

A New Technique For Automobile Air Conditioning System During The Hot Weather In Kuwait

Thamer A N. Alenezi

Lecturer, Civil Engineering Department, Public Authority For Applied Education and Training and a Manager of Doctor Thamer Abdullah Nahar Alenezi Center and Institute for Studies, Researches and Authoring in Kuwait

Thamer.a.alenezi@gmail.com

Abstract:- This paper has been prepared to investigate the new technique for automobile air conditioning system during the hot weather in Kuwait. The Thermometer gun was used to collect data from the internal temperature of the vehicle with and without using the new technique. The finding from this research revealed that the proposed system helped to reduce the internal temperature of the vehicle after using the air condition, and the main conclusion drawn is that the proposed system can be reduce the internal temperature of the automobile after seconds compare it without using the proposed system.

Keywords:- New technique, Automobile, Air condition, Thermometer gun, Temperature, Hot weather, Kuwait,

Introduction

Kuwait is usually mildly cold during the winter season and extremely hot during the summer season where the temperatures are already soaring to unprecedented levels. The temperatures in Kuwait can be exceed 48°C during the summer season. However, people may feel uncomfortable due to excessive heat or polluted air while in vehicles. In view of this, the air condition (A/C) is very important in the vehicle manufacturing. The air condition is a system used to acquire cooling effect. While the air condition load is depending on the outside conditions, as shown in Figure 1. The effect of internal and external heat load will increase the internal temperature which subsequently leads to increases the room temperature. It is similar to automobile air conditioner. Therefore, this paper aims to prepare an idea to increase the cooling of the air condition of the limited space in the automobile during the hot summer in Kuwait when stopping the automobile for a period of time.

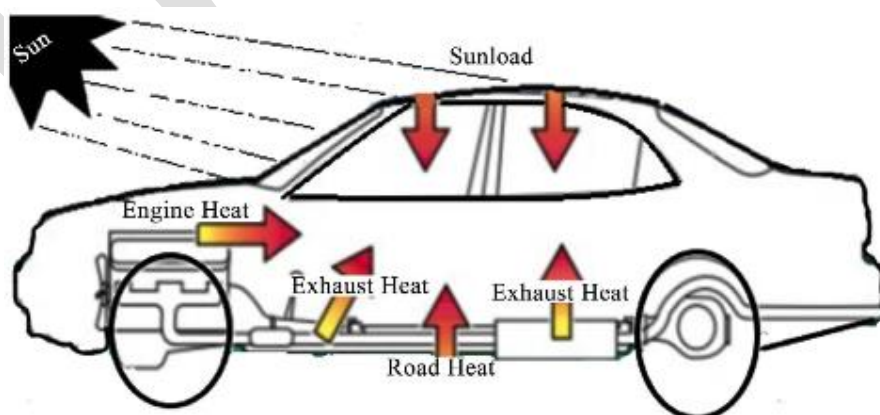


Fig 1:- Mode of heat sources in the vehicle (Bamisaye et al., 2019)

Research Methodology

Etekcitry Laser grip 774 Thermometer gun have been used in this research study in order to measure the internal temperature of the automobile type Toyota Avalon 2012. The proposed system used in this research study is shown in Figure 2. This proposed system was used in order to reduce the internal temperature after a period of operation of the air conditioning in the vehicle. The proposed system has some modification on the related part of automotive windshield wiper system. The important part is the hose which has been moved onto the radiator. The idea is to spray the water that comes from the water tank onto the radiator when turn the wiper arms on.

