**Controlling Speed Of Vehicle Using Sensors and Microcontroller**

**1. Introduction:**

This sections contains the following sub-sections, 1.1 it tells about the problem, 1.2 tells about how the problem can be solved, 1.3 tells about the motivation to the project, 1.4 provides the Ethics.

**1.1 Problem Statement:**

The constraints is the way to monitor the pressure alone in rough terrains.

The study is to use a battery less system for finding the pressure in the tyres an there by controlling the speed of the vehicle.

**1.2 Approach**

Tyre pressure monitoring systems are used for monitoring the pressure in the tyres and there by sending the results to the microcontroller which is connected to the dashboard of the car. This will tell the driver to maintain the speed based on the results sent by the sensors.

Expansion of gas during summer and due to heavy snow, vehicle tend to slip because of frictional force.

Arduino microcontroller – has input sensor(pressure) and the output is displaying the speed to be maintained. This microcontroller is fed with program which will have a reference variable which denotes perfect pressure for tyres. It takes the pressure inputs from the pressure sensors.

Ref variable and the measured pressure input is compared to provide the output.

According to the pressure in the tyres the speed to be maintained will be denoted.

**1.3 Motivation:**

This project mainly concentrates on the safety issues in the society. It consists of the pressure sensors embedded inside the tyre which sends the results to the Arduino Microcontroller. Previously there were those sensors which worked with battery and they gave only the pressure readings. Once the battery is dead we need to change the complete equipment. But here we try to implement a new technique which will use Piezoelectric sensors. They will use the vibrations and convert them into electrical energy. Not only they give the pressure readings but they also give the speed to be maintained at a particular pressure. If the pressure is very low the system will give the warning beep sound. This way we can increase the safety features in the car.

This technology can be used in the ambulance, family cars, public transport etc. So as the weight increases the stability decreases, it is essential to go at moderate speed. So when the pressure in the tyres is acquired it sends the results to microcontroller and speed is maintained according to the pressure. This technology will be very much useful in automatic cars as the driver will not maintain the car. This will be easy to implement for future studies and improvement. People in many fields can use this type of technology. It can be used for safety departments, people who travel long distances by vehicles etc. Researchers can include these studies which include Pressure Sensors, Piezoelectric sensors and Arduino Microcontrollers. This involves three controllers which can be reduced to one in future. Transportation departments and safety departments can check out these kind of findings.

**1.4 Ethics:**

**1.4.1 Virtue Ethics:**

This equipment uses a tyre pressure monitoring system which is connected to the air valves of the tyre. This equipment is loaded with piezoelectric sensor which produces the electrical energy with the vibrations and pressure. This energy is used to keep the sensor in working condition. This sensor with the use of radio frequencies communicates with another sensor which receives the signals and displays on the dashboard. The Arduino microcontroller is fed with a program which enables it to display the speed limit according to the air pressure values received. The whole thing will be taking less space and even cheaper but who would really come forward to get that initialized in their cars? This is mainly important to vehicles used for public safety like ambulance, police patrols etc; this can also be used in legal road racings. This may not have a great impact on common people.

**1.4.2 IEEE Code Of Ethics:**

To ensure persons safety, the equipment will have a buzzer which beeps if the air pressure is very much low and also alerts if one of the sensors in four tyres does not work properly. To replace the sensor the air must not be taken out directly. The wheel must be removed from the car completely and then the sensor is removed otherwise the sensor will be broken due to vehicles weight. The user must be notified earlier. Care must be taken that all the signals from the sensors are received because the distance is varied between the tyres.

**1.4.3 Utility Ethics:**

This does not use a battery, it uses the vibrations and pressures and converts it into electrical energy which is fed to sensor. We use Rf signals, Rf receives, Arduino microcontroller, Piezoelectric sensor, Tyre Pressure Monitoring System. These all are available at low cost. Interface between sensors and microcontroller is used in order to have communication between person and car.

**1.5 Standards:**

We will use a TPMS which will work when 3v is supplied to it. To send this voltage we use a Piezoelectric sensor(Piezo vibration sensor) which generates up to 90v based on the vibrations. The operating voltage of the TPMS is 9V to 18V, this voltage is acquired from the car battery. The working conditions for this equipment is quiet moderate and it does not use any high frequencies which cause any kind of issues to people. The communication between the sensor and its receiver is wireless, Bluetooth is used for this. The power consumption of the Arduino is in Active Mode: 0.2mA , power-down Mode: 0.1 [ch956]A , Power-save Mode: 0.75 [ch956]A.

**1.6 Validation:**

The model and the equipment used is quiet simple and can also be built having a basic idea about its working. We can build it with readily available equipment and assembling them. After building, the equipment can be tested in a simple way by installing it into a wheel and is run using a machine inside the lab which is a kind of prototype. The data can be taken and we can even modify the microcontroller coding if necessary. The main readings or the data to be taken is the speed to be maintained which will be a safe speed at a particular pressure which. The only control system that is involved is the Arduino Microcontroller. This will be fed with some reference pressures and speed to be maintained at that pressures. So whenever the pressure in the tyre is relatively close to the value the speed to be maintained is displayed in the dashboard. The performance of the equipment is measured but its performance is all based on the coding and safety speed limits installed.

**2.0 Historical Review:**

In May 2013 Yizhai Zhang, Jingang Yi and Tao Liu introduced a method of finding the pressure in the tyres using Pressure sensitive electric conductive rubber sensor which will be embedded inside the tyre. This sensor will take the frictional forces and sends the results. Through this experiment they were able to find the performance of the PSECR-based tyre performance[1]. In Jan 2010 Martin Flatscher, Markus Dielacher, Thomas Herndl, Thomas Lentsch, Rainer Matischek, Josef Prainsack, Wolfgang, Horst Theuss and Werner Weber introduced Bulk Acoustic Wave based transceiver for testing the pressure inside the tyre using Tyre Pressure Monitoring System in the inner layers of the tyre. They have reduced the start up time of the system. They were able to find pressure, acceleration, speed, voltage and temperature[2].

