

“DESIGN AND IMPLEMENT OF TIRE MONITORING SYSTEM BASED ON ZIGBEE”

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Abstract-

A simple TPM&VCS method is based on indirect measurements and fuses information from several different physical sensors to compute tire pressure. using Zigbee Tire pressure monitoring systems automatically detect and relay tire air pressure information with sensors attached to the tire, wheel, or valve stem. The control mechanism then helps to reduce the speed if the temperature or pressure of tire exceeds beyond the limit hence to lower the temperature etc; thereby preventing tire burst. The system thus helps us to ensure safe operation of vehicle.

Keywords- tire pressure monitoring; sensors, Zigees.

I. INTRODUCTION

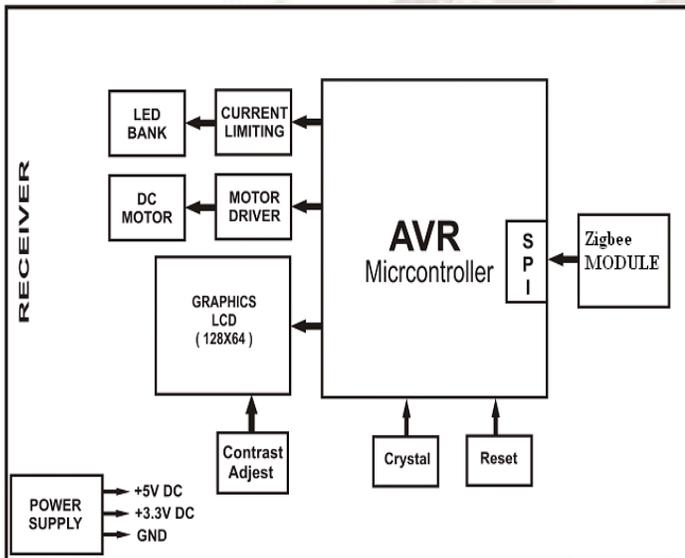
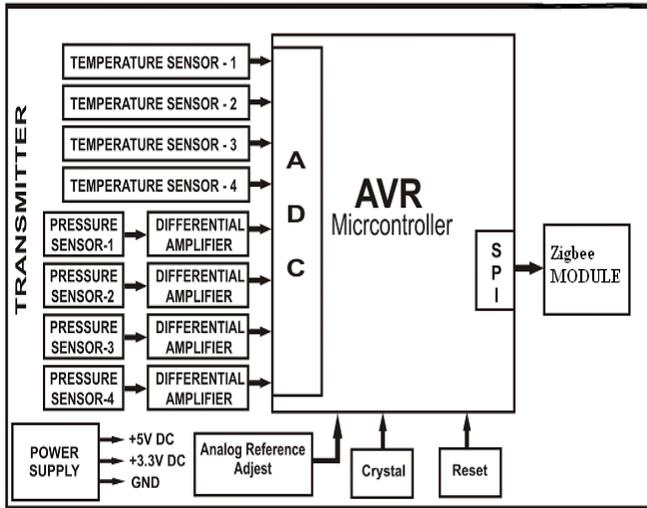
In a super highway, tire fault is very hard to prevent and a severe problem to drivers. It is one of main reasons of the sudden traffic accidents. Researches indicates that the key measure of avoiding tire-break is to keep the tire pressure near to its standard value and discover tire pressure release in time. Thus, tire pressure monitoring system (TPMS) has been drawing attention of many researchers and engineers.

TPMS systems measure the actual tire pressure using sensors which incorporate radio transmitters. The radio signals are picked up by a receiver unit which provides an alarm signal to the driver. Various types of information can be provided for the driver (alarm lamp, actual pressure, audible alarm, voice), and the sensors are either internally wheel mounted or may be externally fitted on the tire valve in place of the valve cap.

More advanced TPMS show the actual tire pressure on a display/receiver unit inside the vehicle. Actual tire pressure is measured by miniature sensors in each wheel which each transmit an encoded radio signal. The receiver/display is a digital back-lit display unit which recognizes your vehicles pre-coded radio signals and sounds an alarm at high or low pressure conditions. Some also indicate and monitor tire temperature.

The system has got a buzzer to indicate the abnormality for a lame user who cannot understand the display contents. The abnormal conditions with the time are saved in the EEPROM memory and can be retrieved by RS232 or USB for diagnostic purpose. The receiver/display typically require either a 12v or 24v DC supply, usually switched with the ignition.

