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VEHICLE MONITORING AND HEAD DETECTION SYSTEM FOR TWO WHEELER

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ABSTRACT

In recent days, use of electronics plays a major role in Automobile to enhance the safety and comfort of using it. Tire Pressure Monitoring Systems (TPMS) are a new standard for improved vehicle safety. These systems are an important and growing safety feature in newer vehicles. The proposed system utilizes advanced integration techniques to provide a TPMS solution that provides real-time tire pressure monitoring and alerts the driver to improperly inflated tires. The project aims at developing a TPMS (Tire Pressure Monitoring System), which displays the tire pressure onto a LCD wirelessly. The other system is present in the car, which receives the current pressure and continuously monitors it. Also, it displays the pressure onto a LCD display. This project involves building IR sensors to detect the human presence. It makes use of the IR sensor application of sensing the infra-red rays that emits when heat is generated from the human body. The application of this project finding the human present in bike

***Key Words*:** *TMPS, Arduino UNO, Sensors.*

I. INTRODUCTION

In recent days, use of electronics plays a major role in Automobile to enhance the safety and comfort of using it. Tire Pressure Monitoring Systems (TPMS) are a new standard for improved vehicle safety. These systems are an important and growing safety feature in newer vehicles. The proposed system utilizes advanced integration techniques to provide a TPMS solution that provides real-time tire pressure monitoring and alerts the driver to improperly inflated tires. The project aims at developing a TPMS (Tire Pressure Monitoring System), which displays the tire pressure onto a LCD wirelessly. The other system is present in the car, which receives the

current pressure and continuously monitors it. Also, it displays the pressure onto a LCD display. This project involves building IR sensors to detect the human presence. It makes use of the IR sensor application of sensing the infra-red rays that emits when heat is generated from the human body. The application of this paper finding the human present in bike. Additionally, under-inflated tyres have increased rolling resistance requiring more fuel to maintain the same speed thus affecting fuel efficiency. The level of apathy and ignorance amongst Indian drivers causes fatal accidents. Thus, to avoid such disastrous consequences, proper tyre pressure should be maintained. Most of the tyre pressure monitoring systems available today are having less accuracy and high cost. Here is a new design for monitoring the tyre pressure which integrate the wireless and wired communication.

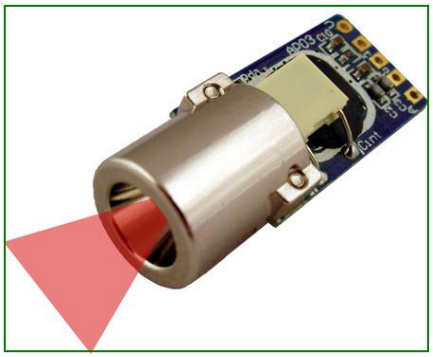
II. HARDWARE COMPONENTS

2.1. ZIGBEE

Zigbee is a standards-based wireless technology, developed to enable low-cost, low-power wireless machine-to-machine (M2M) and internet of things (IoT) networks. Zigbee is for low-data rate, low-power applications and is an open standard. Zigbee is based on the Institute of Electrical and Electronics Engineering (IEEE) standards Association's 802.15 specification. Zigbee is built for control and sensor networks on the IEEE 802.15 .4 wireless standard for wireless personal area networks(WPANs).The Zigbee WPANs operate on 24.4GHz, 900MHz and 868MHz frequencies.

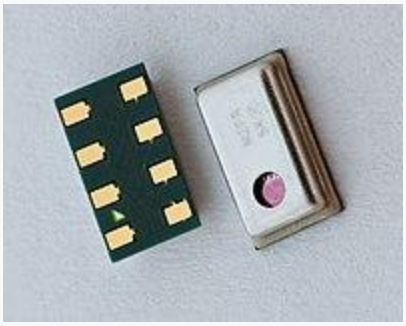
2.2. IR SENSOR:

An infrared sensor is an electronic device that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors are used to measure only infrared radiation, rather than emitting it that is called as a passive IR sensor. Usually in the infrared spectrum, all the objects radiate some form of thermal radiations. These types of radiations are invisible to our eyes that can be detected by an infrared sensor. The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the IR LED. When IR light falls on the photodiode, the resistances and these output voltages, change in proportion to the magnitude of the IR light received.



