



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**DEVELOPMENT OF NAVIGATION SYSTEM WITH
VOICE ALERT FOR VISUALLY IMPAIRED USING IOT**

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

by
اونيورسيتي تيكنيكل مليسيا ملاك

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

SITI RAFIDAH BINTI KAMALIN

B071710512

960809-12-6512

FACULTY OF ELECTRICAL AND ELECTRONICS ENGINEERING

TECHNOLOGY

2020

BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

Tajuk: DEVELOPMENT OF NAVIGATION SYSTEM WITH VOICE ALERT FOR VISUALLY IMPAIRED USING IOT

Sesi Pengajian: 2020

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Disahkan oleh penyelia:



SITI RAFIDAH BINTI KAMALIN

Alamat Tetap:

Lot 99, Taman Sri Arjuna, Jalan
Beaufort-Sipitang, 89808, Beaufort,
Sabah.



GLORIA RAYMOND TANNY

Cop Rasmi Penyelia

GLORIA RAYMOND TANNY

Jurutera Pengajar

Jabatan Teknologi Kejuruteraan Elektronik dan Komputer
Fakulti Teknologi Kejuruteraan Elektrik dan Elektronik
Universiti Teknikal Malaysia Melaka

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Signature:
Author: SITI RAFIDAH BINTI KAMALIN
Date: 15 FEBRUARI 2021


اونيورسيتي تيكنيكل مليسيا ملاك
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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 (Telecommunications) with Honours. The member of the supervisory is as follow:



ABSTRAK

Buta adalah kekurangan penglihatan dan kegagalan untuk melihat apa-apa, termasuk cahaya. Ia juga merujuk kepada kehilangan deria penglihatan yang tidak dapat diperbaiki dengan cermin mata atau kanta lekap. Oleh kerana sedikit input dari persekitaran mereka yang membuat mereka tidak dapat melakukan sesuatu, orang buta tentunya menghadapi terlalu banyak kesukaran dalam rutin seharian mereka. Pengetahuan yang menyeluruh dapat membantu orang yang cacat penglihatan menghindari rintangan dan membuat mereka terbiasa dengan persekitaran dan mendapatkan cara untuk mendorong mereka ke tempat tujuan. Tujuan projek ini adalah untuk mengembangkan sistem navigasi untuk orang yang cacat penglihatan dengan peringatan suara menggunakan Arduino yang dihubungkan dengan teknologi GPS yang disertakan dalam Peta Google. Selain itu, projek ini juga untuk merancang alat yang dapat dipakai yang memudahkan penglihatan yang cacat untuk alat bantu perjalanan mereka dengan penggunaan sensor ultrasonik yang dapat mengesan rintangan hingga 4 meter. Tambahan pula, projek ini juga untuk mengkaji dan melaksanakan penggunaan IoT dalam sistem navigasi untuk penglihatan dengan menggunakan aplikasi Blynk. Projek ini bermula apabila orang buta memasukkan lokasi menggunakan Peta Google di telefon pintar, maka akan mengesahkan arah yang telah dimasukkan. Arahnya akan didengar dari fon telinga. Kemudian, penggunaan sensor ultrasonik adalah untuk mengesan sebarang halangan yang mungkin ada di jalan setinggi 4 meter. Di samping itu, ketika orang buta berada dalam bahaya atau situasi kritikal, perangkat ini mempunyai butang tekan bahawa apabila ia ditekan, aplikasi Blynk akan

mengirim pemberitahuan dengan lokasi orang buta dan mengirimkannya kepada anggota keluarganya. Akhir sekali, projek ini akan membantu penglihatan yang lemah untuk menavigasi dengan mudah dan selamat.



ABSTRACT

Blindness is a lack of vision and a failure to see anything, including light. It may also refer to vision loss that cannot be fixed with glasses or contact lenses. Due to the extreme scant input from their surroundings that makes it impossible for them to do something, the blinds certainly face too many difficulties in their everyday routine. Surrounding knowledge can help the visually impaired person avoid the obstacles and make them accustomed to the surroundings and obtain the ways to urge them to the destination. The purpose of this project is to develop a navigation system for visually impaired with voice alert using Arduino which interfaced with the GPS technology that embedded in Google Maps. Besides, this project is also to design a wearable device that ease the visually impaired for their travel aids with the use of ultrasonic sensor that can detect any obstacles up to 4 meters. In addition, this project is also to study and implement the use of IoT in navigation system for the visually impaired by using Blynk app. This project starts when the blind input the location using Google Maps in smartphone, then it will confirm the direction that had been entered. The direction will be heard from earphone. Then, the use of ultrasonic sensor is to detect any obstacle that might be exists on the path up to 4 meters. In addition, when the blind person is in a danger or critical situation, the device has a push button that when it is pushed, the Blynk app will send notification with location of the blind and send it to his/her family member. Lastly, this project will help the visually impaired to navigate easily and securely.

DEDICATION

I dedicate this thesis to my beloved parents, Kamalin Bin Suntrak and Mariam Binti Yosup, who love, gave inspiration and continually provide moral support, emotional, and financial during hard times. Next, I would like to dedicate this to my supportive supervisor, Miss Gloria Raymond Tanny and to my friends who help me a lot during development of this project.



