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Design and Fabrication of Modified Circuit Connection for Automatic Wiper Using Rain Sensor

N.D.M. Said[1], N.N. Husin[2], N.D.Kamarudin[3], N.L. Mohamad[4]

[1,2,3,4] Electrical Engineering Department, Politeknik Merlimau, Merlimau, Melaka

Abstract: **The paper deals with a simple modified circuit design of automatic wiper for vehicle's windshield. Automatic wiper can be used to wipe raindrops on the windshield using rain sensor detects the rain. The previous project, wiper used to start manually and the process of halting the wiper is difficult to be handled. Thus this automatic wiper is proposed to solve these problems. The objectives of this project to design and fabrication of modified circuit connection of automatic wiper using rain sensor. This concept of this project is almost similar with other existence conventional wiper. An automatic wiper is implemented by combining an automatic wiper circuit and rain sensor. A control unit of this project is incorporated so that the sensitivity of the sensor will detect properly. The result have shown that an automatic wiper which achieves the design goals for convenience.**

Keywords: **automatic wiper, rain sensor, motor DC.**

I. INTRODUCTION

In the last two decades, the automotive industry has researched aggressively ways of exploiting modern computing and electronic advances in the development of technologies for security and reliability. With drivers revealed to the increasing number of interruption, automatic wiper systems become an even more interesting feature, as the researchers work to minimize the time, and the driver must take hands off the wheel. Despite this, systems of automatic wipers are relatively uncommon in modern for a number of reasons vehicles.It also often too expensive or too unreliable to be desired in new cars. While a number of different design approaches have been made to improve these themes, there were not enough successful for the technology to be widely adapted in new vehicles. Wiper blades, which have been standard in most vehicles equipment since 1916, were developed to improve visibility during intemperate weather. For almost 100 years, drivers ran the wipers with manually controls mounted on the dashboard [1]. Today, technology has made possible wiper motor that recognize a problem of visibility in developing and clear the glass until the driver can react to the problem automatically. This project is alternative solution based on cheap devices from low cost manufactured.

II. DESIGN PROCEDURE

A. Design of Automatic wiper circuit and power supply circuit:

Fig. 1 shows the block diagram of project. It also indicated a modified circuit connection for automatic wiper based on the original concept then upgrading the circuit connection become more reliable usage. The circuit show that how the wiper handled by rain sensor as input at the center of windscreen which detects rain and turn on automatically the wiper motor. But, at the same time the user can turn off the wiper using manually switch. The trigger was second pin 2 of IC 555 connected to rain sensor. A small water drop on the rain sensor will connect the negative voltage to the trigger pin of IC 555 which in high output. The outputs of IC 555 were connected to both the base of transistors through a 10kΩ of resistor which forward biases of the transistor and two diodes were connected to the relay1 and relay1 respectively. Thus relay 1 received negative and it switches ON the wiper motor. Another relay 2 received positive and it switches OFF the wiper motor [2].

Referring the fig.2(a), a rather simple design made around a single active component which is IC 555. Astable multivibrator can be designed by using IC 555 timer. The IC 555 timer provided accurate time delay from mille seconds to hours. The frequency of oscillation can be controlled manually by simple modification. IC 555 is suitable for circuit designers with a relatively stable, cheap, and user-friendly integrated circuit for astable applications. IC 555 timer was the first introduced around 1971 by the Signetics Corporation as the SE555/NE55 [3]. Astable multivibrator was simply an oscillator circuit that produced continuous pulses. Other components of the circuit includes a few cheap passive components like resistors and capacitors, diode, PNP transistors and variable resistors. The frequency can be controlled by changing the values of R1, R2 and C1. However, the CI is set in a rather unusual way, as a comparator. When rain sensor detected in previous entries, a low resistance is developed here. Pin 4 as reset is adjusted conveniently such that any water through the entries detection active IC properly. The function of reset was to reset the output to its original condition or situation fixed level. IC 555 can reset by applying a negative pulse on this pin. And the pin was connected to positive power supply to avoid false triggering [4]. When low resistance at pin 2 of the IC acts as a momentum that overcomes the potential on pin 2. This activation instantly makes the IC output low, the motor connected and moving in forward and reverse direction. As long as the sensing input stays immersed under water, the output continues with the above situation. However the moment, water was removed from the specified input terminals, the potential at pin 2 reverts to less than 1/3 of the supply voltage, making the high output high, back to its original position. Fig. 2(b) shows a top layer of PCB layout for power supply circuit. The above operation effectively indicates the commencement of a rain fall when the sensor is appropriately placed for the detection. The charge inside the capacitor C1 keeps the motor moving properly for some period of time even after the water from the sensing inputs is completely removed. Therefore the value of C1 must be appropriately chosen, or may be completely eliminated if the feature was not required [4][5][6].

