



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**SMART CAR TEMPERATURE USING ARDUINO UNO, GSM
AND SOLAR PANEL**

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor's Degree in Electronics Engineering Technology (Industrial Electronics) (Hons.)

by

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I hereby, declared this report entitled “SMART CAR TEMPERATURE USING ARDUINO UNO, GSM AND SOLAR PANEL” 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 Electrical and Electronic Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Engineering Technology (Industrial Electronics) (Hons.). The member of the supervisory is as follow:

.....
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ABSTRAK

Tujuan projek ini adalah untuk membina satu sistem yang boleh memantau suhu di dalam kereta yang diparking di kawasan terbuka yang terdedah kepada cahaya matahari. Hal ini kerana keadaan cuaca yang panas boleh menyebabkan banyak masalah terutamanya kepada kanak – kanak yang menaiki kenderaan secara terus. Selain itu, ia juga akan menyebabkan kesan rumah hijau sekiranya suhu meningkat dan tidak dikawal. Pengguna sukar untuk menggunakan kenderaan sekiranya terdedah kepada matahari contohnya steering kereta akan menjadi panas dan menyukarkan proses pemanduan. Ia nya mengambil sedikit masa untuk kembali kepada normal setelah aircond menjadi sejuk di dalam kereta. Masalah ini boleh dikendalikan dengan membina projek **Smart Car Temperature Control System using Arduino, GSM and Solar Panel**. Projek ini menggunakan solar panel sebagai sumber tenaga yang akan memastikan system ini berjalan dengan lancar. GSM dan Arduino juga digunakan untuk melengkapkan system ini. Arduino akan menghantar data yang telah dikenalpasti kepada GSM. GSM digunakan untuk menghantar notifikasi kepada user sekiranya suhu kereta sama atau lebih daripada suhu yang ditetapkan. Pengguna akan menerima notifikasi dari GSM melalui pesanan ringkas (sms) yang dihantar kepada pengguna. Kipas akan berfungsi setelah suhu melebihi tahap yang ditetapkan. Seterusnya ia akan dapat membantu dalam mengurangkan haba panas di dalam kereta. Projek ini sangat lah membantu untuk mengurangkan suhu di dalam kereta pada hari panas. Dapat mengurangkan kesan rumah hijau sekaligus masalah kesihatan kanak – kanak.

ABSTRACT

The purpose of the project is to make a system which will monitor the temperature within the automotive position in open areas exposed to daylight. This can be as a result of weather condition conditions can cause tons of issues particularly for kids traveling on a vehicle directly. Additionally, it'll additionally cause atmospheric phenomenon if the temperature will increase and isn't controlled. Users area unit troublesome to use once exposed to sun, for instance steering cars can become hot and build the driving method troublesome. It takes a while to urge back to traditional once the aircond gets cold within the automotive. This downside may be handled by building the **Smart Car Temperature Control System using Arduino, GSM and Solar Panel**. This project uses a solar panel as an influence supply that may make sure the system runs swimmingly. GSM and Arduino are accustomed complete this method. Arduino can send information that has been known to GSM. GSM is employed to send notification to the user if the automotive temperature is capable or over the prescribed temperature. Users receive notification from GSM that has been sent to user cellphone. The fans be turned on accordingly when the temperature exceed the set limit. Then it'll facilitate in reducing heat within the automotive. This project is incredibly useful to cut back the temperature within the automotive on hot days will cut back greenhouse gases moreover as kid's health issues.

DEDICATION

To my beloved father, mother, family and those people who have guided and inspired me throughout my journey of education here in UTeM.

ACKNOWLEDGEMENT

I would like to thank to Allah, Alhamdulillah because of His blessing, I finally complete and finish my final year project successfully. Also, with great pleasure I want to take this opportunity to express my heartfelt gratitude to all people who helped in making this Major Project work a grand success. A special gratitude I give to our final year project supervisor, Madam Raeihah, whose contribution in stimulating suggestions and encouragement, helped me to coordinate my project especially in writing this report. Nevertheless, I would like to thank both of my dearest father and mother who has contributed in many forms in order to help me with this project regardless in energy, time and money.

