

# Hydraulic Traffic Reduse System (TRS)

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**Abstract:** India, is a country with the third largest road network in the world. In the year 2019, about 295.8 million vehicles wandered their way through these roads. And amidst this herd, are 10,017 ambulances in an urgency to reach hospitals with patients fighting for their lives. Indian government data shows, about 30% of on-road deaths are caused due to delayed ambulances. Also, more than 50% of heart attack cases reach hospital late due to traffic. With India's speeding population and economy, and people with their personal vehicles, prolonged signals and obstacles for emergencies, our project Hydraulic Traffic Reduce System aims to reduce such casualties. By providing hydraulic jack underneath the footpath such that in case of emergency; vehicles can make their way through the traffic, during signals with ease. With regards to sluggish traffic movements while making way for emergency sirens this way would be certainly effective and a bold approach towards assisting the development of the nation.

**Keywords:** Traffic congestion, emergency, footpath, hydraulic system

## I. INTRODUCTION

Traffic congestion has been one of the major issues. As vehicular traffic began to increase the congestion on streets began to hamper the safe and efficient movement of traffic. Traffic congestion may directly affect the means of the emergency. So, to avoid these we have introduced the concept of Hydraulic TRS for easy and efficient movement of vehicle.

### 1.1. Objectives

The main objective of the study is to solve the traffic congestion problem in cities. The other objectives are given below:

- To minimize the traffic in unstable circumstances.
- To speed up traffic flow.
- To use footpath as an extra lane in case of emergency.
- To reduce traffic congestion and make easy flow of traffic.

### 1.2. Concept

For the vertical movement of the footpath we are going to install the hydraulic jack/mechanism underneath the footpath with electric motor (Automatically)

- Hydraulic Jack: A hydraulic jack is a device that is used to lift the heavy loads by applying a force via a hydraulic cylinder. Hydraulic jack lifts the loads using the force created by the pressure in the cylinder chamber.

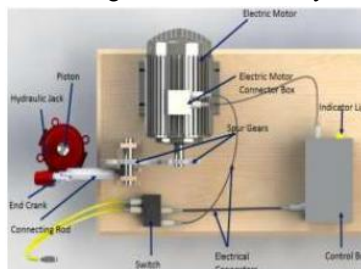
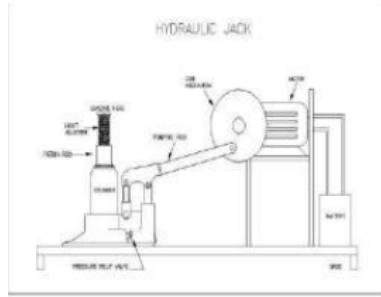


Figure 1: Conceptual hydraulic mechanism/jack with electric motor

**II. METHODOLOGY**

Since, our concept is based on the hydraulic jack system we use the basic of hydraulics and its principles. Principle of Hydraulics: Hydraulics is based on the Pascal’s Law.

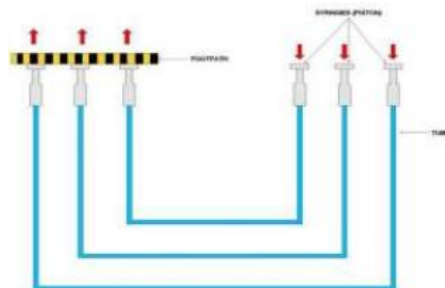
**Pascal’s Law:** A change in pressure at any point in an enclosed fluid at rest is transmitted undiminished to all points in the fluid.



**Fig. 2.1:** Drawing For Electro Hydraulic Jack

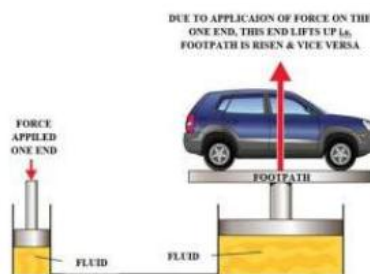
**2.1. Working Principle of Hydraulic Jack**

As shown in the figure a bottle is fixed at a place for lifting purpose. A dc motor is kept with the jack for the pumping purpose. A cam is attached to the motor shaft which can be rotated with the help of power supply. When the dc motor rotates the cam also rotates. The pumping rod in the jack is fixed with the cam. The working of the hydraulic jack is when the pumping process takes place the piston rod in the jack moves in upward direction. This helps to lift the weight. The rear side of the pumping rod is fixed to the cam as shown in the figure. So when the motor turns on, the cam attached to the motor starts to rotate. So the pumping rod gives the up and downward direction which leads to lifting process. When the motor turns off, the rotation of the cam is also stopped. So the pumping action is also stopped. To make the piston rod to come back to its old position the pressure created in the jack due to pumping action should be released. To release the pressure a pressure relief valve is used. When the pressure relief valve is operated the pressure is released from the jack.



**Fig.2.3.** Conceptual design for actual Hydraulic TRS

Demonstration of hydraulic jack actual in footpath:



**Fig.2.4.**Demonstration of hydraulic jack actual in footpath.

Whenever the pressure exerted on one end of the cylinder the liquid pressure will lift the other end. Similarly, in case of emergency the footpath will be lowered to the level of road so that vehicle can easily crawl over it and clear its way.

### **III. DESCRIPTION OF COMPONENTS**

Following components are used for Hydraulic jack with electric motor:

1. Pumping Rod
2. CAM
3. D.C. Motor
4. Pressure Relief Valve
5. Control Unit
6. Guide For Pumping Rod.

#### **3.1 Pumping Rod (Pump)**

The pump is typically a piston pump that is mechanically activated by moving the pump lever or handle up and down. The handle movement builds up pressure in the hydraulic fluid which transfers that pressurized fluid through a check valve and into the main cylinder.

#### **3.2 CAM**

Computer-aided manufacturing (CAM) also known as computer-aided modeling or computer-aided machining is the use of software to control machine tools and related ones in the manufacturing of work pieces.

#### **3.3 D.C. Motor**

A direct current (DC) motor is a type of electric machine that converts electrical energy into mechanical energy. DC motors take electrical power through direct current, and convert this energy into mechanical rotation.

#### **3.4 Pressure Relief Valve**

A relief valve or pressure relief valve is a type of safety valve used to control or limit the pressure in a system; pressure might otherwise build up and create a process upset, instrument or equipment failure, or fire.

#### **3.5 Control Unit**

The control unit (CU) is a component of a computer's central processing unit (CPU) that directs the operation of the processor. A CU typically uses a binary decoder to convert coded instructions into timing and control signals that direct the operation of the other units (memory, arithmetic logic unit and input and output devices, etc.).

### **IV. FUTURE SCOPE**

By adopting this concept of using hydraulic jack underneath the footpath for construction of new roads in modern world we can help to reduce the traffic congestion problems.

### **V. CONCLUSION**

Traffic congestion has been a worldwide issue which results into wastage of time, energy and causes environmental pollution. Identification of congestion is the initial step for selecting appropriate method to avoid this situation. To understand congestion in simple way it is classified into different categories. There are number of reasons for the congestion problem. There are numerous potential congestion administration procedures. The suggested two related measures are for traffic management are; Regularity measures and Economic measures. Regularity measures are access management and parking management and pricing policies are economic measures. Overall, we can use this mechanism to solve the problems. I am confident that it can reduce traffic congestion in the future.

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