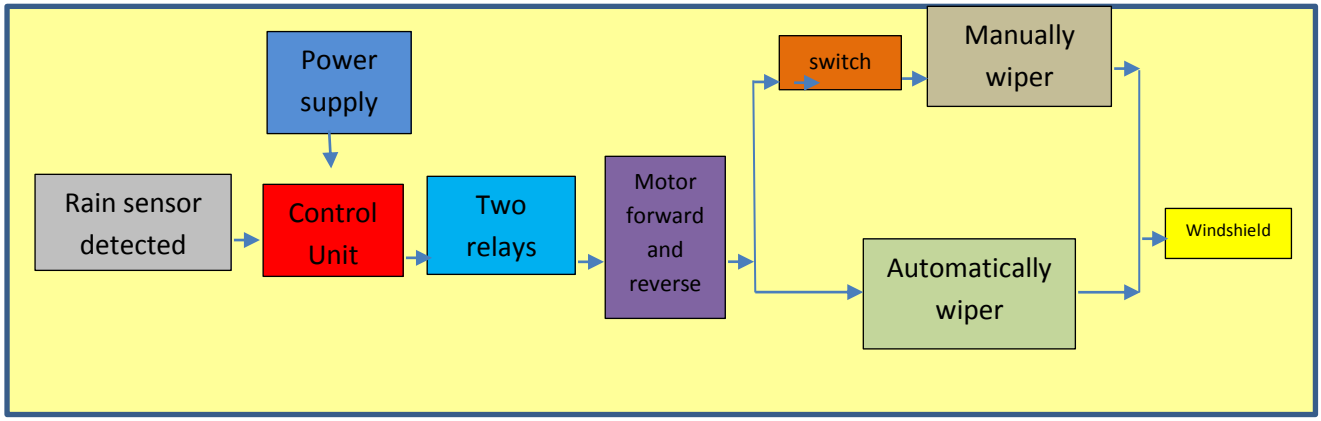
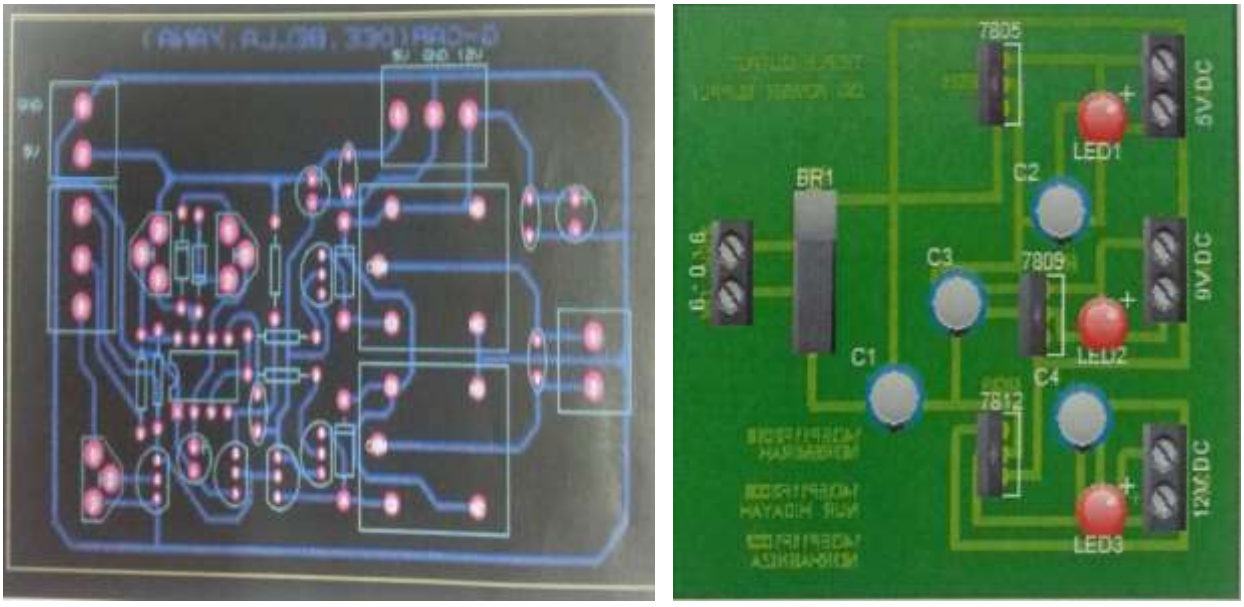


Fig. 1: The block diagram of the project



(a) **(b)**

Fig. 2: (a) A bottom layer of PCB layout for automatic wiper circuit (b) A top layer of PCB layout for power supply circuit

B. Selection of motor and sensor:

(a)

(b)

Fig. 3: (a) DC Motor. (b) Rain Sensor

The function of motor is to replace the electrical energy into kinetic energy can moving in forward and reverse direction. The voltage of motor is 9V to 12 V. Motor usually used in the electrical and electronic equipment. Sensor commonly used to give a feedback to others and make it move based on the effect. Sensor used is astable multivibrator using IC 555 timer.

C. Fabrication of project:

(a)

(b)

Fig. 4: (a) Combination wiper circuit and power supply circuit (b) Fabrication of automatic wiper model

In this paper, automatic wiper was arranged on the glass frame to remove the raindrops. The implementation of modified circuit connection for automatic wiper using rain sensor helps in reducing human effort.

III. CONCLUSION

The windshield wiper had fabricated using rain sensor. The implementation of this modified windshield wiper helps in reducing human effort and operating principle is very easy. Presently, the mode of power supply used which is non-conventional source power. However this project still need adjustment of circuit connection so that the speed of automatic wiper operated based on the amount of the rain fall on the windshield of car.

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