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CHAPTER 1

INTRODUCTION

1.0 Introduction

This section will describe guidance in preparing the entire report content including background of project, problem statement, objectives, scope and expected outcomes of the project. Each section will be described further in this section.

1.1 Project Background

These days, cars are one of the most essential transports for every individual contrast with public transport. The appeal of the private transportation has caused such a large number of issues. For example, the requirements of parking spot have gotten important significantly at the looking territory. Therefore, various choices for those that cannot get indoor parking or select a low-cost lot can find out open parking spot. It can cause another issue to the automotive wherever the temperature within the lodge can increase dramatically toward sixty degree Celsius (°C). The sunlight which enters inside the car can marginally caught by the wind shields that cause greenhouse effect.

Normally vehicles parked on the ground are exposed to sunlight have dramatic increases in cars, especially steering wheel, seating, dashboard temperature record almost doubled the temperature outside the car. It is important to ensure the exchange of air positively without the use of existing energy is battery to avoid unwanted things involving car safety. Critical impacts of high temperatures inside the car. In fact, even on mid-temperature days, a stopped car that exposed to sunlight

might get heat up faster. Normally the temperature inside the vehicle parked under sunlight can reach temperatures of twenty until thirty compared with temperature outside the car.

Temperature magnification can be a direct result of the conductivity, convection and radiation of heat exchange, from air in automotive materials, thermal holding materials and glass and automotive bodies whereas radiation is that the most powerful issue that cause temperature increase of put automotive. Temperature variation within the automotive depends on 2 vital factors. The exchange of heat radiation between the automotive body environment and therefore the absorption of radiation in the interior of the automotive cabin. In this regard, the project focuses on the design and development of an easily solar-powered aeration system to provide the necessary air exchange across the car cabin.

1.2 Problem Statement

Increased indoor temperature during the day in locked and open parking areas is a problem that needs to be addressed. The main reason for the increase in internal temperature is the heat trapped inside as the glass windows are closed and the greenhouse effect. It is very uncomfortable to get into a car that is exposed to sunlight for a prolonged period especially for children. The heat generated in the vehicle cabin will increase the interior temperature up to 45°C, and causes health risk and damage to the vehicle cabin components. Vehicles placed under direct sunlight mainly on summer days, have a sudden rise in temperature in the cabin car, and more often it becomes unbearable to hold or touch the steering wheel and dashboards. Further the high temperature inside the vehicle will cause a huge amount of thermal discomfort to the drivers and passengers during the first few minutes after entering in to the vehicles.

1.3 Objectives

These projects have three main objectives such as:

1. To build a system that can monitor the temperature inside the car at the open surface parking area.
2. To notify the user about the current temperature inside the car using GSM.
3. To develop a system integration between Arduino Uno, GSM and Solar Panel.

1.4 Scope

This system primary focuses on the temperature inside the car at the open surface parking area. System will notify the user about the condition of the car at the open surface parking area. In this projects , the GSM will be used to send notification to the user cell phone when the temperature inside the car exceed the set limit. Arduino is main component of the system that function for control the system. The temperature sensor is used to give the signal to Arduino that have been program and send the data to GSM.

1.5 Expected Result

The expected result of the system is temperature inside the car at the open parking area can be monitoring using this system. Car air conditioning system will experience higher thermal load if the temperature inside the car is higher than the normal temperature when cars are parked under the open surface area. The system will be solves the problems and user feel comfortable when inside the car.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

This section basically contains several articles, journals and conferences, devoted in a brief summary and those related to the project to be undertaken. This study focuses on the temperature regulation in the car placed in the car park and what is the method used to this project.

