

Legroom Vaccum System

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Abstract – Abstract – Many times cars heat up more than the environment temperature when they parked in the sun. When the temperature increases outside, cars become a hazardous place, especially for children, the elders, and pets. That is because a car's cabin environment augments very fast, even when it is parked in the shade. According to our research on average, a number of children under the age of 16 have to suffer from heatstroke each year because they were left in a hot car. Besides, leaving children and pets in hot cars is illegal in more than 25 states including California, Texas, Florida, and Illinois. To solve this problem, we have designed the "Legroom Vaccum System". Which can reduce the internal temperature of cars by 60-70% by installing Automatic Exhaust. The heat exhaust system at each and every Doors also called the "Legroom Vaccum System"

Key Words: Automatic exhaust system, Temperature control system, Heat exhaust system, Research and Innovation, Car Heat Load.

1. INTRODUCTION

The major difficulty to overcome in the development of the "Legroom Vaccum system" is to design and develop a system that can monitor the temperature and change the cabin environment according to the requirement. Therefore, we purchased a temperature controller and install it in our existing system. A W1209 DTC (Digital Temperature Controller) is used to control the heat inside the cars or other important equipment by comparing a sensor signal which is set at maximum and minimum points and perform on calculations according to the deviation between those values. Pieces of equipment that can handle sensor signals for temperatures, like humidity, pressure, and flow rate, are called Controllers. Further, we designed our model with the help of different designing software like AutoCAD, Solidworks, and Fusion360. Now we required all the equipment for the assembly process like low voltage exhaust motors which can give excellent output power, Aluminum nets, 12v Li-ion battery, and so on. In addition, the number of privately owned vehicles has suddenly increased and national car projects also have played a role in motor vehicle growth by limiting the options available to the government. An increasing number of public and private transportations generates

many problems such as environmental pollution, and traffic congestion affecting human and pet's physical and mental health. Studies found that outdoor car parking under the sunlight augments the inner cabin temperature by 60 degrees. The hot temperature inside the car absolutely makes the driver feel uncomfortable in the first 5-10 minutes.

1.1 Child Hot Car Deaths by Year

Year	Number of Death
2022	9*
2021	25
2020	29
2019	53
2018	54

Average deaths per year: 34 (every 9 days)

***Year with the most death: 2018 (54 deaths)**

2. Temperature variation inside and outside

Temperature outside

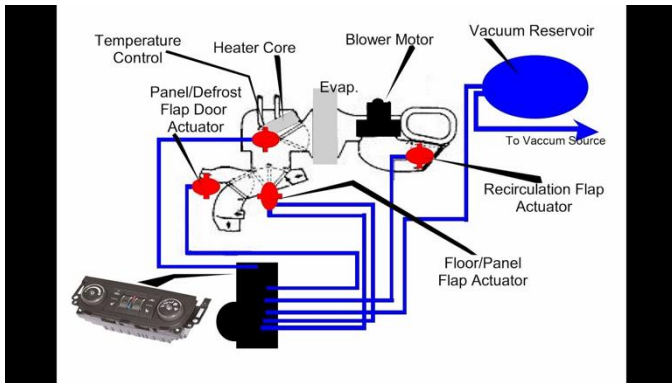
TIME	70°F	75°F	80°F	85°F	90°F
10 MIN	90°F	94°F	99°F	104°F	108°F
20 MIN	99°F	104°F	105°F	113°F	118°F
30 MIN	104°F	110°F	110°F	119°F	124°F
40 MIN	108°F	114°F	116°F	123°F	128°F
50 MIN	111°F	118°F	119°F	126°F	132°F

The sun generates energy in the form of wave radiation, which goes through the glass of a car window, or roof of the car and heats up cars. The sun's wave radiation is absorbed by the surfaces of the car such as the roof, the dashboard, and the Glass, and so on. These surfaces in the car then re-radiate the energy, but in the form of infrared radiation, that heats up the air inside the car. Since the windows are closed, the air circulation is closed in the car. Longwave radiation can't leave through windows as shortwave radiation. The heat gets caught inside the car, just like the Greenhouse Effect. The temperature changes from cool to hot within a minute inside the car.

