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## Design and Development of Car Wash Steamer

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**Abstract:** In recent conditions, the system used for washing cars is based on high speed water jet. The cleaning consists of removing dust, mud and dirt particles. This system uses a huge amount of water during cleaning. Prewashing is done using foam which makes the water not reusable. Hence a drainage system is required for removing this wastewater. Hence to overcome this problem car washing using steam is preferred. The Car Washing system using steam uses the force of steam that can clean things up. It has been discovered that steam washing is very convenient and no soapy forms are required that can make the washing much clumsy. The reason behind the use of steam for washing is the reduced waste of water. The development of the steam cleaning system can revolutionize the washing process. Steam does what the commercial washing system cannot do. Steam can easily clean dust and dirt, while for normal cleaning require expensive detergents. So, our main goal is to use steam and do cleaning without affecting or damaging car paint.

**Keywords** – Car Wash System, Electric, Heater, Steam.

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### 1. INTRODUCTION

In today's modern car wash facilities, be the car wash station, automatic washing stations or self-service stations, the soaps and other cleaning solutions used are designed to loosen and remove dirt and grime. This is in contrast to earlier times, when some operators commonly used hydrofluoric acid, a hazardous chemical, as a detergent in the industry. There has been a strong movement in the industry to move to safer cleaning solutions. The law requires that most car wash facilities treat and/or reuse their water and may be required to maintain wastewater discharge permits, in contrast to unregulated facilities or even street washing, where wastewater can end up in storm drainage and, finally, in waterways, rivers, and lakes.

The main environmental considerations for car washing are:

- a) Use of water and energy resources
- b) Surface water pollution
- c) Pollution of soil and groundwater.

The use of water and energy supply is evident since car washes are users of these resources. The skilled automotive wash business has created vital progress in reducing its environmental footprint, a trend that may still accelerate because of regulation and client demand. Many car washes already use water recovery systems to significantly reduce water consumption and a variety of energy consumption reduction technologies. These systems may be mandatory in the presence of water restrictions. In Europe, Germany leads the way and has very strict rules that make it illegal to wash the car on the road or in the driveway. Surface water pollution can result from the discharge of rinsing in storm drains, which eventually flow into rivers and lakes. The main contaminants in these washing waters include phosphates; Oil and fat; and conduct this is almost exclusively a problem for washing homes/entrances and car-washes. Professional car wash is a "non-point source" of exhaust that has the ability to capture these contaminants, usually in interceptor exhausts, so that contaminants can be removed before the water enters the sanitary systems. (Water and pollutants entering storm drains are not treated and released directly into rivers, lakes, and waterways).

To overcome this problem, we are introducing a system. This system uses steam instead of water. The Car Wash steam cleaning system is truly revolutionary, innovative and environmentally friendly. It is safe and soft enough to be used to clean all car surfaces, car paint, interior, car engine compartment, and other domestic purposes. It gives a perfect external finish without scratches. And when it comes to interiors, they not only clean thoroughly but also disinfect. The steam washing machine is a combination of heat and pressure that quickly removes dirt, bird droppings, oil and spots on the bodywork. The steam cleans without leaving watermarks on the

surfaces and keeps the car in good lighting conditions. Steam is also very effective for cleaning rebel strains in fabric seats, carpets, and rugs. Steam cleaning has wide applications in human life, as they are better than cleaning detergents.

Compared to normal washing, steam cleaning has a significant advantage which is the main objective of our project. With the high vapour pressure, you can clean those surfaces where stains and germs are unreachable. From an industrial worker to a housewife, the steam plays a significant role. All household surfaces can be cleaned by the use of steam, but one must always keep in mind that the material he/she is the cleaning and think about how it will react to direct water and heat. Before directly cleaning the surface, the person should take a small area of surface he/she is cleaning.

## 2. LITERATURE REVIEW

Table 1: Literature Review

| Sr. No | AUTHOR NAME                | TITLE  | JOURNAL        | YEAR OF PUBLICATION | OUTCOMES FROM THE WORK  |
|--------|----------------------------|--|----------------|---------------------|---|
| 1      | Zhiyong Liu et.al          | A high efficiency electric heater based on dual-helical tube and screw-tape for instant water heating. | Science Direct | 2019                | By using dual helical tube with screw tape we can get highest heating rate than Single helical tube due to increase in the Surface area. By using this system we can improve 59.6% of efficiency. |
| 2      | Krishnamurti M. et.al      | Design of multipurpose Cleaning system by using steam  | IJLERA         | 2018                | This paper explains a system of method used in multipurpose cleaning and process to determine types of sensor to be use.  |
| 3      | Dr. E. Subbarao et.al      | Design and Thermal Analysis of Steam Boiler (Without & With Baffles)                                   | IJARSET        | 2018                | CFD and Thermal Analysis are done to determine the heat transfer coefficient, heat transfer rate, pressure drop, temperature distribution and heat flux.  |
| 4      | Abhijeetsinh Makwana et.al | Design of Multi Cleaning System using Steam  | IJERA          | 2016                | The steam cleans more efficiently than water. There is no need of any detergent or any chemicals while cleaning.  |

## 3. PROBLEM DEFINITION

### 3.1 Problem Statement

After visiting some car wash garages, it was found that a huge amount of water is getting wasted. In current conditions, the system used for washing cars is based on the high-speed water jet. The cleaning process consists of removing dust, mud and dirt particles. The previous water-based system uses a huge amount of water during cleaning. Prewashing is done using foam which makes the water not reusable. Thus, in order to reduce the wastage of water, the international product named “optima steamer” was processed which is very costly as compared to the normal car wash system. The steam based car washing system in which cleaning car with the minimum amount of water consumption is done. With further moving to this matter, the following causes were identified for a long time.