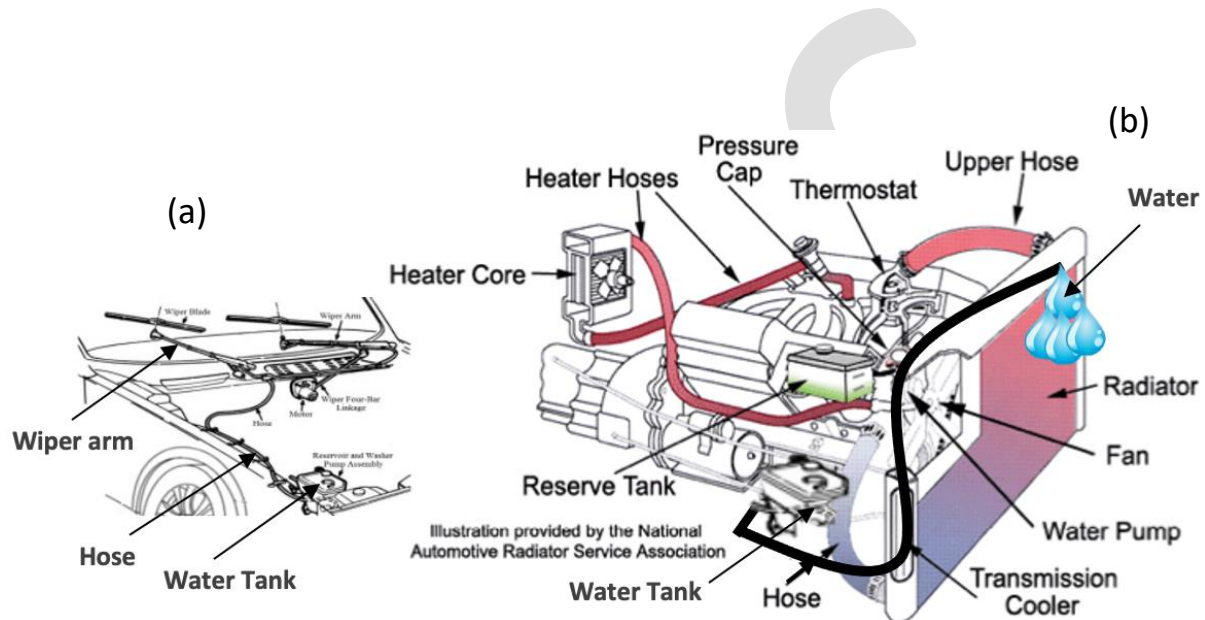


Fig 2:- (a) Windshield wiper system (Esmail et al., 2018); (b) The proposed system (Modified after Prudhvi et al., 2013)

Data Collection

The car (or automobile) engine was first to run for some 40 minutes. After that, the A/C in the vehicle was on for 80 minutes. The first 40 minutes were taken and recorded the internal temperature in the intervals of 5 minutes, then the proposed system as shown in figure 2 was used directly for the last 40 minutes in order to recording the internal temperatures in the intervals of 5 minutes after spray the water onto the radiator for 60 sec. The internal temperature data for the Toyota Avalon 2012 were collected on Thursday 8th of July 2021; first at 1:00pm when the air temperature was around 52°C and then the data were also collected at 10:45pm when the air temperature was around 39°C in order to compare it with and without using the proposed system in this research study when the A/C on for a period of time.

Findings

The results presented in Table 1 show the internal temperature (°C) measurements taken after the A/C in the vehicle was on for 80 minutes at a regular time interval of 5 minutes (mins). Each measurement was taken three (3) times and the average value was recorded in each time. The total number of recorded readings were 8 in each case at 1:00pm and 10:45pm respectively with and

without the proposed system. The reading was started from 5 mins and was gradually increased on every 5 mins and a reading is taken in each time, until the total time of 80 minutes is reached.

Table 1. The internal temperature (°C) measurements on Thursday 8th of July 202, with and without the proposed system at 1:00pm when the air temperature was around 52°C

S/N	Time (mins)	Temperature (°C)	
		Without "Proposed System"	With "Proposed System"
1	5	42	38.1
2	10	40.1	38.8
3	15	40.1	39.2
4	20	40.1	40.1
5	25	40.1	40.1
6	30	40.1	40.1
7	35	40.1	40.1
8	40	40.1	40.1

Table 2:- The internal temperature (°C) measurements on Thursday 8th of July 202, with and without the proposed system at 10:45pm when the air temperature was around 39°C

S/N	Time (mins)	Temperature (°C)	
		Without "Proposed System"	With "Proposed System"
1	5	36.6	28.3
2	10	33.9	27.6
3	15	32	27.9
4	20	32	28.4
5	25	31.1	28.4
6	30	30.3	28.4
7	35	30.3	28.4
8	40	30.3	28.4

Discussion

The results in Table 1 showed that the internal temperature for the Toyota Avalon 2012 decreased from 42°C to 40.1°C without using the proposed system when the A/C was on for 40 minutes, while the internal temperature for the Toyota Avalon 2012 decreased from 40.1°C to 38.1°C after 5 minutes when the A/C was on for another 40 minutes after spray the water onto the radiator for 60 sec, see figure 2. These results are similar trend as shown in Table 2 with and without the proposed system. Furthermore, by comparing the results in Table 1 and 2, it observed that the internal temperature for the Toyota Avalon 2012 decreased 2°C when the A/C was on for 40 minutes plus 5 minutes after spray the water onto the radiator for 60 sec, see figure 2. In sum, the internal temperature for the Toyota Avalon 2012 can be decreased 2°C when the A/C was on for 40 minutes plus 5 minutes after spray the water onto the radiator for 60 sec. However, further research is still required to understand the reason for this. Furthermore, the results in Table 1 showed that the internal temperature for the Toyota Avalon 2012 increased from 38.1°C to 40.1°C after 20 minutes of spray the water onto the radiator for 60 sec (see figure 2) when the A/C was on for last 40 minutes. This could be because the water that came from the water tank through the hose onto the radiator was evaporated and the external heat load will increase the internal temperature of the automobile.