3. LVS MANUFACTURING PROCESS

The entire manufacturing process includes designs of each and every component, Selection and purchase of materials, Making AEIOU summary sheet (Activity, Environment, Interaction, Objects, User), Assembly, and so on.

3.1 Product design and process chart of LVS



Product design illustrates the process of creating, imagining, and iterating products which can solve users' problems or address specific needs in a given market.

The key to successful product design is understanding the end-user customer, and the people with whom the product is going to be created. Product designers try to solve real problems for people by using empathy and knowledge of their prospective customers' habits, behaviors, frustrations, needs, and wants.

3.2 MATERIAL SELECTION For LVS

- W1209 DTC (Digital Temperature controller)
- Blower Motor
- Floor/Panel Flap Actuator
- Air filter
- 6061 Aluminum Net

1. W1209 DTC (Digital Temperature Controller)

W1209 DTC have a temperature sensor, keys, LED display, relay and requires a direct current 12V of power supply. DTC is an affordable, good-quality temperature controller. This temperature sensor is attached with the cabin control unit and from their monitor inner of the cars and display actual temperature on LED display mounted on the top.

Specification :-

- CR (Control Range): -50 ~ 110 C
- Authenticity In measurement: 0.1 C
- Ascertainment in control : 0.1 C

2. BLOWER MOTOR for heat exhaust

The Blower motor is a major component in LVS, it flows the hot air through pipes and helps to maintain the inner car temperature. A blower motor is a component installed in a car's heating, ventilation, and air conditioning systems (HVAC). The motor ventilates high temperature air through pipes when the cabin temperature is more than 50 degrees. On contrary, some blower motors circulate cold air when the blower is used in an air conditioning system. There are two distinct types of blower motors: single_speed motors and variable_speed motors. Single_speed blower motors ventilate air at only one speed. Variable_speed motors regulate their speed of airflow at different speed levels. We used a variable-speed motor in LVS (Legroom Vaccum System) to manage airflow in the pipes because it is the major requirement for our project.

3. PF ACTUATOR (Panel Flap)

heating, ventilation, and air conditioning systems (HVAC) Blend Door Actuator -- HVAC Heater Blend Air Door Actuator.

4. AIR FILTER for fresh environment

The air with the dirty particles passes from the filter screen. As the air passes, the filter material catches particulate matter such as pollen, dust, dirt, and allergens. Many air filters can even remove bacteria and viruses from the air. We assembled this air filter at both the rear door. Therefore, it can easily filter the air and make environment cool.



3.3 AEIOU SUMMARY SHEET

AEIOU Summary:		Group ID: Domain name:	Date:	Version:
Environment: - General impressions / observations (Style, material & atmosphere) - Floor plan - Elements, features and special notes - Scenes	Interactions: - General impressions / observations (Who is interacting with whom, what?) - Scene of interaction (How it is being done) - Elements, features and special notes	Objects: - General impressions / observations (What components are involved? How?) - Inventory of key objects - Elements, features and special notes		
Activities: - General impressions / observations - Sketch/photo- Summary of activity - Element, features and special notes		Users: - General impressions / observations (Who is present? role and responsibilities?) - Scene of user in context - Elements, features and special notes		

