

ACCIDENT AVOIDANCE DUE TO TIRE INFLATION

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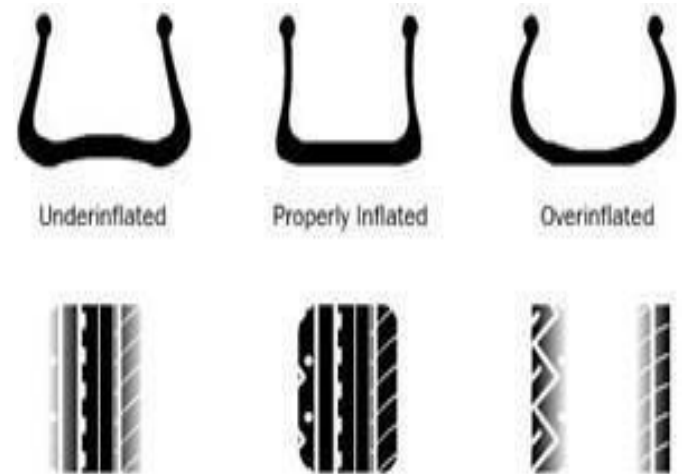
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Abstract –

Maintaining optimal tire pressure is a crucial aspect that allows for greater vehicle control and, as a result, increases vehicle and human safety. This study seeks to identify remedies in the event of anomalous tire pressure, thereby ensuring the vehicle's safety. According to the National Highway Traffic Safety Administration (NHTSA), abnormal tire pressure-related collisions result in 660 fatalities and 33,000 injuries each year. The pressure of the tire is checked and monitored to assure its safety, and thus the vehicle's safety. In this project, the pressure and wear and tear on the vehicle's tire are both monitored and quantified.



Key Words: Tire and Wheel, air compressor, motor, pressure sensor, microcontroller, alerting

1.INTRODUCTION

Collisions with high-performance vehicles on good roads are a cause for concern, and flat tires are said to be one of the main causes. The Ministry of Road Transport has decided to write to the Bureau of Indian Standards (BIS) requesting it to update the existing specifications of tires in India to comply with international standards. Low air pressure is one of the most common causes of flat tires. The rear tires pass under the weight of the car, causing the tires to bounce up and down when the car is traveling at high speed. This causes high friction, which ultimately causes heating in the tire, rather than weakening the tire and eventually causing an accident. Heavy trucks can also cause flat tires because the tires are subjected to more force than they are designed for. Additionally, the bottom tires can easily be punctured. One of the main causes of tire damage is under-inflation, which can cause tires to become oversized and flat. Swelling can also reduce the bearing capacity, cause excessive bending of the walls, which causes rolling resistance, causes overheating, which damages everything. Overinflation compresses the vehicle, makes driving uncomfortable, causes the vehicle to vibrate excessively and increases the risk of damage. Finding a solution to a flat tire is important as very few drivers regularly check their car's tire pressure.

Since the tire is elastic, the bottom part becomes flat as it rolls. When not in contact with the ground, the contact point will return to its original position. This recoil creates a wave of motion and some friction. When there is less air in the tire, the waves become larger, creating more friction and causing heating. If there is enough heat, the rubber holding the tire together will begin to melt and the tire will fall off. Learn more about how tires work. Because low-profile tires create more resistance when rolling, your car's engine has to work harder. AAA (American Automobile Association) statistics show that underinflating tires by as little as 2 psi can reduce fuel consumption by 10 percent. When you drive for a year, you will need to purchase hundreds of dollars in extra fuel. Bad tires are likely to wear out quickly. The tread of the tire is the rubber part that comes into contact with the tire path. Therefore, tire tread helps increase the car's handling. If the tire pressure is too low or too high; The tire in contact cannot withstand the pressure of the vehicle, so the tread wears unevenly. This occurs when one side of the tread block wears out faster circumferentially than the other side.

1. Components of Inflation System

These are the components and specification used for the manufacture of the project

1. Air Compressor

2. 1.DC 12V, 150W, heavy-duty, high power solid metal air compressor.
3. Powerful direct-drive 100 percent, Material: Copper
4. Inflates a 145/70 R12 tire from 0 to 30psi in about 2 minutes (we recommend the car engine running)

2. Wheel & Tire

- 1 Vehicle Compatibility: Maruti Alto, 800, Zen, Fiat Uno (All Models), Hyundai EON (except Magna).
- 2 Carcass incorporates supple sidewalls for comfort and reliability
- 3 Premium all-season tread compound
- 4 Optimum traction and a smooth, quiet ride, DryGrip

3. Flexible Air Hose

- 1 Using tire can be inflated fast without removing the side wheel, such as truck, bus and other vehicle which have two wheels at the back of themselves.
- 2 Replacement Bike Bicycle Pump Connector Adapter Presta Valve.
- 3 Using tire can be inflated fast without removing the side wheel.
- 4 Material: Metal, Rubber, Material: Metal, Rubber.