ACKNOWLEDGEMENTS

Firstly, I would like to express my special thanks and gratitude to my supervisor, Miss Gloria Raymond Tanny for her guidance, advices, suggestions and support during planning and development of this project. I would like to thank everyone who is involved in this project either directly or indirectly for their helps and cooperation. Lastly, a special thanks to my family for their support because without them, I would not be able to finish my final year project.



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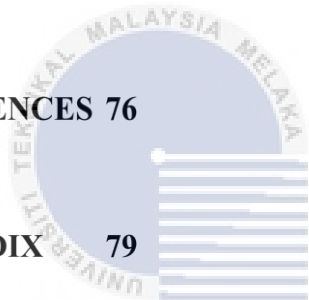
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LIST OF SYMBOLS & ABBREVIATIONS

GPS	-	Global Positioning System
IOT	-	Internet of Things
IR	-	Infrared
IDE	-	Integrated Development Environment
ETA	-	Electronic Travel Aids
I/O	-	Input/ Output
RX	-	Receiver
TX	-	Transmitter
MQTT	-	Message Queue Telemetry Transport
VCC	-	Voltage Supply
SMS	-	Short Message Service

CHAPTER 1

INTRODUCTION

1.1 Background

Nowadays, designing a device to ease the visually impaired is not a new thing. Thus, multiple technologies were used to improve and facilitate the visually impaired. As technology is growing rapidly, people are making a better solution and advancing the method from previous studies to help the blind as much as they can in their daily lives. However, there are some difficulties in drawing up a solution that can serve its purpose because of the price and not all countries can be implemented with such device because of the economy itself. According to the (World Health Organization, 2019) , to the projected 2020 around 76 million of world population in 2020, it is predicted a double rise in the magnitude of visual impairment in the world by 2020. It is estimated that the majority of young blind children would need visual rehabilitation interventions for their personal development. However, it usually comes with huge amount of medical in visualisation so visual rehabilitation is not the best option for all. This proposed wearable device provides the functions of Real time Maps to locate the blind person and make them ease to go wherever they want by input the destination through their smart phone. This device also interfaced with ultrasonic sensor that will detect any obstacles. Lastly, once the blind person is in a critical situation, the SOS button can be push then it will send text message that contain exact location of the blind to the family members.

1.2 Objectives of Project

The objectives of this project are:

- i. To develop a navigation system for visually impaired with voice alert using NodeMcu which interfaced using GPS.
- ii. To design a wearable device that ease the visually impaired for their travel aids with the use of ultrasonic sensor that can detect any obstacles.
- iii. To study and implement the use of IoT in navigation system for the visually impaired by using Blynk app.

1.3 Problem Statement

Being visually impaired means that a person is facing visual issues, such as having no peripheral vision, affect the vision. They are surely facing so many limitations in their daily life because of the limited information from their surroundings that makes them difficult to do anything. The knowledge of surroundings can help the visually impaired person to avoid the obstacles and ease them to accustomed to surroundings and obtain the choice ways to urge to the specified destination. Genetic or various other reasons are the main reasons that certain people have to face difficulties because of lack of sight completely or partially. Furthermore, there are so many methods that are getting improved with the technology day by day. Traditional methods employed by the visually impaired person for the travelling purpose include the white cane. This walking stick has become a basic necessity for the blind people to

detect or spot the objects ahead. But this has a lot of drawbacks with it because the user must constantly hold and tap with the stick 's assistance.

1.4 Scope of project

In this project, project focuses on developing and designing the prototype that is wearable to works on the main target which is the visually impaired person. This project utilizes the blinds with navigation system with voice alert that helps them to know the path of their direction. By using maps that is stored in Google Maps, it will helps the blind to navigate easilu. Therefore, by using GPS, this device gives the real time location of the blind and also give the location to the family members once the blind push the SOS button this device gives the real time location of the blind and also give the location to the family members once the blind push the SOS button through Blynk app. This project also helps the blind to avoid any obstacle surrounds them by using the ultrasonic sensor. For this project, the caretaker must help the blind person to set up with the Blynk app before they going anywhere as they cannot see the handphone.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This section is the literature review section, the explanation about GPS, Internet of Things will be describe here based on related materials from other sources. This part will show the investigation work that relative with this envision by journals, proposals, articles, inquire about papers and diverse sources. The writing survey is the utilizing of crafted by other before starting on examination work to sufficiently secure critical information and data on practically identical ventures done by others.

2.2 Overview of GPS Technology

GPS or Global Positioning System that is simply addressed as GPS has the ability to transmit precise location data due to its network that surrounds the Earth's satellites or maps the appropriate direction, speed and time depending on the location of the vehicles (latitude and longitude). The GPS receives the signal from satellites and can use the theory of trilateration or determining absolute location in mathematical terms to classify our position. Besides, this is fundamentally what the beneficiary of GPS does, despite the way it uses hovers instead of circles to cover. In addition, the GPS satellites have their own specific nuclear tickers with one significant edge of one kind to keep up a precise time. However, the normal and unique relativity anticipates varieties appearing on Earth