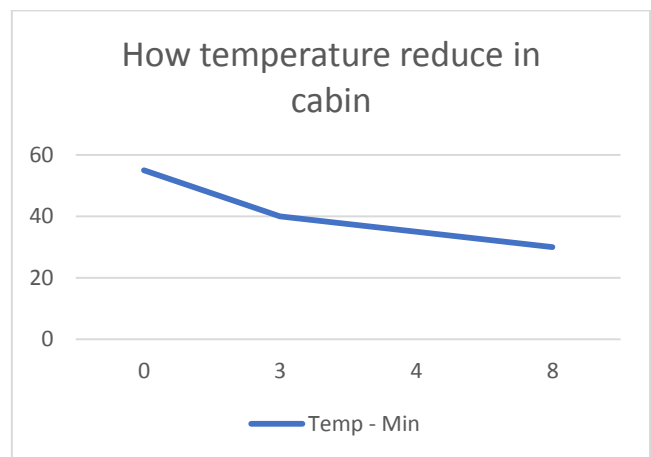
The A, E, I, O, U theme was founded in 1991 at Dublin by Rick Robinson, Ilya Prokopoff, John Cain, and Julie Pokorny. Their main objective was to help and analyze Ethnomethodology data and Conversation analysis with MECE. Information and Data are collected through ethnographic methods: notes, photos, videos, interviews, observation, and so on. During field observation, we use the A, E, I, O, U framework as a lens to watch the surrounding environment, and review observations under the suitable headings. Stick direct observations with photos and videotape when require. Review the things and group observations to spreading themes and patterns. A, E, I, O, U individual analysis will be wiped out of A3 paper but the entire AEIOU summary canvas is to be an A1 size canvas.

4. PURPOSE OF LVS

Project scope, which the major part of project planning that involves explaining and documenting a listing of particular project goals, deliverables, features, functions, tasks, deadlines, and ultimately costs. In other words, it is what must be got and also the work that has to be done to make a project. The main reason behind this project is to save lots of people's lives and find an answer for this major problem which we found by observing and researching on the social media platform. Legroom Vaccum System can read the temperature and maintain it in keeping with the common temperature by its maximum and minimum value. Our vision. as an example, when cabin temperature rises up to 60 degrees Temperature controllers send indications and blowers activate automatically and make the cabin environment healthy. LVS can reduce the temperature by 60-70%, however, we also installed Air filters during this system which might filter the dusty air and make car travelers comfortable. this is often our main vision, by this, we are able to save many of us, children, and pets who died from Heatstroke.

5. WORKING PRINCIPAL OF LVS

Working and assembling are two important steps in this process. First, we installed a temperature controller unit at the cabin which monitors and controls cabin temperature. Secondly, we set up an air exhaust blower at the car doors, when the cabin temperature rises up to 50 degrees, it sends an indication to a blower that reduced the temperature to 30 degrees within 5-10 minutes. Simultaneously, the air filter is installed at both rear doors. Basically, air filters clean the dirty air which is harmful to our health, filter converts this dirty air into clean and fresh air. Apart from that, the air filter and temperature controller both are connected to each other. So, when blowers are turned on, blowers automatically turn off. The below graph shows how the temperature reduces with time.



6. RESULTS

We have observed that, when we test our project around 50 degrees, the temperature indicator turns on and quickly reduced the cabin temperature. However, cabin temperature is only able to reach 38 degrees due to the outer environment. Eventually, we get success in our project because we reach our vision which is to save people's lives from heatstroke.

7. CONCLUSION

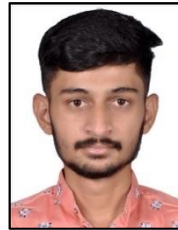
- The possibility of applying this design and development further to huge mega-companies like TATA Motors and Maruti Suzuki is increased.
- We find one more solution for the Automotive industry. Besides, petrol cars have now started getting extinct and EV cars take place of them, therefore this development in this industry can save many people's lives.

- Eventually, our main task is to introduce a system which can solve this problem by alleviating the inside temperature of cars.
- As a result, we are able to reduce the cabin temperature from 55 degrees to 35 degrees within 5 minutes. Further, we are planning to install this product in every car which runs under the sun.
- Finally, the Legroom Vacuum System is very rare but people adopt this technology perpetually.

8. REFERENCES

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BIOGRAPHIES



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