1. Consumed high amount of water during wash.
2. Huge amount of water is getting wasted.
3. Uses hazardous chemical during water -based cleaning system.

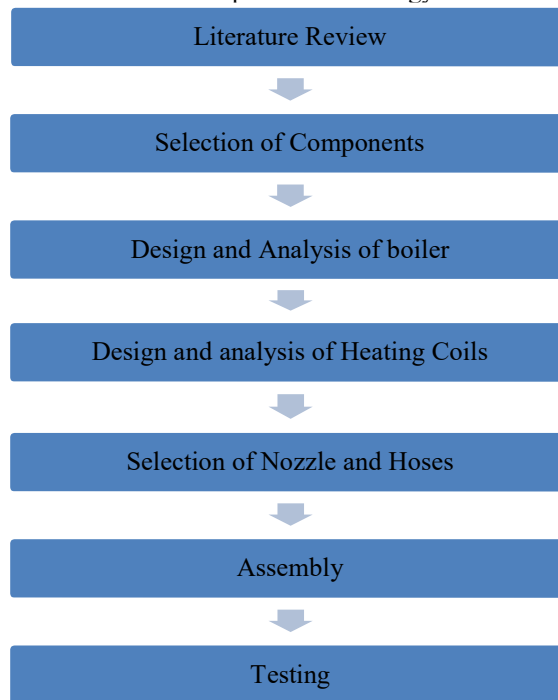
### 3.2 Objectives:

1. To reduce water wastage during automobile washing.
2. To reduce water pollution by avoiding use of chemicals.
3. To manufacturing a cost effective and compact device.
4. To use only electrical energy and no fossil fuels.

To manufacture a device that reduces the wastage of water, degradation of water quality during automobile washing by chemicals which are harmful for the environment.

## 4. PROPOSED METHODOLOGY

Table 2: Steps of Methodology



## 5. PROJECT CAD MODEL

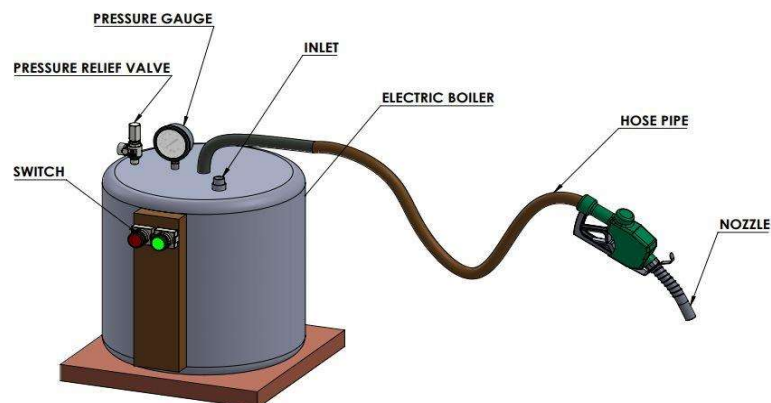


Fig. 1 Car Wash Steamer

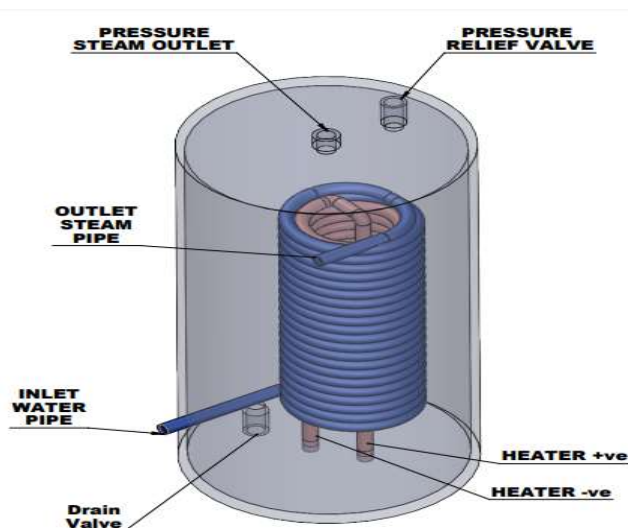


Fig. 2 Internal View

## 6. RESULT AND DISCUSSION

The proposed methodology targets at the reduction in water wastage. The following results are found after implementing Steam Based Cleaning:

1. Reduction in water wastage during automobile washing.
2. Reduction in water pollution by avoiding use of chemicals.
3. Manufactured a cost effective and compact device.
4. Used only electrical energy and no fossil fuels.

## 7. CONCLUSION

Applying the steam-based cleaning system, we can save a large amount of water giving a high return to the environment. Therefore, it is still a very large field to explore and can be a pioneer in saving water and maintaining vehicle, since detergents are not used. Therefore, there will be no water pollution from this car wash steamer. Also, we expect the cost of the project will be minimum compared to original one. Hence, we are expecting the results while using the steam to wash the cars listed below: -

1. Consumes minimum amount of water per hour.
2. The process of cleaning the surface without chemicals.
3. Minimum amount of water wastage.
4. Remove dirt, stains, grease and will require less effort to clean the surface.
5. Can be used for cleaning of interior, exterior, compartments and tire.

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