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## An Initial Development of Simple and Low-Cost Approach for Affordable Semi-Automatic Car Cover

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**Abstract:** *New design of affordable car cover has been developed to facilitate the users to close their car cover easily and save the users' time from installing it manually. Heavy rains and prolonged drought were frequently occurs thus the car parked under direct sunlight can cause thermal heating in the car and will be leaded the consumers feel uncomfortable. Users are less diligent to use a manual car cover because it is quite troublesome to use it. The method used to produce this system is a simple design of circuit which can make the motor move forward and reverse. Relays are switches that active and deactivated the circuits electromechanically or electronically. Relays control one electrical circuit by opening and closing contacts in another circuit. 4 unit of relay 9V was used in the circuit to turn on the motor. Only two push buttons was used in the circuit that is for forward and reverse and 9V battery was also used to supply the relay and both motor. 9V battery that been used in this project is Panasonic which has 7 hours of lifetime. Time used to open the cover is 20 seconds and time used to close the cover is also same that is 20 seconds when the canvas size is 30cm. A calculation has been made to show how many times the cover can be opened and closed which is 630 times based on the battery lifetime. This car cover system can be used to all type of materials such as canvas, fabric and plastic.*

**Keywords:** *Car cover, relay, battery, dc motor, semi-automatic, canvas.*

### 1. INTRODUCTION

Car covers are available in a variety of different materials and are intended to protect both the exterior and the interior of your car from external pollutants and damage. The car paintwork is surprisingly vulnerable. However, a car cover can protect the paintwork from the elements and from minor damage like grit or salt on the road. Besides that, the location of the car when not in use is very important. The car can be seriously damage if it is in an area where there are lots of birds (for example, on the coast) or where the car is stored under a tree. Bird poop, sap, and other material from trees can seriously damage the paintwork of a car. The car also will be damage caused by grit or stones flicked up from the road surface if it is parked on a very busy road. Car paint will be faded and the interior of the car will be damaged if it is often left in direct sunlight for any long period of time and leather and plastic upholstery can also fade and crack under direct sunlight. Long-term effects can lead to body rust, especially on the roof of the car bonnet, doors or

car body causing injury to your vehicle. Severe corrosion will also cause a hole in the car body and a leak in the car [1]. Refer to Figure 1, 2 and 3. Therefore, a system of semi-automatic car cover has been produced to facilitate the users to cover their car and save the users' time from installing it manually which is takes longer time. The method used to produce this system is to simply design a circuit which can make the motor work properly and cover the car with canvas.



**Figure 1:** Car Scratches

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**Figure 2:** Car Dust



**Figure 3:** Car Parked Direct Under Sun

## 2. LITERATURE REVIEW

Most of car covers on the market is a simple plastic sheets deployed manually by the owner of the car. Some of recent car covers are installed inside of trunk of a car and re-winded automatically by a spring re-winder that also is installed inside thereof. However, it is not an easy job to take out the car cover from the trunk and deploy that all over the car. Especially, for bad weather, when it rains or in a snow storm, it is very hard to deploy the cover alone even for an adult man. Meanwhile, some expensive luxury cars are provided with a trunk that opens and closed automatically. However, it is almost impossible to deploy a car cover when it rains while the owner of the car holds luggage in both of his/her hands. If there is a car cover deploys automatically, it will protect the luxury cars even at the worst situation. R K Tyagi et. al. proposed an automatic car cover which will opens itself with the help of push button. It covers the whole car with a thin, but a strong material that not only protects the car from rain, dust and mud (in parked situation) but, also from minor scratches. An assembly of different diameter, concentric cylinders is used to form a hoisting pole and also,

so that it could be contained in small space when not in use. The cover material is attached to the top of the innermost cylinder on both sides and to a rolling rod, which has the cover rolled on it. For the accomplishment of their task, they were using a simple but dependable mechanism of rack-and-pinion gears. A flexible rack is attached to innermost of the 4 concentric, different diameter hollow cylinders. The pinion is attached to a motor, which derives its power from the car battery. As the pinion moves, the rack moves and pushes the innermost cylinder upwards. The bottom of every inner cylinder is attached to the top of the just outer cylinder, but providing the linear motion between the two. When the rack moves, the innermost cylinder is pushed, which in turn, after being completely hoisted makes the second inner cylinder to move. The After second the third cylinder is hoisted and with it the complete four cylinder pole structure is formed. After complete hoisting, whole structure is rotated along the rear parallel axis of the car. The cover takes the shape of the car and the car is well protected. After complete hoisting, whole structure is rotated along the rear parallel axis of the car. The cover takes the shape of the car and the car is well protected. It is most suited for sports car, because sports car generally have open roof [2].