2.1 Past Related Project Research

2.1.1 Parked Electric Vehicle Cabin Temperature Management Using Photovoltaic Powered Ventilation

The project utilizes physical phenomenon integrated electrical vehicle roof (PV) hopped-up ventilation to manage the temperature at intervals the auto. It illustrates the performance analysis of the electrical car's ventilation, once a roof-mounted PV module is used to handle DC-powered fans for ventilation. It had been found that the motor-fan alternative for removing the great and replica air from cabin home is of significant. Motor-fan operative points have to be compelled to be nearly the foremost power points of PV modules at a lower place variable radiation. the straightforward technique for ventilation in vehicles practice PV hopped-up motor-fan, once the auto is create in associate party directly receptive the sun. Once a vehicle is create at intervals the party at a lower place clear sunshine. PV arrays unit directly used for powering water pumping and machine systems through DC motor-

centrifugal pump / load. There's a chance to be used of automobile roof mounted PV array for powering directly coupled PV hopped-up DC motor-fan systems for automobile ventilation. This work is examining role of directly PV hopped-up DC motor-fan system for reducing the auto cabin temperature and increasing the energy efficiency of the electrical automobile. This project used thermocouples sensor to sight the temperature at intervals the auto. (Kolhe, Muneer, & Adhikari, 2017)

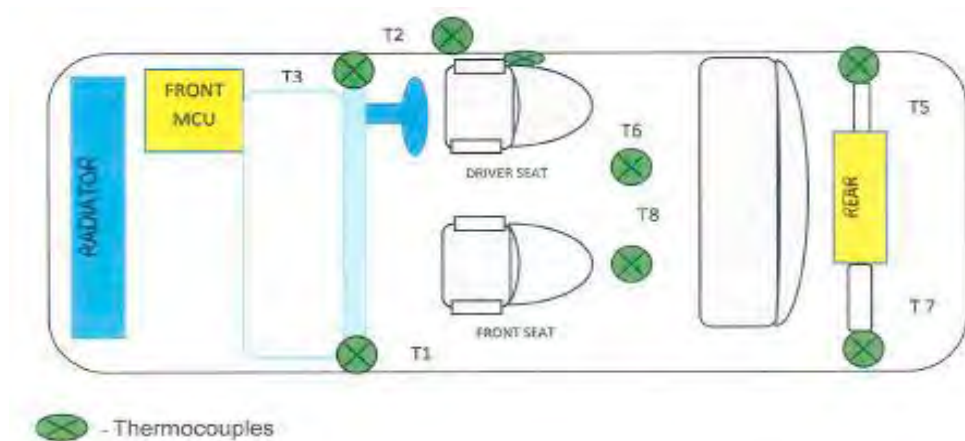


Figure 2.1: The thermocouple positions in the car

2.1.2 Temperature Variations In a Parked Car Exposed To The Sun During Hot And Dry Climates

This project was style to live the temperature at four wholly totally different places inside the cabin. Four Thermometers sq. (measure) accustomed live the temperature at front dash board, rear board, front seat, and rear seat. The impacts of automobile orientation on the cabin temperature are studied by facing the car towards the foremost four directions, North, South, East, and West. This project has four techniques to scale back the temperature inside the car. First, Dadour et.al. They develop a simple „greenhouse“ model for predicting the daily internal vehicle temperature. They jointly predict the temperature inside the cabin of black and white vehicles. Second, Kaynakli Associate in Nursingd Kilic measured temperature and

condition at style of points inside an automobile throughout heating quantity. Third, Korukcu Associate in Nursingd Kilic utilized in infrared diagnostic technique to measure the instant Associate in Nursingd transient temperature distributions of all surfaces inside an automobile and investigate the thermal discomfort that was caused by those surfaces. Lastly, Mezrhab and Bouzidi have given a numerical model to review the behaviour of thermal comfort inside the car compartment in step with climate and materials that compose the vehicle. They developed numerical model taking into account of the combined convection, conduction, and radiation heat transfer. (“Temperature variations , inside a parked car in hot and dry climates,” 2014)

2.1.3 Solar Powered Heat Control System for Cars

A simple project that can controls the heat development rate in parked cars with the help of solar energy powering. This device working based on newton’s law of cooling. The device to measure the temperature inside the cars that all directly exposed to the sun. The device also choose the suitable equipment that will be used to develop a simple device for dissipating heat from a car A simple device consisting of two micro fans is used for air circulation. It is also used for air circulation in the car when it is parked. One fan is use for inlet and the other for outlet actions respectively. The inlet air forced in by the micro fan is passed through a closed chamber containing a coolant. The coolant primarily used is liquid acetone. The electric power required for the functioning of the two micro fans are harnessed by solar panels by solar energy harnessing principle. This paper deals with to design a device for heat removal inside a car which will help to cooling down the temperature in the car and reduce the excessive heat felt by the passenger of the car on vehicle start-up, besides reduce the damage an automobile's interior as well as personal property kept in the passenger compartment. (Abin John, Jithin Thomas, Jose S Kattukaran, Relno Baby M, 2014)

