UNIVERSITI TEKNIKAL MALAYSIA MELAKA

AUTOMATIC VOLUME CONTROL USING RASPBERRY PI

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electrical Engineering Technology (Automation Industry and Robotics) with Honours.

by

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Tajuk: Automatic Volume Control Using Raspberry PI

Sesi Pengajian: 2019

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I hereby, declared this report entitled Automatic Volume Control Using Raspberry PI is the results of my own research except as cited in references.

Signature: ……

Author : Muhamad Iqram Bin Hasni

Date:

APPROVAL

This report is submitted to the Faculty of Electrical Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as partial fulfillment of the requirements for the degree of Bachelor of Electrical Engineering Technology (Automation Industry and Robotics) with Honours. The member of the supervisory is as follow:

Signature: …….

Supervisor : Mr. Ahmad Idil Bin Abdul Rahman

Signature: …….

Co-supervisor: Mr. Johar Akbar Bin Mohamat Gani

ABSTRAK

Abstrak- Pada masa kini, setiap kenderaan telah dilengkapi dengan radio dan sistem bunyi untuk hiburan dan membantu untuk mengelakkan pemandu dari tidur semasa perjalanan panjang. Pemandu dan penumpang menikmati muzik atau radio saluran kegemaran mereka dengan mendengar bunyi kualiti yang baik. Walau bagaimanapun, semasa perjalanan ke destinasi, mereka mungkin mengalami gangguan bunyi yang mungkin boleh menjejaskan kualiti bunyi. Sistem konvensional yang tersedia menggunakan butang fizikal untuk menaikkan tahap kelantangan yang boleh mengganggu tumpuan mereka kepada pemanduan, yang mana boleh menjadi berbahaya kepada pemandu di jalan raya dan juga kepada pengguna jalan raya yang lain. Dalam projek ini, kawalan kelantangan automatik menggunakan Raspberry PI adalah dicadangkan sebagai penyelesaian. Sebalik menggunakan butang fizikal tradisional untuk menaikkan tahap kelantangan, pengguna boleh menggunakan sistem yang dicadangkan untuk mengawal kelantangan suara secara automatik tanpa mengganggu tumpuan mereka kepada pemanduan. Projek ini akan menggunakan Raspberry PI sebagai pengawal, mikrofon sebagai penderia dan pembesar suara sebagai output penggerak. Oleh itu, projek ini adalah dicadangkan sebagai peranti pintar yang bermanfaat untuk membantu pengguna untuk memberi tumpuan kepada memandu dan menjamin keselamatan mereka kepada mereka, penumpang bersama-sama dengan pengguna jalan raya yang lain.

ABSTRACT

Abstract- Nowadays, every vehicle have been equipped with radio and sound system for entertainment and help to prevent the driver from sleeping during a long journey. The driver and passengers enjoy their favorite music or radio channel by listening to good quality sound. However, during a journey to the destination, they might experience to have sound disturbance which can probably affect the quality of sound. The conventional sound system recently utilizes the physical button to level up the volume that can disturb their focus on driving, which can be dangerous to the driver on the road as well as to other road users. In this project, an automatic volume control using Raspberry PI is proposed as a solution. Instead of using the traditional physical button to level up the volume, the user can use the proposed system to control sound volume automatically without disturbing their focus on driving. This project will use Raspberry PI as controller, microphone as sensor and speaker as output actuator. Therefore, this project is proposed as a beneficial smart device to help users to focus on their driving and secure their safety to them, the passengers along with other road users.

DEDICATION

To my beloved parents Mr. Hasni bin Mahmood and Mrs. Norma binti Abdullah. I want to express my gratitude to them for all their love and sacrifice across my life and study. The sacrifice what they had done really make me inspired and the main reason for me to continue my study until now. Their support and faith for my ability to achieve my ambition is not something that can be contradicted.

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I also would like to expresses my big thank and deepest gratitude from the bottom of my heart to my mother. Norma binti Abdullah and my father Hasni bin Mahmood for their unconditional support, encouragement, money and inspiration that I receive through of my final year project.

Last but not least, I would like to expresses my deepest and gratefulness to my classmate helping me during this project.

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LIST OF SYMBOLS

dB	-	Decibel
°C	-	Celcius
°F	-	Fahrenheit
Hz	-	Hertz
V	-	Voltage
ms	-	Millisecond
mm	-	Millimetre

LIST OF ABBREVIATIONS

GPS	Global Positioning System
PA	Public Address
USB	Universal Serial Bus
SOC	System On Chip
OTG	On The Go
RAM	Random Access Memory
GPU	Graphics Processing Unit
KB	Kilobytes
CPU	Central Processing Unit
MB	Megabytes
RPI	Raspberry PI
MIDI	Musical Instrument Digital Interface
ARM	Advanced RISC Machine
OS	Operating System
IDLE	Integrated Development and Learning Environment
REPL	Read Evaluate Print Loop
PC	Personal Computer
LAN	Local Area Network

POE	Power-over-Ethernet
HAT	Hardware Attached on Top
HDMI	Human Definition Multimedia Interface
BLE	Bluetooth Low Energy
NOOBS	New Out of Box Software
VNC	Virtual Network Computing
TCP/IP	Transmission Control Protocol/Internet Protocol
DSI	Display Serial Interface
WIFI	Wireless Fidelity

CHAPTER 1

INTRODUCTION

1.1 Introduction

The first section will clarify about the project background, problem statement, scope, expected results and objectives with regard to this project.

