

# AUTOMATIC CAR ROOFING

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## ABSTRACT

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This project entitled “Automatic Car Roofing” is aim to provide comfort and relief for the convertible car users from driving chores. It is a new accessory product for the convertible car users to protect themselves and their passengers from hot bright sun, rain, and darkness while they are driving. It serves as a mean of automated system for the convertible car users whereby they can drive freely without disturbance from sun shine, rain and darkness. The automated car roofing system operates when the car engine is revved up; it shuts automatically when the weather is too hot or is rainy, and even when the car is in a total darkness. These functions keep the drives and the passengers from undesirable situations and ensure their safety. To illustrate, the pre-programmed electro-mechanical system can aid the car in avoiding road obstacles automatically due to its environment-sensing ability.

This project contains two different systems, one is the collision avoidance system and the other one is the automatic car roof system. Both of the systems are each controlled by a Peripheral Interface Controller (PIC) which is the PIC16F877A. For collision avoidance system, the microcontroller will control the DC motors for the mobility of the car. The robotic car uses microcontroller to manipulate its direction according to the input signals from three infrared (IR) sensors mounted in front of the car. The infrared sensors will pick up the presence of the obstacles in front of the car and the microcontroller will first analyze the position of the obstacles and change the path of the car consequently. On the other hand, the automatic car roof system works on four different sensor input signals which are the rain sensor, the temperature sensor, the dark sensor and the engine switch. The microcontroller will control the position of the car roof and the car roof is moved by using servo motors as their parts. The car roof will automatically come out to provide shade to the passenger when either one of the following criteria is met:

1. When the rain sensor detects water droplets, i.e. it's raining.
2. When the surrounding temperature is greater that a preset threshold temperature, i.e. the weather is hot.
3. When the dark sensor detects no bright light, i.e. the surrounding is dark
4. When the engine switch is turned off, i.e. the engine is off.

Nonetheless, the car roof will automatically fold back to the recess of the rear car seats when it's not raining and the engine of the car is turned on. Additional features have been added to the system, where the buzzer will buzz to alert the passenger the car roof is in motion and also the LCD will display the current surrounding temperature and the position of the car roof. Last but not least, the headlights at the front end of the car will be automatically turned on when it's raining and when the environment is dark to illuminate the surrounding for safety purpose.

The operation of “Automatic Car Roofing” project is included in the introduction chapter by presenting block diagrams and brief explanations on their functions as well as the aims and objectives. In literature review, the theoretical background of the project and

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also the main components used in this project are explained thoroughly. The hardware designs, circuit designs, software programming flows, and the methodologies are listed and discussed in detail in the hardware and software designs, methodologies chapter. Proof of the testing and results will be shown to prove the project is functioning properly. The problems encountered and the respective solutions are listed in discussion chapter. The status of the project, future improvements, and conclusion of the project are included in the end of the report.