2.3. PRESSURE SENSOR

Digital air pressure sensor



Miniature digital barometric pressure sensor

A pressure sensor is a device for pressure measurement of gases or liquids. Pressure is an expression of the force required to stop a fluid from expanding, and is usually stated in terms of force per unit area. A pressure sensor usually acts as a transducer; it generates a signal as a function of the pressure imposed. For the purposes of this article, such a signal is electrical.

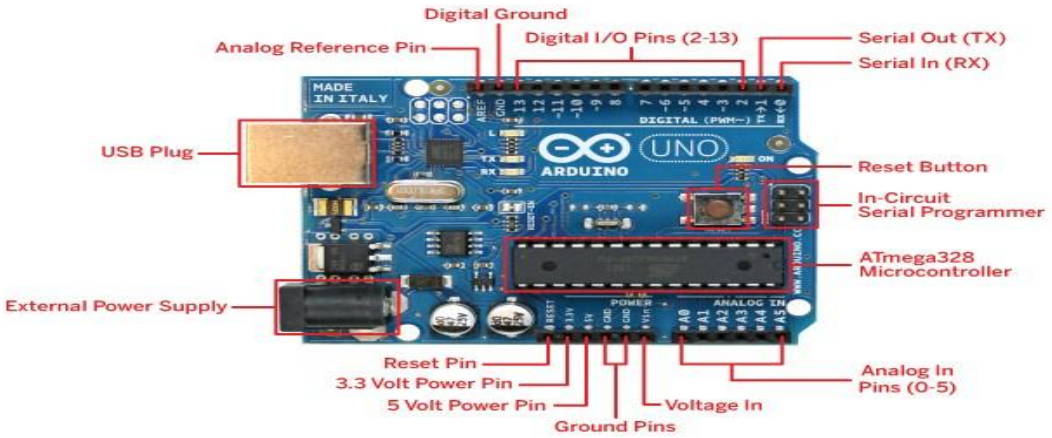
Pressure sensors are used for control and monitoring in thousands of everyday applications. Pressure sensors can also be used to indirectly measure other variables such as fluid/gas flow, speed, water level, and altitude. Pressure sensors can alternatively be called pressure transducers, pressure transmitters, pressure senders, pressure indicators, piezometers and manometers, among other names.

Pressure sensors can vary drastically in technology, design, performance, application suitability and cost. A conservative estimate would be that there may be over 50 technologies and at least 300 companies making pressure sensors worldwide. There is also a category of pressure sensors that are designed to measure in a dynamic mode for capturing very high speed changes in pressure. Example applications for this type of sensor would be in the measuring of combustion pressure in an engine cylinder or in a gas turbine. These sensors are commonly manufactured out of piezoelectric materials such as quartz.

Some pressure sensors are pressure switches, which turn on or off at a particular pressure. For example, a water pump can be controlled by a pressure switch so that it starts when water is released from the system, reducing the pressure in a reservoir.

2.4. ARDUINO UNO CONTROLLER

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which six can be used as PWM outputs), six analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. The Arduino Uno differs from all preceding boards because it does not use the FTDI USB-to-serial driver chip. Instead, it features the ATmega8U2 programmed as a USB-to-serial converter. Revision 2 of the Arduino Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode.



III. SOFTWARE MODULES

3.1. KEIL

The µVision IDE combines project management, run-time environment, build facilities, source code editing, and program debugging in a single powerful environment. µVision is easy-to-use and accelerates your embedded software development. µVision supports multiple screens and allows you to create individual window layouts anywhere on the visual surface.

The µVision Debugger provides a single environment in which you may test, verify and optimize your application code. The debugger includes traditional features like simple and complex breakpoints watch windows and execution control and provide full visibility to device peripherals.

µVision Project Manager and Run-Time Environment

With the µVision Project Manager and Run-Time Environment you create software application using pre-build software components and device support from Software Packs. The software components contain libraries, source modules, configuration files, source code templates, and documentation. Software components can be generic to support a wide range of devices and applications.