1.2 Background

Audio systems are worldly devices that play a vital role applied in several uses. Clearness and explicitness of up to date sound systems take greatly progressive in technology advance. In spite of the advance, the present system doesn't sufficiently complete close circumstances of the environment within which the systems are used.

For example, the automotive stereo could be a model of a sound system is automotive audio. The automotive audio is placed within an automotive to move with a large multiplicity of close noises. In the very usual state of affairs, once the automotive at the start, the close amplitude because of road vehicle engine noise, highway noise, and wind noise is fairly small. Hence, the automotive audio can be setup primary, low volume level. Because the automotive starts headed for maneuver, the close amplitude will increase, therefore the degree level of the automotive stereo conjointly rise to atone for the amplified noise. Once the automotive grasps a high speed, the close sound end up to be terribly loud thus, the degree level of the automotive stereo should be amplified even a lot of. If the automotive reduce speed, the close sound drops, as well as the audio volume

level, is going to physically decrease. Afterward, the capacity level of the automotive audio is going to be attuned variety of times throughout the driven course. As a result, the stereo is often detected well despite the ever-changing close noise over time.

Once the tune is played during a great ambient noise surrounding, the music could also remain concealed by that sound. as an example, during a moving vehicle, the audio or music is being played by binaural electronic equipment, due the background level differs or the audio is being altered, the music or audio could also be on an irregular basis hid by the ambient noise. The link between the close background level and sound volume is shown in Figure 1.1. The common sound volume (b) it will increase because the close noise (a) will increase [2].

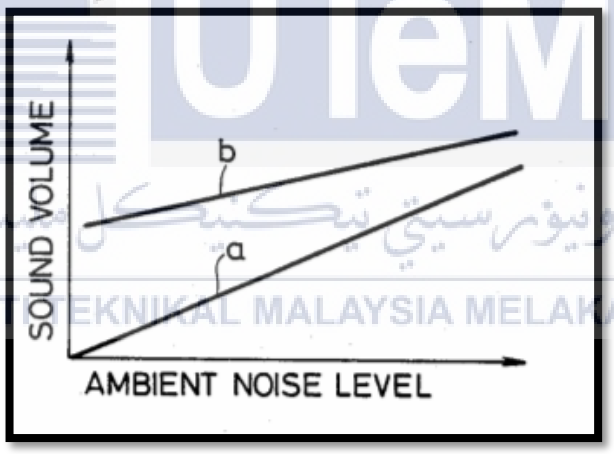

Figure 1.1: Relationship between the ambient noise level and sound volume [2].

The device could be designed for mechanically controlling the radio volume of a sound system which is it could be the personification of the invention. This system contain audio output device, audio signal supply, and amplifier. The sound system output will respond to the surroundings of ambient noises based on the audio volume. To obtain

the ambient noise, the device include an electro-acoustic transducer therefore the volume. The device includes an for obtaining the ambient noise and therefore the audio volume will increase and the microphone will link to the process circuit. The audio volume signal will received respond to the ambient noise due capable of mechanically fixing the audio volume.

Alternative personification of the development may be a device designed for mechanically adjusting the initial audio system volume level. The audio system has same component with other development which is includes sound output mechanism, amplifier, and audio signal supply. The initial volume level will respond depending the surroundings as audio system output. The second volume level for environmental sound are include the sound system which is wavering external sound. For receiving the system sound the device are includes a microphone as the dynamical external sound. it additionally includes a process circuitry coupled to the electro-acoustic transducer for wavering the initial volume level of the system sound in relevancy variant among the second volume level of the environmental sound [1].

1.3 Problem Statement

Normally, the vehicle users use the traditional physical button to level up the sound volume when they hear the music or sound of the radio. Traditional physical button need a user's touch such as the finger, in order to adjust, whether to level up or level down the sound volume. This need to be carried out frequently, especially when driving in different type of surrounding. This will disturb the focus and concentration of the driver when driving thus can lead to safety hazard to the driver and other road users. By

implementing this project, the users does not need to use physical action to level up the volume thus they can be more focused on their driving routine.

When driving to destination that users do not familiar of in term of its location, the user usually need a navigator such as Waze and Google Maps installed in their smartphones or Global Positioning System (GPS) devices to lead them to the correct destination. When driving on the road, occasionally the driver needs to focus on the road and monitor their speed on the vehicle speedometer. In this condition, the driver need the GPS in term of a voice assistive device to help and guide the user to navigate the road in order to reach to the correct destination. The sound from the GPS assistive device should be clear enough but not too loud in a proper volume, so that the driver can hear and understand the directional instruction from the voice assist clearly.

Besides the application in vehicle sound system, this project also can be practical to be used in speaker sound system at large area or compound, for instance an auditorium, hall or convention room. This will be very useful, especially when giving announcement or deliver talk or speech, as the objective is to convey a clear message to the audience without disturbance or echo. The conventional public address (PA) sound system is too loud and sometimes the sound is not clear and need to be adjusted manually from time to time. This situation happened especially to new user to the public address system, as they probably cannot determine how loud the volume need to be leveled up, so that the audience can hear the announcement clearly. Therefore, this project can be a useful solution to overcome the problem.

From this time, the developed system offered by this project are targeted to:

1. Help the user focus on driving while using the sound system
2. Improve the sound quality with correct level sound.