Ted Justin Suh et. al. proposed an automatic car cover system, driven by electric motors, for a car, which is equipped with an automatic opening/closing trunk lid, is provided. The automatic car cover system according to current application is comprised of one cover runner, one holster, one holster casing, one guide, one cover sheet, and one cover sheet un-folder. The cover runner is a small electric motor driven vehicle equipped with caterpillars, which are comprised of magnetic plates covered with rubber. The holster pushes out/rewinds the cover runner, the guide, and the cover sheet with un-folder. The holster comes out of and goes into trunk of the car with aid of a line connected to a reverse power motor installed in the holster [3].

In addition, other attractive researches are also having done to improve the facilities of the car to become more comfortable and save. For example, N. M. Z. Hashim et. al has proposed the traffic light control system for emergency car using radio frequency [4]. Car security system using Zigbee Technology is also has been introduced by S. A. W. A. S. Mokhtar et. al. [5].

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### 3. DESIGN METHODOLOGY

The design consists of two parts which are software and hardware. The software required to simulate the circuit and develop the layout of printed board circuit for this project is Proteus 7 software. For schematic design, Proteus 7 ISIS was used to simulate the circuit while Proteus 7 ARES was used to produce the PCB Layout. The schematic design of the circuit is shown in Figure 4. Then, it has been made on the PCB by doing the UV exposing, developing, etching, stripping, drilling, and soldering process. Lastly, the whole project can be function by inserting 9V battery. The completed circuit after fabrication is shown in Figure 5.

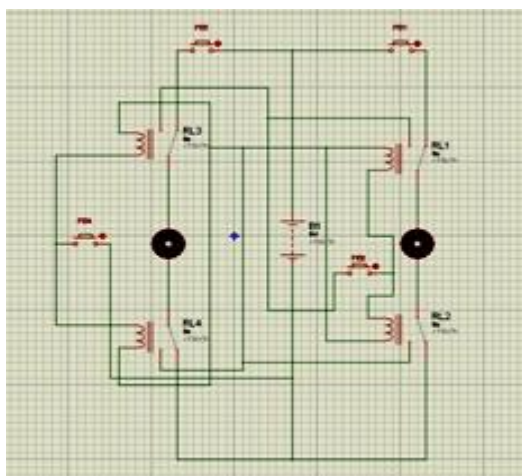


Figure 4: Schematic design of DC geared motor

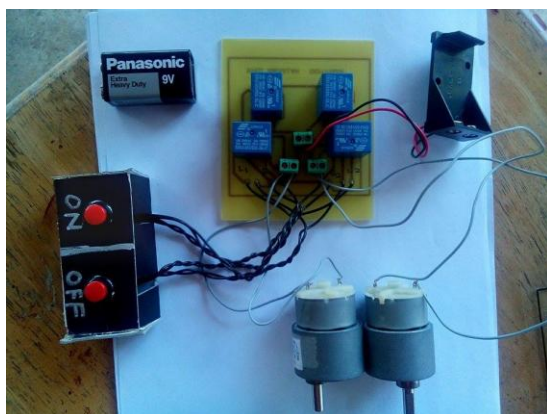


Figure 5: The completed circuit

The DC geared motor will detect the user that press the ON button or OFF button. When users press ON, the motor will move forward and open the car cover. And when users press OFF, it will activate the relay and causing the motor to move

backward and finally close back the car cover. Relays are used as switches that active and deactivated the circuits electromechanically or electronically. Relays control one electrical circuit by opening and closing contacts in another circuit. 4 unit of relay 9V was used in the circuit to turn on the motor in rolling the car canvas or cover.