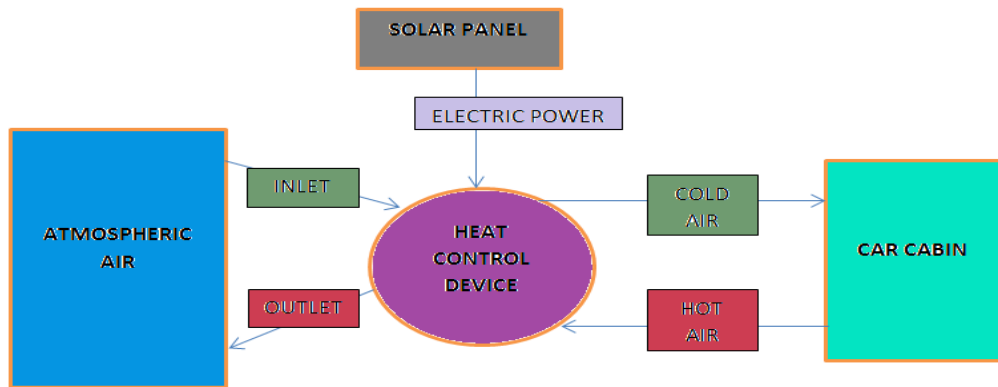


Figure 2.2: Block diagram of solar heat control system

2.1.4 Effect of Solar Ventilation on Air Conditioning System Performance of the Car Parked Under Sun Light

A simple mechanical system was developed and put in in a very chosen take a look at vehicle with necessary instrumentation that equipped contemporary air from outdoors into the automotive cabin and purging the recent accumulated air from vehicle cabin. so as to judge the air-con system performance within an extended put vehicle, a straightforward proof of construct of star powered cabin mechanical system was developed and studied at the Caledonian faculty of Engineering Oman field.

In general, purpose of ventilation system is to remove the air or smell unwanted in any place as well as maintain conditions of temperature or smell which are compatible with human habitation and industry a operations. Experimental methodology adopted in the current study can be divided into two parts. The first part of the study included, developing and installing the temperature measurement devices inside the cabin of the chosen car and record the cabin temperatures rise without ventilation system. In the second part of the study, a simple standalone solar P.V ventilation system was to designed, fabricated installed and experimental studies

were carried out to investigate cabin air temperature rise with developed the solar P.V ventilator. The ventilation system was designed and developed, to take hot air from inside the car to outside so that it reduces the temperature inside the car. It was a challenge to install a ventilation system inside the car as it should not obstruct the cars utility. This project use sensor thermocouple to detect the temperature inside the car.(Sudhir & Al Dhali, 2015)

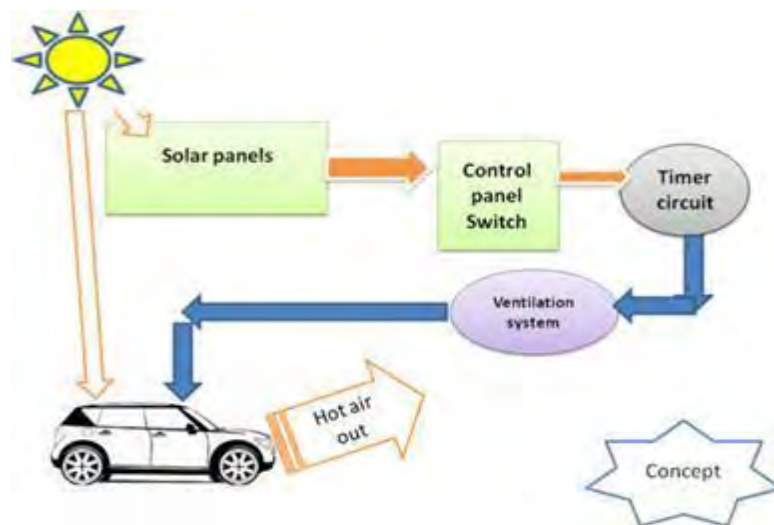


Figure 2.3: Concept diagram of the setup

2.1.5 Maximum Potential of the Car Cabin Temperature in the Outdoor Parking Conditions as a Source of Energy in Thermoelectric Generator