In April 2012 Hideo Iizuka, Nobuhiro Ide, Katsutoshi Nakatsu, Hiroshi Yoshimoto and Kazuo Sato introduced a new technique to find out the pressures in the tire. In this they used CST microwave studio. Numerical experiments are taken in this. They used electrically small dipoles and placed inside the tyre. Magnetic and standing waves are taken into consideration[3].In March 2013 Kanghyun Nam, Sehoon Oh, Hiroshi Fujimoto and Yoichi Hori introduced a method of finding the wheel sideslip estimation and roll angle using the sensors. This will eliminate the undesired driving experience[4].

In December 1998 Alfred Pohl and Franz Seifert introduces Wirelessly Interrogable Passive Surface acoustic wave sensors which gave responses based on the vibrations. The snapshots of sensor responses are considered and the results are taken[5].In August 2012 Hua Zeng and Todd H. Hubing fount a Tire pressure monitoring system. In this paper they sent the results in the form of electromagnetic waves. They introduced technique which will not introduce the effect of metal rim in the tyre and also the metal body of the car[6].

In November 2013Charbel El Tannoury, Said Moussaoui, Frank Plestan, Nicolas Romani and Guillermo Pita-Gill introduced a new technique to find the effect of pressure of tyre using the rotational and longitudinal dynamics. They found the rolling resistances[7]. In November 2005 Christopher R. Carlson and J. Christian Gerdes found technique to find longitudinal stiffness and effective radius using GPS and ABS which related to pressure in tyres. They intend to find that the pressure in tyres changes with temperature. It requires speed controller because vehicle looses stability based on climate[8].

In December 2014 Yizhai Zhang, Jingang Yi did experiments to find out the friction between the road and the tyre. This made them use the pressure sensors in the layers of the tyre. By this they can know the pressure which made tyre to stick to road and slip on the road[9]. In February 2010 Junhui Hu, Januar Jong and Chunshenh Zhao used Piezoelectric Components to generate electricity not by pressure but by vibrations. Weight is applied at one end and through vibrations the energy is saved in the capacitors[10].

In June 2012 Xiaoguang Yang, Bo Zhang Jiangui and Youhua Wang presented power generator based on vibrations. They used magnet and magnetic spring. These are wounded with coils both inside and outside. The characteristic curves and natural frequencies are used for the results[11].In December 2012 Tzeno Galchev, Ethem Erkan Aktakka and Khali Najafi presented a design of piezoelectric parametric frequency for making use of vibrations. The electromechanical transducer is outlined as a clasped braced winding bar so as to abatement the solidness inside of a restricted foot shaped impression. An inner component up-proselytes the encompassing vibration recurrence to a higher inward operation recurrence so as to accomplish better electromechanical coupling and effectiveness[12].

In February 2003 C. Keawboonchuay and T. G. Engel presented a Piezoelectric pulse generator for maximum power generation. The boost strategies are gotten from the mechanical and electrical models of the generator and give plan rules as to the geometric measurements of the piezoelectric material and circuital conditions that will create most extreme force in the gadget. The hypothetical results demonstrate the top stack voltage to increment with an expanding thickness to region proportion of the piezoelectric material also, with expanding connected power. In any case, rather than the top yield voltage, the crest yield current increments with the diminishing of thickness to range proportion of the material. Moreover to the physical measurement, the crest stack current increments as the estimation of the reception apparatus inductor diminishes[13]. In June 2006 Triet T. Le, Jifeng Han, Annette von Jouanne, Kartikeya Mayaram and Terri S. Fiez tested using a Piezoelectric micro-power generator. Circuit plans and estimation results are introduced for a half-wave synchronous rectifier with voltage doubler, a full-wave synchronous rectifier and an inactive full-wave rectifier circuit associated to the piezoelectric smaller scale power generator[15].

Nouman Naim Hasan, AdeelmArif, Muhammad Hassam, Syed Shabeeh UI Husnain, Usman Pervez proposed a method which is used to find the pressure in the tyres. It has got it has sensors which measure pressure and sends ti receiver and separate coding is given to the sensors so that they will not get signals from other sensors[16]. I-Hsiu Ho, Jia-min Chung, Hsiao-Chin Chen, Hung-Wei Chui utilized a concept which made them find the pressure in tyre wirelessly using contactless power transmission technique in RFID technique. This system uses load modulation to realize data transmission[17].

Salem Saadon, Othman Sidek designed and simulated MEMS-based energy harvested using ANSYS11. They showed very good scope for MEMS piezoelectric harvesters in fields of power[18]. Shahab Mchraeen, S. Jagannathan and Keith Corzine did two modifications for harvesting electrical power from vibrating piezoelectric material. In the first place, the voltage reversal strategy, which has as of late been utilized as a part of piezoelectric based vitality collecting and that shapes the voltage to be in stage with current to expand the gathered force is inspected. By infusing extra current another voltage reversal plan alluded as voltage pay plan is presented[19].

Jiachou Wang and Xixin Li proposed TPMS sensor and fabricated for automobiles which used piezoresistive pressure sensor and cantilever-mass piezoresistive accelerometer monolithically. The manufacture of the accelerometer is likewise taking into account a hexagonal stomach that is hitherto cut into suspended cantilevers and seismic-mass. Created with the minimal effort front-side micromachining procedure, the little measured TPMS sensors are promising in pragmatic applications and volume generation[20].

**3.0 Literature Survey:**

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