3.2PROTEUS

The Proteus Design Suite is a proprietary software tool suite used primarily for electronic design automation. The software is used mainly by electronic design engineers and technicians to create schematics and electronic prints for manufacturing printed circuit boards.

It was developed in Yorkshire, England by Lab center Electronics Ltd and is available in English, French, Spanish and Chinese languages.

The Proteus Design Suite is a Windows application for schematic capture, simulation, and PCB (Printed Circuit Board) layout design. It can be purchased in many configurations, depending on the size of designs being produced and the requirements for microcontroller simulation. All PCB Design products include an auto router and basic mixed mode SPICE simulation capabilities.

3.3. SCHEMATIC CAPTURE

Schematic capture in the Proteus Design Suite is used for both the simulation of designs and as the design phase of a PCB layout project. It is therefore a core component and is included with all product configurations.

3.4. MICROCONTROLLER SIMULATION

The micro-controller simulation in Proteus works by applying either a hex file or a debug file to the microcontroller part on the schematic. It is then co-simulated along with any analog and digital electronics connected to it. This enables its use in a broad spectrum of project prototyping in areas such as motor control, temperature control and user interface design. It also finds use in the general hobbyist community and, since no hardware is required, is convenient to use as training or teaching tool. Support is available for co-simulation of:

- Microchip Technologies PIC10, PIC12, PIC16, PIC18, PIC24, dsPIC33 Microcontrollers.
- Atmel AVR (and Arduino), 8051 and ARM Cortex-M3 Microcontrollers
- NXP 8051, ARM7, ARM Cortex-M0 and ARM Cortex-M3 Microcontrollers.
- Texas Instruments MSP430, PICCOLO DSP and ARM Cortex-M3 Microcontrollers.
- Parallax Basic Stamp, Freescale HC11, 8086 Microcontrollers.

PCB Design

The PCB Layout module is automatically given connectivity information in the form of a net list from the schematic capture module. It applies this information, together with the user specified design rules and various design automation tools, to assist with error free board design. PCB's of up to 16 copper layers can be produced with design size limited by product configuration.

3D Verification

The 3D Viewer module allows the board under development to be viewed in 3D together with a semi-transparent height plane that represents the board's enclosure. STEP output can then be used to transfer to mechanical CAD software such as Solid works or Autodesk for accurate mounting and positioning of the board.

3.5. EMBEDDED C

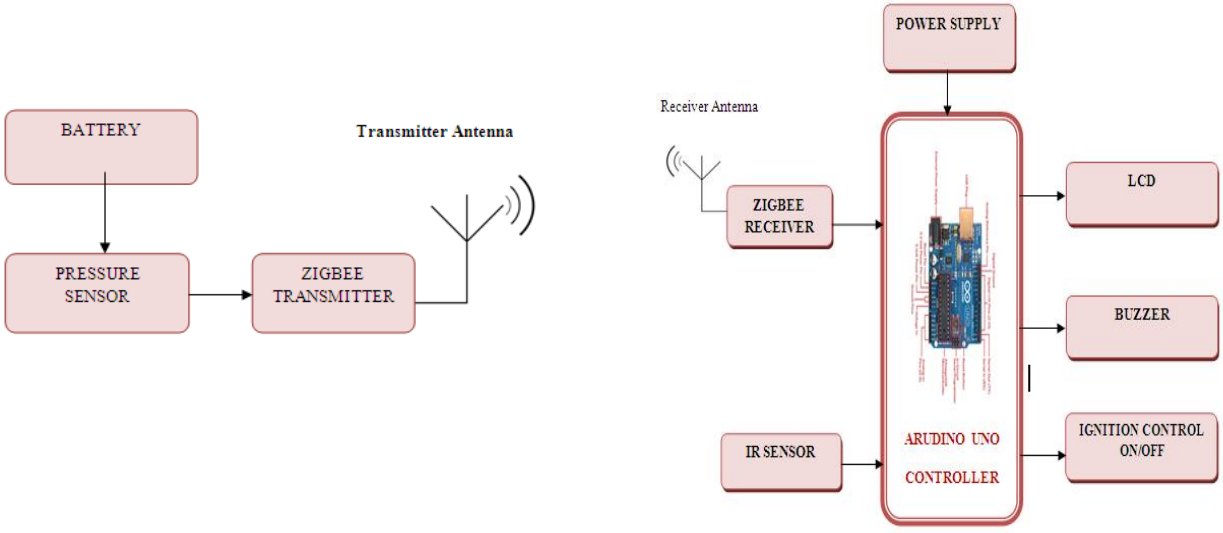
The C standard doesn't care about embedded, but vendors of embedded systems usually provide standalone implementations with whatever amount of libraries they're willing to provide. C is a widely used general purpose high level programming language mainly intended for system programming.

