AUTOMATIC WIPE AND SMART CONTROL WIPER USING SENSOR AND
CONTROLLER SYSTEM

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To my beloved mother, father and friends, thank you for the support and encouragement

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ABSTRACT

This project aims to build the automatically wiper system by using programmable software. This system functions through the combination of the hardware and software. This system is called automatic wipe and smart control wiper using sensor and controller system. The advantage of this project was help users to use the wiper automatically when the sensor detects raindrops. Driver doesn't need to turn on or turn off the control stalk at the wiper. This system will function automatically when the raindrops. Sensor use to senses the raindrop or moisture when it hitting on sensor. Otherwise, this system function to push up and pull down the wiper when the engine was starting or engine stops. This system prevents the wiper's rubber from damage during hot weather. The main objectives of this project are to upgrade the older cars system and to prevent the wiper's rubber from damage. The material as a stand used to pull down the wiper when the engine is started. When the engine is stops, the wipers automatically push up using the motor placed at the wiper blade. The mechanical function is used to control the motor system. By using this system, user doesn't control the wiper system manually and this system functions using controller system.

ABSTRAK

Projek ini bertujuan untuk membina satu sistem pengelap secara automatik dengan menggunakan perisian yang boleh diprogram. Sistem ini menggabungkan perisian dan perkakasan untuk membolehkannya berfungsi. Ia dikenali sebagai sistem pengelap automatik dan pengawal cekap menggunakan penderia dan sistem pengawal. Kebaikan sistem ini ialah dapat membantu pengguna menggunakan pengelap secara automatic apabila penderia mengesan air hujan. Pemandu tidak perlu membuka dan menutup suis pada pengelap. Sistem ini akan berfungsi secara automatik apabila berlakunya hujan. Penderia digunakan untuk mengesan air atau sebarang kelembapan yang terkena ke atasnya. Selain itu, sistem ini berfungsi untuk mengangkat dan menurunkan pengelap semasa enjin dihidup atau dimatikan. Ini bagi mengelakkan getah yang terletak pada pengelap rosak apabila terkena panas. Objektif utama projek ini ialah untuk memperbaharui sistem yang sedia ada di dalam kereta lama dan juga mengelakkan kerosakan pada getah wiper. Alat seperti tongkat digunakan untuk mengangkat pengelap apabila enjin dimatikan. Apabila enjin dihidupkan, tongkat tersebut akan ditarik ke bawah menggunakan motor yang diletakkan pada tongkat tersebut. Fungsi mekanikal digunakan bagi membolehkan system ini berfungsi. Dengan menggunakan system ini, pengguna tidak perlu menggunakan kawalan manual dan ia dikawal menggunakan sistem pengawal.

LIST OF CONTENTS

LIST OF TABLE

LIST OF FIGURES

LIST OF ABBREVIATIONS, SYMBOLS, SPECIALIZED NOMENCLATURE

PIC   -   Programmable Interface Controller

DC   -   Direct Current

3D   -   Three Dimensional

PCB   -   Printed Circuit Board

CHAP   -   Chapter

PWM   -   Pulse Width Modulation

NHTSA   -   National Highway Traffic Safety Administration

EEPROM   -   Electrical Erasable Programmable Read

RISC   -   Reduced Instruction Set Computer

I/O   -   Input / Output

CPU   -   Central Processing Unit

ROM   -   Read Only Memory

UART   -   Universal Asynchronous Receiver/Transmitter

CHAPTER 1

INTRODUCTION

1.1   Project Introduction

"Automatic Wipe and Smart Control Wiper Using Sensor and Controller System" is a system used to renew the old system from manual to automatic. When it rains, the wiper will wipe automatically and the smart control wiper is to push up the wiper when the engine is shut off and pull down the wiper when the engine is starting. This system is fully controlled using microcontroller system.

A windscreen wiper is a device used to wipe rain and dirt from the windscreen. The early wipers invented are operated manually by moving a lever inside the car back and forth. The wipers faithfully keep the window clear, moving back and forth across the windscreen countless time as they sweep the water away.

This project is to renew the system from manual to automatic. The main function of 'Automatic wipe and smart control wiper' uses sensor and controller system wipes and sweeps the water from the windscreen. The main idea is to construct an automatic wiper using a sensor as a component which is used to sense the raindrops. But the system has been upgraded by considering the existing new problem. Therefore, the second idea is to automatically push up the wiper when the engine stops. This prevents the wiper's rubber from damage during hot weather. This function is similar to the automatic door lock function used in cars. The wiper

automatically pulls down when the engine is started. To operate this system, the actuator is used as a device that can move the wiper from windscreen.

This system is suitable for all vehicles. It is because the system has a simple function and do not use a lot of circuits and requires less cost. The wiper will automatically switch on when the sensor sensed water or raindrops. The wiper is turned on until the sensor does not sense any water or raindrops. The equipment as an actuator used to push up the wiper from windscreen when the engine is stopped. This project is to design and develop a system which will help users to use the wiper automatically when the sensor detects raindrops. Users do not need to face difficulties in controlling the wiper when it is raining heavily.