Full-Sized Camera-Ready



DESCRIPTION:-

The generalized block diagram of smart cursor is shown as above. The block diagram can be divided into two parts first one is **Master** and second is **slave**. Master consists of following block:-

- AVR microcontroller
- Zigbee Module
- Power supply
- Graphics LCD
- Motor Driving circuit

Similarly slave consists of following block:-

- AVR microcontroller
- Zigbee Module
- Power supply
- MEMS Pressure sensor



The Zigbee Module is interface to the Microcontroller using SPI – Serial Peripheral Interface. The Atmega16 controller from Microchip Company is from AVR series.

At the slave part the pressure sensor will sense the pressure. The output of the pressure sensor is analog data. This data would be converted into digital using internal ADC. The data is further processed and given to Zigbee module. The Zigbee module will convert the digital data in 2.4 GHz waves. This data would be received by the Zigbee module at master side. This data is processed in the microcontroller and displayed in the LCD. Also depending upon the pressure the motor speed would be controlled.

Actual Setup in the tire:

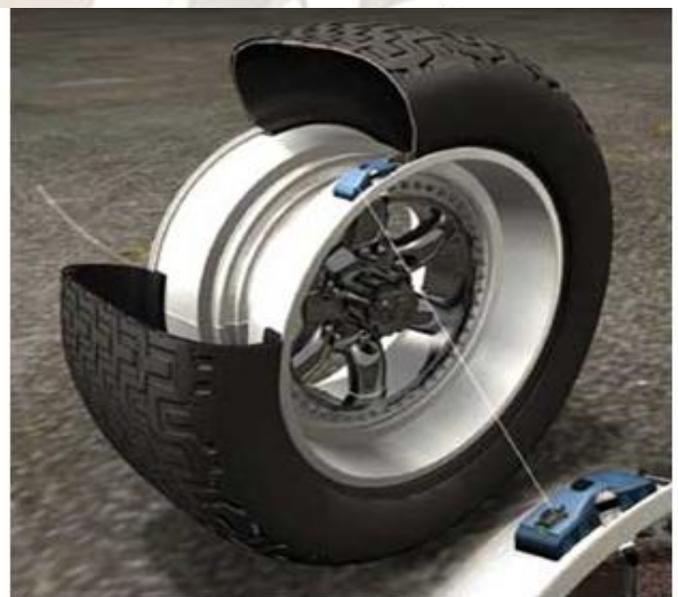


fig.1

the equipment. Application (APL) layer is made up by application support sub-layer (APS), application framework (AF), ZigBee device object (ZDO) and user-defined objects. not “webers/m².” Spell units when they appear in text: “...a few henries,” not “...a few H.” If your native language is not English, try to get a native English-speaking colleague to proofread your paper. Do not add page numbers.

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DASHBOARD DISPLAY:

A typical tire-pressure monitoring system integrates many functions. Sensors in each wheel measure temperature and pressure at regular intervals. That information is sent by radio-frequency signal to an electronic control unit inside the vehicle. The unit analyzes the data it receives. Initiators interrogate sensors as needed to rapidly confirm possible warnings and to ensure that accurate information is sent to the driver. A display warns the driver in real time of any critical deviations from normal conditions.

ZIGBEE TECHNOLOGY

A. ZigBee protocol

ZigBee standard is based on the IEEE802.15.4[1]standard, its protocol stack is divided into two parts, low-level MAC layer and physical layer protocol are handled by IEEE802.15.4, ZigBee Alliance just standardize its network layer and API. All levels achieve data communications and protocol stack management through Service Access Points (SAP), There are two SAPs between two layers, one provide data transmission services and the other provide implementation management. When ZigBee device is working, different levels tasks complete through the layers service, and the service is achieved by original language.

B. Level Protocol Functions [2]

The functions of the physical layer (PHY) are sending/receiving data, activating the RF transceiver, channel energy detection, idle channel assessment, link quality indication. MAC layer is mainly responsible for the beacon

frame which generated and sent by coordinator. Equipment synchronize with coordinator accord to the beacon frame, supporting PAN association and the abolition, supporting wireless channel communication security, CSMA-CA channel access mechanism is used, supporting slot protection (GTS) mechanism, different devices transmitting through MAC layer reliably is also supported. Network layer’s (NWK) functions are joining/leaving the network mechanism, application security mechanisms, routing and maintain the path between