UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DESIGN AND FABRICATION OF MOTORCYCLE CORNERING WARNING SYSTEM

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

by

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2018

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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Tajuk: DESIGN AND FABRICATION OF MOTORCYCLE CORNERING WARNING SYSTEM

Sesi Pengajian: 2019

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I hereby, declared this report entitled DESIGN AND FABRICATION OF MOTORCYCLE CORNERING WARNING SYSTEM is the results of my own research except as cited in references.

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APPROVAL

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

Signature: …….

Supervisor : AHMAD ZUL HUSNI BIN CHE MAMAT

ABSTRAK

Sebuah motosikal mempunyai risiko tertinggi untuk terlibat dalam kemalangan di jalan raya berbanding dengan jenis kenderaan lain. Selain itu, motosikal adalah kenderaan yang paling sukar untuk mengekalkan kestabilannya walaupun sedikit kecemasan berlaku berbanding kenderaan roda empat lain seperti kereta yang lebih stabil untuk dipandu. Selain itu, kemalangan bermotor yang boleh membawa kecederaan atau maut yang berlaku di negara kita Malaysia adalah dinominasi oleh penunggang motosikal dan beberapa kemalangan berlaku apabila seorang penunggang motosikal mengambil selekoh di jalan raya. Oleh itu, peranti yang boleh memberi amaran kepada pelumba perlu dicipta. Peranti ini akan menggunakan sensor gyro sebagai komponen utama. Sensor gyro ini akan mengesan sudut bersandar motosikal di arah paksi-y dan data akan dihantar ke Arduino untuk ditafsirkan sama ada sudut condong yang dilakukan oleh penunggang motosikal semasa mengambil selekoh melebihi tahap sudut condong yang sesuai atau tidak. Peranti ini diharapkan dapat meningkatkan ciri keselamatan motosikal dan membantu penunggang menunggang motosikal mereka dengan cara yang lebih selamat.

ABSTRACT

A motorcycle has the highest risk to involve in an accident on the road compared to other types of vehicles. Moreover, a motorcycle is the hardest vehicle to retain its stability when even a slight malfunction happens compared to other four-wheeled vehicles like a car that is more stable to drive. Furthermore, motorized accidents that can bring injury or fatal that happen in our country Malaysia is dominant by the motorcyclist and some of the accidents happen when a motorcyclist is cornering on the road. Therefore, a device that can give warning to riders needs to be invented. The device will consist of a gyro sensor as main components. This gyro sensor will detect leaning angle of a motorcycle in the y-axis direction and will the data will be sent to an Arduino to interpret whether the leaning angle that being done by a motorcyclist during cornering exceed maximum appropriate leaning degree or not. This device hopefully can improve the safety feature of a motorcycle and helps riders to ride their motorcycle in a safer way.

DEDICATION

This project report is lovingly dedicated to my respective parents who have been my constant source of inspiration. They have given me the drive and discipline to tackle any task with enthusiasm and determination. Without their love and support, this project report would not have been made possible. I also dedicated this project to my project supervisor who never failed to teach and guide me, to my family who supports me in everything, to my friends who helped me finish this project report, and most of all to the Almighty God who gives me strength and good health while doing this.

ACKNOWLEDGEMENTS

I have taken efforts in this project. However, it would not have been possible without the kind support and help of many individuals and organizations. I would like to extend my sincere thanks to all of them. I am highly indebted to Universiti Teknikal Malaysia Melaka (UTeM) communities for their guidance and constant supervision as well as for providing necessary information regarding the project & also for their support in completing the project. I would like to express my gratitude towards my parents for their kind co-operation and encouragement which help me in the completion of this project. I would like to express my special gratitude and thanks to all the lecturers especially my project supervisor Encik Ahmad Zul Husni Bin Che Mamat for giving me such attention and time. My thanks and appreciations also go to my colleague in developing the project and people who have willingly helped me out with their abilities.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF SYMBOLS

D, d	-	Diameter
F	-	Force
g	-	Gravity = 9.81 m/s
I	-	Moment of inertia
1	-	Length
m	-	Mass
N	-	Rotational velocity
P	-	Pressure
Q	-	Volumetric flow-rate
r	-	Radius
T	-	Torque
Re	-	Reynold number
V	-	Velocity
w	-	Angular velocity
x	-	Displacement
z	-	Height
q	-	Angle
°	-	Degree

LIST OF ABBREVIATIONS

PCA	Principal Component Analysis
ABS	Anti-lock Braking System
PC	Personal Computer
IC	Integrated Circuit
LCD	Liquid-crystal Display
LED	Light-emitting Diode
deg	Degree
km/h	Kilometre per Hour
USB	Universal Serial Bus
ICSP	In-circuit Serial Programming
MARG	Magnetic, Angular Rate and Gravity
AC	Alternating Current
DC	Direct Current

LIST OF PUBLICATIONS

CHAPTER 1

INTRODUCTION

1.1 Introduction

In this modern age, a motorcycle is the most popular motor vehicle use by people, especially in Malaysia. This trend happens because this type of vehicle is the most affordable and most practical vehicle on the road for users. Despite this, motorcycle also has the highest risk to involve in an accident on the road compared to other types of vehicles. This is because two-wheeled motorcycle vehicle is the hardest vehicle to retain its stability when even a slight malfunction happens compared to other four-wheeled vehicles like a car that is more stable to drive. This is why motorized accidents that can bring injury or fatal that happen in our country Malaysia is dominant by the motorcyclist.

The most critical situation for riders when riding their motorcycle is when doing leaning at the curve. This is because when leaning at curve are not being done correctly and stable, the riders can lose control of their motorcycle and can be involved in an accident. Although there's lots of safety feature available on nowadays motorcycle, not even single safety feature for leaning purpose of motorcycle invented. This is why the design and fabrication of motorcycle cornering warning system are needed to assist and warn the riders to take leaning at curve roads more safely.