CONCLUSION

A new technique for automobile air conditioning system were investigated during the hot weather in Kuwait. The main conclusions of this paper are summarised as follows:

- The proposed method used in this study allowed to decrease the internal temperature of the automobile while the air condition on for a period of time.
- The internal temperature for the Toyota Avalon 2012 without using the proposed system decreased their temperature when the A/C was on for 40 minutes, while the internal temperature for the Toyota Avalon 2012 decreased even further after 5 minutes when the A/C was on for another 40 minutes after spray the water onto the radiator for 60 sec.
- The internal temperature for the Toyota Avalon 2012 can be increased from 38.1°C to 40.1°C after 20 minutes when the A/C was on for 40 minutes plus 20 minutes after spray the water onto the radiator for 60 sec. This could be due to the water that came from the water tank through the hose onto the radiator was evaporated and the external heat load will increase the internal temperature of the automobile. Further research is required to investigate the internal temperature when the A/C is on for a period of time after spray the water onto the radiator for 120, 200, 260 sec, etc.
- Further research should also required to investigate the internal temperature for another type of the car during the hot weather when the A/C is on for a period of time after spray the water onto the radiator for 60 sec.

REFERENCES:

- [1] Alahmad B, Shakarchi AF, Khraishah H, Alseaidan M, Gasana J, Al-Hemoud A, Koutrakis P, Fox MA., "Extreme temperatures and mortality in Kuwait: who is vulnerable?", *Sci Total Environ* 732, 2020.
- [2] Bamsaye OS, Oyerinde AY, Essien UA., "Investigation of the Effects of Air-Conditioning System on the Temperature and Speed of Automobile Engine Using Paired T-Test and Regression Analysis", *Open Access Library Journal*, Vol.6, 2019, 1-14.
- [3] Casey MS., "The history of Kuwait", Greenwood Publishing Group, 2007.

- [4] Esmail LE, Juber HA, Hussap AH., "Reconfigurable Four-bar for mechanism design laboratory", *IJMET*, Vol. 9, December 2018, 897-907.
- [5] Ishak MI, Khor CY, Jamalludin MR, Rosli MU, Shahrin S, Wasir NY, Zakaria MS, Yamin AFM, Dahlan ND, Draman WNATW., "Conceptual design of automotive compressor for integrated portable air conditioning system", In *MATEC Web of Conferences*, Vol. 97, 2017.
- [6] Kargilis A., "Design and Development of Automotive Air Conditioning Sys- tems", ALKAR Engineering Company, 2003, 1-3.
- [7] McDowall R., "Fundamentals of HVAC systems: SI edition", Academic Press, 2007.
- [8] Merlone A, Al-Dashti H, Faisal N, Cerveny RS, AlSarmi S, Bessemoulin P, Brunet M, Driouech F, Khalatyan Y, Peterson TC, Rahimzadeh F., "Temperature extreme records: World Meteorological Organization metrological and meteorological evaluation of the 54.0 C observations in Mitribah, Kuwait and Turbat, Pakistan in 2016/2017", *Int J Climatol*, Vol.39, 2019, 5154-5169.
- [9] Prudhvi G, Vinay G, Babu GS., "Cooling systems in automobiles & cars", *IJEAT*, Vol.2, 2013, 688-695.
- [10] Sidik NAC, Yazid MNAWM, Mamat R., "Recent advancement of nanofluids in engine cooling system". *RENEW SUST ENERG REV*, Vol.75, 2017, 137-144.
- [11] Veerakumar S, Dhanakumar B, Balamurugan J, Balanayagam M., "Modernization of Automotive Air Condition System Using Arduino Controller", *Journal of automation and automobile engineering*, Vol.5, May-August 2020.
- [12] Wang SK, Wang SK., "Handbook of air conditioning and refrigeration", New York: McGraw-Hill, Vol.49, 2000.