide are blind or visually impaired. There are 45 million visual impaired people and 269 million people with limited eyesight. People aged fifty and up account for 82 percent of all blind people. It is estimated that 45 million blind people rely on other people for navigating. According to the NES II (National Eye Survey) on year 2014 in Malaysia, 216,000 people were blind because of cataract surgery delays. It also resulted in the blindness of 272,000 people. Diabetic eye disease is the second most prevalent cause of blindness in Malaysia, with 10% of people blind and 6% with poor imagination and foresight. The third

most common motive of blindness might be glaucoma wherein it brought about 7% blind and a couple of with low vision. subsequently, the rate of low vision people increase led to the rises of development of Assistive Technology. The blind cane highest frequently used often assistive technology (AT) used by visually challenged people. According to Mazo and Rodriguez (Mazo *et al.*, 1995), the blind cane is one of the most important pieces of help for the visually impaired. Traditionally, the usage of a blind cane has been focused on two main topics that is grip and arc. Someone's pace is quicker and more amazing outside. The palm dealing with at the waist peak while the index finger along with the cane and the last fingers and thumb softly wrapping over the cane is the proper approach to hold the blind cane.

When the person is indoors, the grasp of the cane changes to that of a pencil, with the grip upright at sternum position and nearer to the body. For both grips, one elbow is tucked tight to the body. Traditional blind canes, on the other hand, were initially fashioned of wood. Aluminum eventually took the role of wood. Aluminum, on the other hand, bends and breaks readily. As a result, both wood and aluminum were replaced with fiberglass and carbon fiber. Although fiberglass is less expensive than carbon fiber, it is heavier. Fiberglass, on the other hand, may flex slightly yet still return to its former shape. Carbon fiber, on the other hand, is more costly than aluminum and fiber glass. Although carbon fiber is lighter, it is more difficult to bend and shatter.

However, with the support of this blind cane, independence for the visually handicapped can no longer be delivered. Then, technology will continue to circulate closer to today's worldwide market. As there have been so many developments in assistive technologies in the years. For example, using Laser Cane, having Mowat Sensor, the Nav Belt, Sens Cap, Tyflos, Nottingham impediment Detection, Binaural Sonic manual, route voicer, Embedded Glove, smart Cane, and the spectacle itself. Most Assistive Technology

come in White Cane form type. The reason for planning and studying assistive technology is to decrease the challenges that concerning visually impaired as much as should. When persons with vision impairment go in unfamiliar circumstances, memorizing the part region or hindrance will be hard for them. But its kilometers on the waist might damage the neuronal machine via Nav Belt (Sankar Kumar et al., 2013). The Sens Cap is set on the top of the users besides Sankar Kumar et al., 2013. The neural device might potentially be damaged. Therefore, assistive technology for the visually handicapped is not acceptable currently. Every assistance equipment desires the necessity to be useful, portable, cheaper, handy, and safe.

## **1.2 Problem Statement**

Most of spectacles for the special needs using voice output technique that not friendly to public. For example, buffer that make continuous buzzing or beeping may cause irritation and stress to the user. Then the external noise may cause the user disturbs and unable to focus on their way. There are Mp3 module will be placed that will deliver output voice through earphone. The output is in human robotic voice that will also the distance and direction of obstacle detected. So, as it directly places on ear of user the user will not listen to any surrounding voice as able to estimate because distance is clearly said in output. Next mostly of obstacle detection device such as blind stick and smart cane it may provide with navigation tool. But in spectacle is rarely placed because unable to avoid component compatibility in term of size and specification. As per solution placed to different remote using Rf Module that make the component no longer to placed together. The Rf module works to send data between remote and devices. It ensures the persons with visual impairments able to navigate freely.

### **1.3 Project Objective**

After studying the above problem statement, the key objectives of the lead of PSM to propose a systematic and effective methodology are as follows:

- a) To develop a system that could give a warning to visual impaired person if there are any obstacle detected.
- b) To provide visual impaired person assist in case of emergency that notify and locate to caregivers.
- c) To design voice output techniques with human based voice using mp3 Module attached to earphone that remove sound distraction to others.

### **1.4 Project Scope**

This studies goal enables to assist low vision challenged pupils. The glasses are designed to help with a variety of jobs. The project demonstrates mode which is instruction using audio module as a prove of concept. Included with navigation of real time location and SOS message by using GSM and GPS module. The assist the low challenged in obstacle detection on left, front and right side of person. The project prototype contains a customized built voice output border platform, an eyeglass is used with an obstacle detection and navigation, connected to the double board computer the Arduino Uno and Arduino Nano. Each board is connected via Rf Module transmitter and receiver. Arduino Ide package for board is used to undergo the modelling and coding.

## 1.5 Summary

The studies work we put forth in this work is to make use of contemporary technologies to develop the visually impaired mobility. This research paintings are based totally often detecting obstacle, guidance and course making plans in concise to reduce navigating problems associated to them. Navigating via someplace which is not known turns into a huge-time difficulty whilst we are able to even depend on our eye. Dynamic objects carry noise while shifting, visually impaired can construct the capability to listen and to help localize them. even though, they may be confined to the sense of contact like when the goal is determining the placement of an item location. The most common used technique for navigation making use of the taking walks stick or taking walks cane. one of the most important targets of this research paintings is through offering, real-time, relevant navigation information that makes the consumer or visually impaired to make correct and timely selections on which course to comply with through in space.

The next chapter stated will explain briefly more about:

- Chapter 2: The literature review and the technical methods theory.
- Chapter 3: Understanding study approach, recommended technological procedures, and tools and components are all included.
- Chapter 4: Reviews and analyzes the technical results.
- Chapter 5: All previous sections are concluded with proposed workflow and planning to future works.