During the day, especially on hot weather, normally users will push up the wiper to prevent the wiper's rubber from damage or melting on the windscreen. This system uses the actuator as a component which helps the wiper to push up. It functions to move the wiper from windscreen directly using the metal hook. This actuator can move the metal hook to the left or right. When mounted in the car, it is vertical, so the metal hook can move up or down. The metal hook device attached at the actuator directly. When the engine is started, the sensor circuit was functioning, and the metal hook will drop down.

The system will be controlled by a controller. The controller will be programmed to execute the function of this system. By using PIC microcontroller, the controller can be programmed using C language or assembly language. This project combines three circuits with a main control system.

1.2   Problem Statement

Wiper is a component that used to wipe the raindrops or any water from the windscreen. The previous system used manually to activate the wiper and the process of pulling up the wiper is difficult to handle. The driver needs to switch on and off the control stalk and it will reduce the driver's concentration towards driving. Thus, this system is proposed to solve these problems. The concept of this proposed wiper

system is just the same with other conventional wiper, in spite of removing water from windscreen, this system also will be upgraded to an automatic control system by using a controller.

When the water hit sensor, it will send signal to the system thus moving the wiper motor. Once sensor did not detect any water, the wiper will stop. This will reduce the weaknesses which have been stated at beginning. Additional plan to this invention is to make the wiper automatically push up from the windscreen when the engine shut off.

1.3   Objectives

To make sure that this project meets the goals and requirement, the objectives of this project are defines below according to the points:

i.   To upgrade the older cars system by providing automatic wiping system.

ii.   To prevent the wiper's rubber from damage and contribute lifetime increases.

iii.   To improve the system by using sensor and actuator.

iv.   To design a basic program that will fully operate with the system.

1.4   Scope of study

The scope of project that has been used to complete this project is explained as below:

i.   Study how to combine the circuit for sensor, controller and motor.

ii.   Design criteria will focus on application, economical aspect and flexibility.

iii. The system functions at two speed modes. When the sensor detect water, the system automatically functions and its will stop if the sensor does not senses water.

iv. The wiper automatically pulls up when the engine is shut off. The wiper will return to its initial position when the engine is started.

1.5 Methodology

i. Project planning is the most important phase which is to develop the Automatic Control Wiper. In this phase, it is started with the title definition to know what is the main element should be carried out.

ii. Problem identification and clarification is the next step followed by the literature review to find the relevant and related information regarding the car wiper in term of type, function and mechanism. From the information that been collected from past and current research, the development phase proceed by designing the conceptual design.

iii. The design will focus on the mechanism to use for this project where to achieve the automatic function.

iv. Pugh concept selection used for screening and scoring the conceptual design to identify the advantages and disadvantages so the refinement can be made. The selected conceptual design from the Pugh selection concept then will be the main design of the Automatic Control Wiper and the detail design can be proceed.

v. Modification is necessary if there is any problem or element that needs refinement. In order to develop a prototype, the component selection needed to decide on suitable parts or tools as different types of component have different function. Then, the replication phase will continue start form the

manufacturing process that involves and assembly. Analysis will perform after the automatic wiper system produced.

vi.   Design evaluation is an important activity because it needs to evaluate the appropriateness of design on its functions that provides the features intended. The wiper more simple circuit and simple hardware to reduce the cost.

vii.   The component will be use is important things to choose depend on the circuit. There are many things need consideration when selecting the type of component. Lifetime, economical, power, voltage and weight are some of criteria need to be study. Otherwise, all the circuit can combine with the main controller.

1.6   Thesis Outline

Thesis outline is the overall outline of report which is include summary each of the chapter in this report. This thesis focuses on the development and implementation of the Automatic Wiper for the vehicle application.

Chapter two of this thesis outlines the literature review about explanation of product overview from early it was produced until now. Then, also explained the perspective and method are used at last inquiry and surveys the products already exist to link with my project. Otherwise, the theory and concept that used is existing product used to solve the problem in this project.

Chapter three introduces the methodology. From this part are explained what the activity of research is, how to proceed, how to measure progress, and what constitutes success. The factors that contribute in order to get the method and information been considered. The overall method that used also explained clearly and the general structure of the wiper control system is then examined.

Chapter four introduces the prototype design and the plan for installing the Automatic wiper in the controller system. In this chapter, the detail hardware construction of Automatic wiper within the controller system prototype, along with their software to successfully control was explained. First design was developed using Protel SE software to select the best through Pugh Concept Selection Matrix. The second method uses Proteus software. All the method was explained.

Chapter five presents the experimental results of tests confirming the correct operation of the Automatic wiper control system. The result during tests from the entire parts was presented.

Finally, chapter six discuss possible development to the Automatic wiper control system to further enhance its functionality followed by the thesis conclusion signifying successful operation of the Automatic wiper design.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter will discuss precisely about the project which includes the part which need to consider, overview of the major component involved and overview of the project.

2.2 History of Wiper

The first wipers were inside, hand operated crank connected to an outside arm holding a rubber wiper blade and operated manually by moving a lever inside the car back and forth. Later, for the convenience of the passenger, a blade and arms was installed on the passenger's side of the windscreen and connected to the arm on the driver's side by linkage and operated in tandem with the driver's wiper. [6]

This was unsatisfactory and was replaced by the vacuum wiper motor that operated the wiper arms using the vacuum. This system not inability caused when the engine vacuum lowered, the wipers would stop and cause visibility problems.