A Survey and Implementation of Tire Inflation System for Automobile

Jaypal Patel¹, Mayank Patel²

¹,²B.E. Mechanical Students of Laxmi Institute of Technology, Sarigam – 396155, Gujarat, India

¹pateljaypal5@gmail.com, ²mayank96075@gmail.com

Abstract: In our project tire inflation system shows that tire loose air through normal driving especially when run through pot holes & permeation. At high speeds friction between tyres and the road results in air pressure increasing. Its results in reducing tire pressure by the few PSI leads to reduce tire life, safety, and gas mileage and vehicle performance. This project aim to develop an automatic self-inflating tire system. The working principle of our project is to supply required air in the tire with the help of compressor. Compressed air is supplied in tire which is passed through the rotary joint which fixed between the wheel spindle and wheel hub at each wheel. This is used to reduce fuel consumption, increase life of tyre and safety of car and drive.

Keywords: Automatic control, tire inflation system, rotary union, reduced tire wear, safety.

I. INTRODUCTION

The use of automobiles has been increasing day-by-day. Humans are completely reliable on automobiles for transport purpose. In today’s competitive automobile sector; various automobile industries are competing with each other in order to win hearts of human. In order to do so the companies are making the system more effective by improving the safety systems in cars. The more reliable the system is, more successful the car becomes.

After the discovery of wheels by man, it has been used extensively for variety of purposes. Wheels have become the vital part of human lives since ages. The effective use of wheels with more innovative ideas further developed with developing technologies. One such upcoming technology is automatic air inflation system used in automobiles. This system is used to maintain the pressure of tires in running condition.

The best application of such automatic air inflation system is in military vehicles. Military vehicles are supposed to run on various environmental conditions; where land conditions are continuously changing. Such vehicles are supposed to be operated in worst conditions such as heavy rainfall, snowfall & deserts. At such remote places tire maintenance stations are not available. In such crucial conditions such systems serves as a boon for the users.

Thus such a system will maintain correct inflation pressure in tire automatically, whenever the pressure in tires (psi) is low. The advantage of this system is that it does not require any special attention from driver side after the system being installed. It eliminates the need of checking tire pressure manually, thus saving time and labor.

II. LITERATURE REVIEW

1. To study on implementation of tire inflation system for automobile vehicle

Tire Inflation System is device to inflate the tires when air pressure drops below normal level and to maintain it at required level. The working principle of Tire Inflation System is that compressed air from a compressor is passed through rotary joint into the nozzle fitted in the rim of the wheel. The rotary joint thus allows the air to flow through itself providing the rotary motion to the wheel assembly.

Most of the vehicles on road are driving with one or more tires underinflated due to several reasons. Tires can lose air through normal driving or after hitting pot holes or curbs. Bad quality roads in rainy season and temperature changes can further deteriorate the situation. Tires lose 1 or 2 Psi each month in the winter and even more in summer and rainy season. It is difficult to predict the condition of tires just by looking at them and we have to use a tire pressure gauge. Under inflation is bad for the tires as well as for the fuel economy and road safety. It can affect the handling and control of the vehicle and is generally unsafe to drive when tires are underinflated. The tires wear more quickly when Underinflated which reduces the life of tires. The underinflated tires may also get over heated more quickly than tire which are properly inflated tires. This can result in greater tire damage. Underinflated tires can also cause severe road accidents.

2. Automatic tire pressure controlling and self-inflating system: a review

A variety of tire monitoring strategies have been proposed to aware driver of low tire pressure.
Under inflated tires run on the road due to unawareness of the fact that properly inflated tires can safe tire life up to 20% which is nine months more of its life span. It can also save fuel from 4% to 10%, increase braking efficiency up to 20%, and ease the self-steer. The research finding shows that the air pressure in the car drops 10 to 20 kpa a month which is equivalent of adding a 70kg person into the car.\(^2\)

3. A survey on automatic air inflating system for automobile

According to Concept, about 80 percent of the cars on the roads are driving with one or more tires under inflated. Tires loose air through normal driving (especially after hitting pot holes or curbs), permeation and seasonal changes in temperature. They can lose one or two psi (pounds per square inch) each month in winter and even more in the summer. And, you can’t tell if they’re properly inflated just by looking at them. You have to use tire pressure gauge. Not only is under inflated bad for your tire but it’s also bad for your gas mileage, affects the way your car handles and is generally unsafe. When tires are inflated, the tread wears more quickly. According to Goodyear, this equates to 15 percent fewer miles you can drive on them for every 20 percent that they’re under inflated. Under inflated tires also overheat more quickly than properly inflated tires, which cause more tire damage.\(^4\)

### III. Problem Statement

To develop an automatic air filling system, this recognizes and fills air in respective tire when its pressure goes below the desired/required pressure (under inflated condition). Underinflated tires overheat more quickly than properly inflated tires, which cause damage to tires. To reduce this problem we are designing this system. As soon as a tire Pressure goes under inflated, then a pressure sensor senses it and send it to the Controller which activates the solenoid valve and air is filled up to proper inflation.

### IV. Objectives

1. To implement turbocharger for drive a compressor instead of external power source.
2. To regulate higher pressure to lower pressure we are using pressure reducing valve.
3. To maintain the pressure in all the tires according to varying loading and driving condition.
4. To reduce the time for filling the air in tire under inflation condition.

### V. Working Principle

The working principle is that the compressor running with the help of turbocharger. Compressed air is passed through rotary joint into the tire. The rotary joint thus allows the air to flow through itself providing the rotary motion to the wheel assembly.

A pressure sensor measures pressure. When the pressure in the tire reduced below the required level then the sensors senses the pressure level and send feedback signal to compressor for maintaining pressure level of the air in the tire. When tire pressure is increased the excess air reduced by relief valve.

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VI. EXPECTED CONCLUSION

We are conclude that tire inflation system have several benefit for the transportation industry and for the vehicle owners and always maintain required pressure and thus improving safety, mileage and vehicle performance.

REFERENCES