4. Bearing

1. Deep Groove Ball Bearing
2. Colour: chrome
3. chrome steel

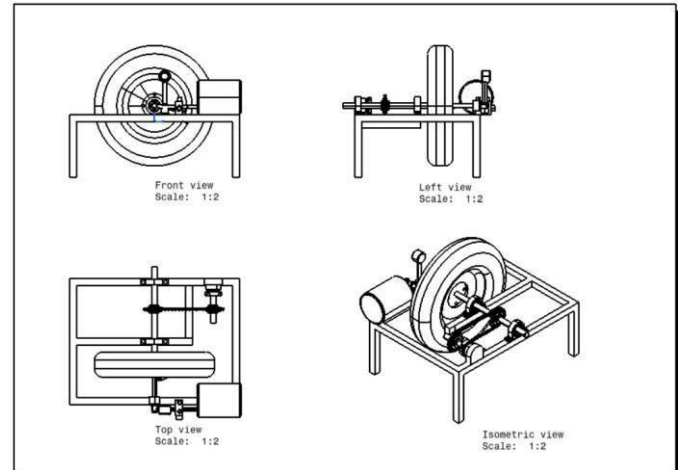
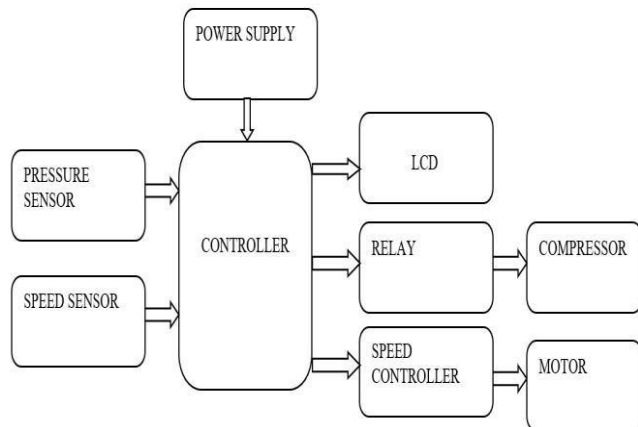
4. Chain Drive

1. In belt and rope drives slipping may occur. In order to avoid slipping, steel chains are used. The chains are made up of number of rigid links which are hinged together by pin joints in order to provide the necessary flexibility for wrapping round the driving wheels.
2. These wheels have projecting teeth of special profile and fit into the corresponding recesses in the links of chain as shown in figure. The toothed wheels are known as Sprocket Wheels or simply Sprockets. The sprockets and the chain are thus constrained to move together without slipping and ensures perfect velocity ratio.

5. Motor

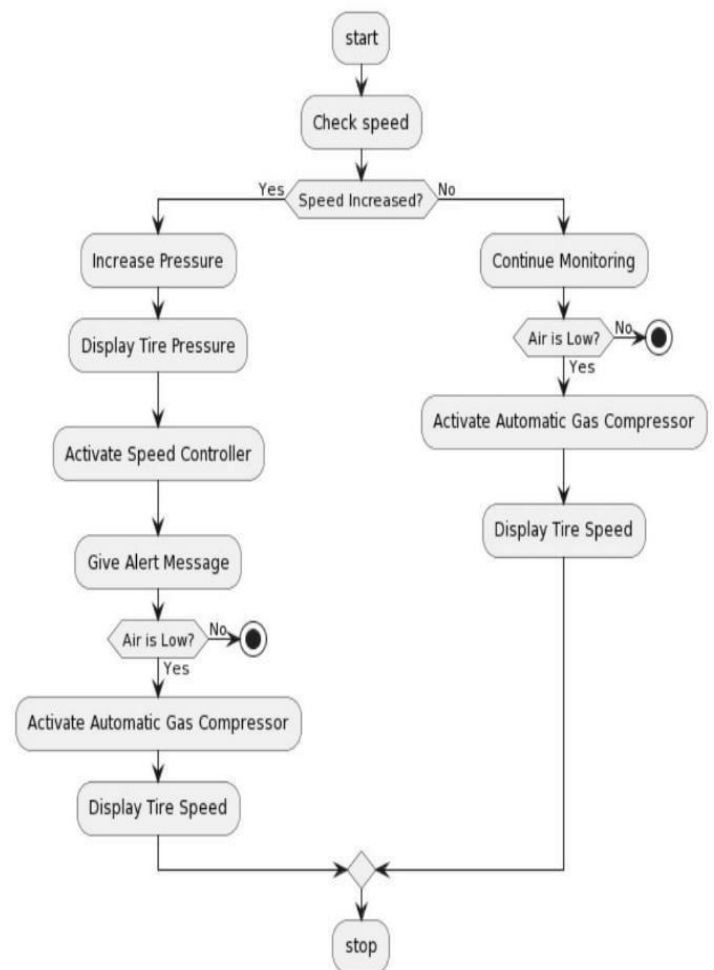
1. DC Wiper Motor-the same old voltage requirement for the wiper motor is volts in DC. the electric machine in, a going, for walks automobile normally puts out between thirteen and thirteen. Five volts, so it's secure to mention the motor can cope with up to 13.5 volts and not using a problem.
2. The minimum required contemporary for the motor is 1.6 amps at 70 rpm, zero.9 amps at forty one rpm (and four amps in case you opt for to run it at 106 rpm). Direct contemporary automobiles transform electrical power into mechanical power.