This system applies the principle of changing heat energy into mechanical energy. The studies are conducted that apply the principle thermoelectrically to converts the warmth energy into electricity. If it's created a module block the energy created is enough to lower the temperature and charge batteries for additional cooling. This project has special ways in which to chop back the temperature. First, reducing fuel consumption by reducing the air con load of the cooling system.

This technique operate used thermoelectrically that the temperature among the vehicle can generate electricity up from zero to 17W whereas mistreatment solar cell entirely obtained to 10W of energy may accustomed facilitate flow into the heat among the vehicle therefore temperature among the car will unbroken cool.

Next, heats which can take blessings once the uses of heat square measure usually energy offer to activate the cooling module based thermoelectrically square measure done. Some variation of applications which can be examined given by Xongxia Xi for refrigeration, air conditioning and power generation. it should be accustomed meet the load demand for energy conservation. Moreover, hot on the auto cause once the auto is ready at a lower place the blazing daylight. It'll cause physical phenomenon, analysis disclosed that a serious rise in temperature and should be harmful to human health significantly children area unit gift at intervals the vehicle.

The cooling system among the auto began to increase efficiency per the calculation technique to figure out the aim of heat provide from outside the vehicle. It determines what proportion the quantity of energy needed to relax the auto supported road conditions and time. All predictions ought to be listed to supply a top level view of energy needs throughout a car's cooling system. So, Efficiency thermoelectric Generator (thermoelectric plants) can be used. Thermoelectric modules are integrated circuits in the form of a solid which uses three principles of thermodynamics which is known as the Seebeck effect, Peltier and Thompson. Its construction consists of pairs of p-type semiconductor material and n-type thermocouples formed that has a shape like a sandwich between two thin ceramic wafers. This module can be used to produce heat and cold on each side if the electric current used.

Lastly, Potential electric cell is also used. The electric cell may well be a kind of energy generation that additionally a development with the accumulated efficiency and power output to boot as a result of the modest price of star cells. It encourages plenty of research to explore deeper, ranging from materials (materials), design,

placement location, until the position angle of inclination of the device. The star cells square measure able to be combined with various plants Associate in Nursingd square measure capable of standing alone as energy provide. It may also be used in vehicles, lights and various sources. This technique using sensor temperature data logger RC-05 to read the temperature within and out of doors of the automotive. (Goes, Sinhoreti, Consani, & Silva, 1998)

2.1.6 Alternative Way in Reducing Car Cabin Temperature Using Portable Car Cooling System (Car-Cool)

This project concerning the transferrable automobile Cooling system. the car cooling system is use to help cool off the car that create below the new sunny days. So, the aim of this analysis is to create a system that capable to cool down down the somebody cabin whereas not operates the car's engine. The materials prices used for the system are also low. the fabric together had high strength. This transferrable automobile cooling system is used to manage and maintain the temperature at intervals the car at temperature even below a extremely hot condition. the car ventilation fan is exploitation theme and it'll merely notice at intervals the market. This product was created to remain the car cool whenever it's heating by the daylight or hot shut. There are a unit variations between this product and transferrable automobile cooling system planned throughout this paper in term of the structure of the merchandise, product functions, system used, strength and much of further.

The automobile ventilator fan used AN device and battery as a offer of energy to run the ventilation fan whereas mobile automobile cooling system applying Petier cell as offer of energy. Besides that, the weakness of the car ventilator is simply is also placed if the window's glass is slightly opened and this might cause unwanted things like automobile law-breaking. this technique operates exploitation 12Vdc battery power kind metal compound where it's can reversible. The battery is also charged either using a charger or Peltier cell. There unit of measurement several Peltier cell placed at intervals the left and right. Peltier cell will manufacture electricity once one of the surfaces is obligatory with hot air and various surface with