

# Design Optimization of Bike Washing Plant

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**Abstract:** This paper consists of brief information of the product, as we know in today's era the automobile sector is having rapid growth all-over the globe but the sub category of the automobile industry two is having a large consumer base. Water is used for cleaning the bike, but is the water used is been measured? No it's not the water is deliberately wasted and it is not the correct way to use it. So this product the minimum use of water for washing the bikes. This product has been developed for recycling water. The portability of the product ensures an entrepreneurial development of an individual by setting a business. Key feature of the product is that it has been made for cost effective purpose.

**Keywords:** water-recycle, portable, cost effective.

## 1. Introduction

The population is increasing day by day, as the population increases the demand for transportation is on a rise. One of the key mode of transportation is road transportation, in this the use of cars and bikes are most preferred by people. As the demand for bike is increasing their number is also increasing which leads to rise in maintenance work. The maintenance includes different parameters which are follows:

- Engine Maintenance.
- Washing.
- Tyres Maintenance.
- Body Maintenance.

Our primary focus is to work in the field of washing. Washing is a facility used to clean the exterior and some part of interior of the motor vehicle. For exterior purpose the different type of washings is used, they are categories as follows:

- Hand Wash: where bike is washed by hand cloth by workers.
- Hand Nozzle Wash: in this the worker uses a hand nozzle powered by water pumps.
- Steam wash: where jet of steam is used.

India is far from the best country for vehicles of any kind. Over a period of time, the two wheeler bike population has gone up, and now not just the people who can't afford cars use bike, but also people who like biking as a hobby. People are really passionate about their bikes / two wheelers and was them clean always. Our temperatures are extreme. The roads push your suspension and spine and most of all, the conditions are often a blend of dusty and/or mucky. Good bike maintenance is important to keep your vehicle looking and running like new. Basic maintenance such as replacing tires or checking tire

pressure, oil changes, and fluid checks can help preserve the exterior finish of your vehicle. But it is important to cleanse the rear surfaces of the bike properly or else it will result in its damage.

## 2. Literature review

### *Automatic Hybrid Machine for Bike and Car Wash*

(Rahul Ralebhat, Rupesh Kumar Chhugani, Shubham Padalkar, Abhishek Patne), the paper was published in June 2019, where they concluded that using hybrid automatic machine for car and bike wash. The product is technically sound, financially viable, operationally feasible, environmental friendly and of great usability. Future work can be done to make tailor made applications for various vehicles.

### *Automatic Washing for Two Wheeler*

(Jagdish Vaishnav, Udhesh Kapadnis, Akshay Kasbe, Saket Kachhawa, Prof. Sagar Aswar). They published a paper in which they developed a prototype for bike washing plant which was fixed, providing a unique system which is robust enough to automatic washing of two wheelers within 2 minutes. This prototype will help to perform Bike washing automatically results in high quality end product. Thus it will be User-friendly and capable to wash multiple bike at a time. Also require less man power, time and no pollution. The washing bay has a few oscillating nozzles for spraying water under the chassis and over the body of motorcycle.

### *Automatic car washing system using PLC*

(Zeenal Lalluwadia, Nidhi Bhatia and Jayana Rana.) where these above authors concluded that by eliminating the manual cleaning of vehicle will result in better and higher quality of services.

### *RFID-GSM Autonomous Car Washing System*

(K. Vidyasagar, R. Ram Prasad) The product was way expensive than it has been for day to day use it can be used for luxurious car wash. The developed concept is implemented on prototype working model to test various car washing conditions. The results obtained enabled us to implement the same concept for real time applications. So that, by implementing the proposed mechanism improper washing of the car with manual operation may be eliminated.

Considerable time is also reduced to complete the operation. In future fuzzy logic concepts proposed to be implemented using ARM processors.

*Trends in Modern Car Washing*

(H. Janik, A. Kupiec) from Poland in 2007 these researchers stated that chemical washing can be a solution for water waste for used in vehicle washing. Good water reclamation systems based on the biological water treatment followed by filtration technique are innovative and effective water treatment methods that lead to consistently clean reclaimed water for better vehicle wash results. Water recycling system must be compatible with chemicals used to wash a car, and must be prepared for high salt loads. Reverse osmosis can be applied in fresh water purification and reclaim water desalination. Reverse osmosis membranes are highly efficient in rejection of solutes.

*Design of Car Washing Machine*

(Pratik Subhankar, Abhinav Kumar, Ashutosh Sahoo), Where they created a portable pressure washer for vehicle. The product was designed and modified following the changes such as applying soap and water simultaneously and attaching the self-rotating sponge scrubber to the machine itself, thus making the job easier and less tedious for the user. The 3D CAD model of the product was made in CATIA and it was then analysed by digital human modelling software with the 50<sup>th</sup> percentile male manikin within the comfort range and the results showed that it can be used by the targeted user comfortably and safely.

The product can easily overcome most of the difficulty faced while operating the existing models.