3. BLOCK DIAGRAM :

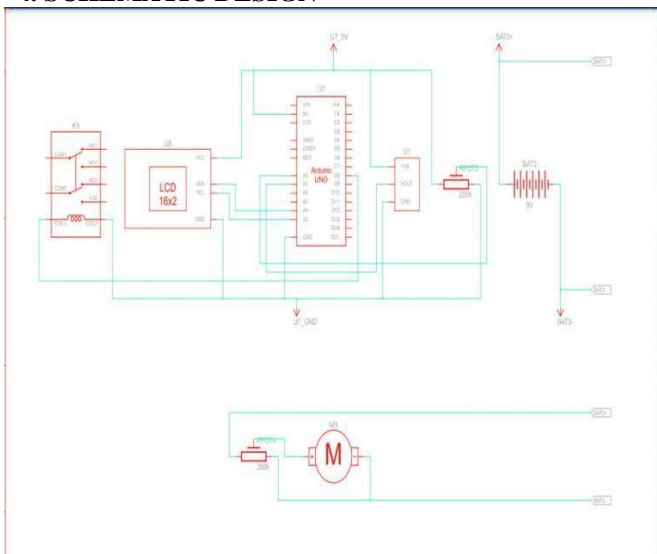


Our project consists of Compressor, control unit, pressure sensor, speed sensor and Tire model. We are using pressure sensor to detect the pressure level in the Tire. The level of pressure is already programmed in the control unit. When the pressure level is decreased, the sensor gives signal to the control unit. After that the controller unit will trigger the compressor for filling the air when the required pressure is obtained the control unit will turn OFF the solenoid valve. When the required pressure is reached the operation will be stopped by the control unit

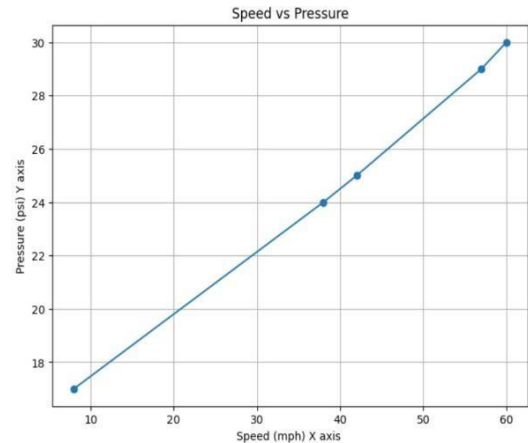
5.FLOWCHART



4. SCHEMATIC DESIGN



6. RESULT



CALCULATION:

```
float voltage = sensorValueTemp * 5.0 / 1023.0;
float temperature_celsius = (voltage - 0.5) * 100; // TMP36
output is 10mV per degree Celsius
```

```
// Calculate pressure increase based on speed increase
float base_pressure = 30; // Base pressure value
float pressure_psi = base_pressure + ((speed_mh - 60) / 6) *
1.5;
```

Speed(mph)	Pressure(Psi)
8	17
38	24.5
42	25.5
57	29.7
60	30

According to above table we got to know about when speed of tire is reaches 8 mph the pressure is produce of 17 psi while when it reaches 38 mph it produce 24.5 psi .

When it reaches its triggered values it give warning regarding pressure of tyre and in case air is not sufficient for tire it refill the tire air.

Therotically,
+6 miles/hour = increase psi by 1.5

7.CONCLUSION

According to studies, reducing tire pressure by a few PSI can reduce gas mileage, tire life, safety, and vehicle performance. We have developed an automatic tire inflation system to ensure tires are always properly inflated. Our design proposes and successfully implements the use of a centralized compressor that will supply air to all four tires through pipes and swivels mounted between the hub and hub of each wheel. .

Effective rotating seal allows air to enter the tire without clogging the hose. With the recent rise in oil prices and growing concerns about environmental issues, this system addresses the potential to improve

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