Embedded C is a set of language extensions for the C Programming language by the C Standards committee to address commonality issues that exist between C extensions for different embedded systems. Historically, embedded C programming requires nonstandard extensions to the C language in order to support exotic features such as fixed-point arithmetic, multiple distinct memory banks, and basic I/O operations. In 2008, the C Standards Committee extended the C language to address these issues by providing a common standard for all implementations to adhere to. It includes a number of features not available in normal C, such as, fixed-point arithmetic, named address spaces,

and basic I/O hardware addressing. Embedded C uses most of the syntax and semantics of standard C, e.g., main() function, variable definition, data type declaration, conditional statements (if, switch case), loops (while, for), functions, arrays and strings, structures and union, bit operations, macros, etc.

IV. BLOCK DIAGRAM:

(a)Transmitter section **(b)Receiver section**



V. PROPOSED SYSTEM

In this system enables the rider to constantly monitor the tire pressure which results in reduced fuel efficiency and seldom accidents, due to low pressure tires. Hence our concept is directly addressing the factor of increasing fuel efficiency and ensured maintenance. IR sensor is used to detect the human heads in bike. The proposed system provides the facility of dynamically changing the tire pressure limit setting. Also, the system alerts the driver by horning alarm if the tire pressure is high or low. The controlling device system of the whole systems is a Microcontroller. The project can be divided into two sub systems; one present in the tire which helps in sending current tire pressure through Zigbee based wireless communication. The other system is present in the car, which receives the current pressure and continuously monitors it. Also, it displays the pressure onto a LCD display. This system is capable of alerting in case of improper inflated tires.

VI. ADVANTAGES

- Road safety. Under-inflated tires can be dangerous. They can cause strange, erratic drive patterns at high speeds. A tire pressure monitoring system keeps an eye on tire inflation continually, for maximum safety in everyday driving situations.

- Increased MPG. Proper tire inflation also leads to maximum miles per gallon for a vehicle. Driving with under-inflated tires can burn a lot more gasoline on any given trip. Good tire pressure maintenance will lead to cost savings and lower fuel consumption.

- No more manual tire pressure readings. Before tire pressure monitoring systems, drivers had to always monitor their tire pressure with manual gauges. That meant kneeling down to each tire, taking off the valve stem cap, and inserting the tire pressure gauge. With new tech tire pressure monitoring systems, this is no longer necessary.

- Increased vehicle value. A tire pressure monitoring system can add value to the vehicle, as a feature that saves on costs.

- Better insurance rates. Because a tire pressure monitoring system helps with safety, it may lead to lower insurance premiums for your vehicle.

5.1. APPLICATIONS

- It is used in the all vehicle manufacturing industries.
- As of the 2008 model year, the National Highway Traffic Safety Administration (NHTSA) now requires that} all passenger cars and light trucks feature the Tyre Pressure Monitoring System (TPMS).
- TPMS report real-time tyre-pressure information to the driver of the vehicle, either via a gauge, a pictogram} display, or the simple low-pressure warning light.
- TPMS can be divided into two different types direct (TPMS) and indirect (TPMS).So it is used as direct} TPMS or as indirect TPMS according to the applications

VII. CONCLUSION

This project enables the rider to constantly monitor the tire pressure which results in reduced fuel efficiency and seldom accidents, due to low pressure tires. Hence our concept is directly addressing the factor of increasing fuel efficiency and ensured maintenance. This process can be implemented almost in all vehicles present because of the fact monitoring pressure is of major importance Integrating features of all the hardware components used have

been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Secondly, using highly advanced IC's with the help of growing technology, the project has been successfully implemented. Thus the project has been successfully designed and tested.

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