*Design, Analysis & Fabrication of Portable Car Wash Trolley*

(Amber Naik, Rahul Mishra, Apurv Khot, Sandeep Sharma, Abilash Desai), The pressure developed by the machine is 100 bar and it is suitable enough to clean the vehicle by removing the grease and other dirt as can be seen during demo run [8].

*Vehicle Wash Apparatus with an Adjustable Boom*

David M. Gauthier, Denver, CO (US). The adjustable boom was able to eliminating the barrier of sizes of the cars the product can washed a pickup truck also to a big car like hummer.

*Design of pipe nozzle system and water regulation in automatic bike washing unit.*

(Sagar Khatavkar, Sushant Khismatrao, Tejas Mane, Somesh Kolwakar, Ajaykumar Maurya.) Their contribution to these products reveals that high pressure washing results in greater and effective cleaning. It deals with study of consumption of time, cost, eco-friendly, proper design and handling.

*Review paper on automatic car washing system*

(Sagar Khatavkar, Ashish Sawant, Pravesh Gupta, Balaji Shinde, Sonali Gaonkar). The PLC based controller can improve the working of the automatic washing.

**3. Gap analysis**

After reviewing the above research papers, we see that there has been multiple attempt of designing automated bike and car washing system. But we realize that the designed structure is complicated. We intend to design and optimize a structure that is compact, efficient and easy to maintain.

**4. Objectives**

- Minimum use of water which can further even be recycled.
- Cost effective and time saving operation.
- Optimize use of resources available of manufacturing.

**5. Design**

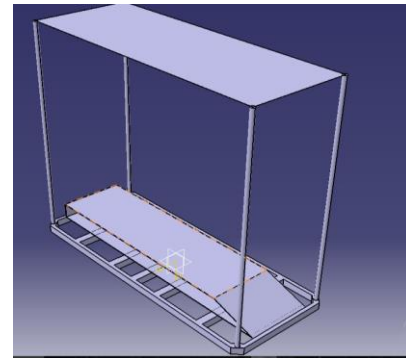


Fig. 1. Design

*Design consideration:*

Sq Section of Mild Steel is to be use.  
 Were the dimensions are: 10\*8\*4 ft

**6. Components**

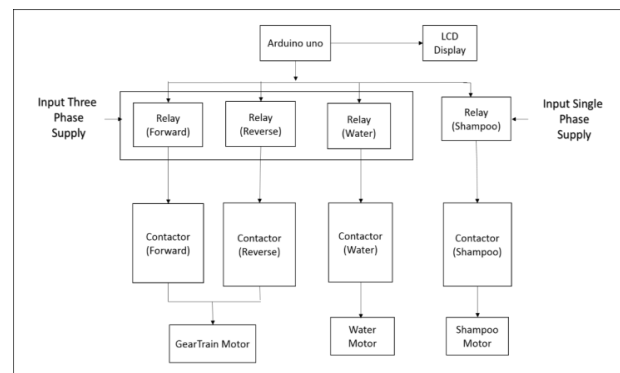


Fig. 2. A functional design of the product



Fig. 3. Nozzle

A spray nozzle is precision devise that facilitates dispersion of liquid into a high pressure spray.

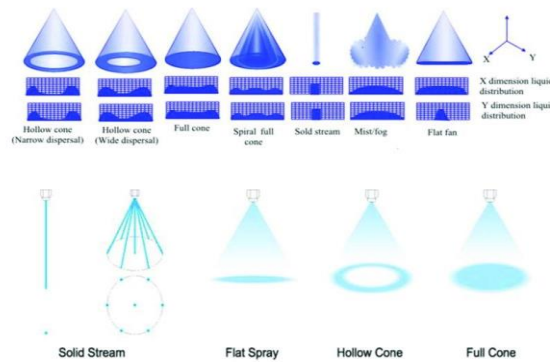


Fig. 4. Patterns for nozzle spray [15]



Fig. 5. Pump [14]

Pump is obtained use where relatively small quantity of liquid is to be handled and where delivery pressure is quite large

- Submersible Pump 1-2 HP Single phase.
- Steel pipes.
- PVC pipes.
- Gear train for conveyer platform.
- Nozzles.
- Adriano mega 328p.
- Relay and Contractors.

### 7. Conclusion

Automatic bike washing system makes cleansing of bike easier. The water motor, shampoo motor and gear train are automatically controlled by the microcontroller Arduino Uno. Relays and contactors were used for switching motors and gear train automatically with the help of electrical signal from microcontroller. The time required for the cleansing of bike is less than conventional method. The manpower is also reduced to greater extent. Almost all of the water can be recycled. Improving the economy of the system in the future such system will have more demand.

This system can also be used for Car Wash Cleanser with additional modification in width and height of the nozzle frame. The washings process just takes only 1 min to complete. In general, existing bike washing technologies takes more than 2 minutes to wash a bike.

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