### 4. RESULTS AND DISCUSSIONS

Figure 6 shows the lifetime of different types of battery which is Duracell, Panasonic, Eveready and Energizer. Duracell have the longer lifetime which is 8 hours while Panasonic has 7 hours, Eveready has 6 hours and lastly Energizer has 5 hours only. Therefore, the Duracell can be the longer lifetime battery but the energy supply from the battery to the DC motors is more effective and almost same at the first 2 hours. Figure 7 shows the time of each different length of canvas that has been used. The longer the length of canvas used, the longer the time taken. This car cover system can be used to all type of materials such as canvas, fabric and plastic.

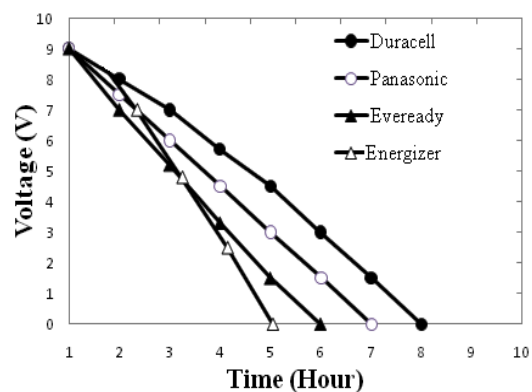


Figure 6: Lifetime of the different types of Battery

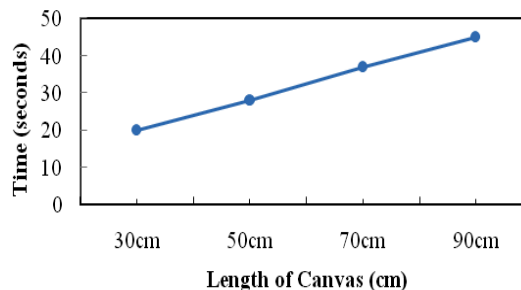


Figure 7: Dependence of length of canvas on time.

The calculation below shown how many times the cover can be opened using Panasonic battery

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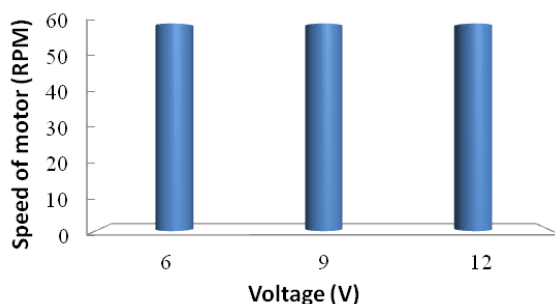
which has a battery lifetime 7 hours or 25200 seconds. The length of the canvas is 20cm. However, the cover material and time delay when battery weak condition is ignored in this calculation and can be considered in future works.

Time used for open and closed the cover = 40sec

Lifetime for Panasonic battery = 7hours (25200s)

$$\text{How many times it can be used} = \frac{25200s}{40sec} \\ = 630 \text{ times}$$

Figure 8 shows that motor that has been used have 60rpm, therefore different voltage is applied at the motor and the result of speed motor does not change even though the voltage applied is different. Therefore, this affordable semi-automatic car cover can be used at the same speed with minimum voltage supply is 6V.



**Figure 8:** Relationship between the voltage and speed of motor (rpm).

## 5. CONCLUSIONS AND FUTURE WORK

With this project, users can open and close the car cover semi-automatically without using any excessive physical strength. Overall, this project has been achieved their objectives which is produce a product that will facilitate the users to close their car semi-automatic and save the users' time from installing it manually which is takes longer time. However, this project is used a 9V battery as power supply. If the battery power is low, it will interrupt all the system in the circuit and the circuit cannot be function well. So DC power supply or battery from the car is suggested to replace the 9V battery so that the project can be functioning well. Besides that, the solar charged battery can be proposed as the power supply regarding to the hot climate and high solar panel output voltage throughout the year especially in Southeast Asia [6]. Instead of

that, this circuit can be modified by using other types of motor so that it will be stronger and more accurately in rolling the car canvas. Relay that supports more voltage can also be replaced according to the power supply that has been used. Furthermore, this semi-automatic car cover can be improved using the integration technology of new press machine [7], temperature monitoring [8][9] and closed feedback loop [10] to control the canvas motion in the future.

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