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# Fault finding system in vehicle using I2C bus

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***Abstract-*** ***Automotive electronics is rapidly expanding area with an increasing number of safeties, driver assistance and infotainment devices becoming standard in new vehicles. Current vehicles generally employ number of different networking protocols like RS485, RS232, and RS422 to integrate these systems into the vehicles. The introduction of large numbers of sensors like water level sensor ,coolant temperature sensor, pressure sensor to provide driver assistance applications and the associated high-bandwidth requirements of these sensors have accelerated the demand for faster and more flexible network communication technologies within the vehicle. In this project, we design and develop CAN bus like protocol using I2C bus which is control by PC. In this we connect PC through USB port to vehicles dashboard to monitoring the parameters like blown fuse indication, temperature, oil level and controlling .Characteristics including less circuit complexity and faster speed of data transmission.***

***Keywords- CAN bus, I2C bus, Embedded System, Microcontroller.***

## I. INTRODUCTION

Several embedded systems are distributed systems which consisting the multiple microprocessors. That microprocessor communicating with networks to did the shared tasks. For example, a modern automobile system have many more microprocessors which communicate with several networks to manage entertainment and navigation functions, central locking mechanisms, lighting and other vehicle systems. Safety systems like air bags and powertrain control uses for high speed network communication and uses for communication between the engine and transmission controllers respectively

In this system, we monitor the four vehicle's parameters i.e. pressure of tyre, temperature of the engine, speed of the car and fuses. Fuses are inexpensive and easy to replace. Many vehicles having two fuse boxes i.e. one under the hood and other is under the dashboard. Fuses provide important protection for sensitive electronics. If too much voltage is sent into a circuit, the fuse blows. This protects accessories (radio, headlights, dash lights, etc.) but need to replace the blown fuse before use that accessory again. The wire inside the fuse is designed to melt if the current passing through the fuse exceeds its rated amperage. When the fuse "blows", it opens the circuit and stops the flow of current to protect the circuit from the dangerous overload that might

Otherwise damage components or start a fire. The main causes for overheating of car engine are point out in below:-

1. Low Coolant by a Large Margin
2. Electric Cooling Fan Failure
3. Bad Radiator Fan Switch
4. Thermostat Not Opening

## II. LITERATURE REIVEW

1. All I2C devices are designed to be able to communicate together on the same two-wire bus and system functional architecture is limited only by the imagination of the designer. But while its application to bus lengths within the confines of consumer products such as PCs, cellular phones, car radios or TV sets grew quickly, only a few system integrators were using it to span a room or a building.

2. CAN is used in many systems like automotive, control. Authors observed that there is need of improvement in the vehicles systems. In current vehicles many driver assistance systems are available like adaptive light control system, automatic braking system, automatic parking system, collision avoidance system and also blind spot detection system. But these systems are not useful for finding the faults which occurs in vehicles. Therefore, authors made the CAN based fault finding system for vehicles using I2C bus. This System monitoring the parameters like blown fuse indication, temperature and controlling. System reduces the complexity of wiring and develops a centralized hub to control and monitor the vehicle environment. It can be further modified by adding extra sensors for monitoring other parameters of vehicles.

3. As stated above that a vehicle can run by itself without the intervention of human beings by the embedded intelligence in it. For this purpose Global Positioning System (GPS) using satellites can provide positioning information and proves to be a versatile all-time. For still higher accuracy wide area differential GPS is used, which offers a robust system that readily deals with selective availability errors and satellite clock errors. The models for GPS also include aiding sensors, e.g. dead reckoning, radar and camera, in-vehicle control features.

## III. PROPOSED MODEL AND WORKING

The communication starts with the Start condition, followed by the 7-bit slave address and the data direction bit. If this bit is 0 then the master will write to the slave device. Otherwise, if the data direction bit is 1, the master will read from slave device. After the slave address and the data direction is sent, the master can continue with reading or writing. The communication is ended with the Stop condition which also signals that the I2C bus is free. If the master only writes to the slave device then the data transfer direction is not changed.

If the master only needs to read from the slave device then it simply sends the I2C address with the R/W bit set to read. After this the master device starts reading the data. Sometimes the master needs to write some data and then read from the slave device. In such cases it must first write to the slave device, change the data transfer direction and then read the device. This means sending the I2C address with the R/W bit set to write and then sending some additional data like register address. After writing is finished the master device generates repeated start condition and sends the I2C address with the R/W bit set to read. After this the data transfer direction is changed and the master device starts reading the data

In the automotive industry, an embedded control system has grown from stand-alone systems to highly integrated and networked control systems.

Modern automobile have more microprocessors. These microprocessors are communicating over several networks, to manage infotainment systems, central locking mechanisms, lighting systems and other vehicle systems. The most commonly used network for control in automotive and manufacturing applications is the CAN or Controller Area Network. CAN is a serial communications protocol suited for networking sensors, actuators, and other.

The I2C allows connection of up to 128 individually addressable devices using only two bi-directional lines: clock (SCL) and data (SDA). The only additional hardware required is a pull-up resistor for each of the lines. Each of the connected devices can be either a master or slave device. Only master devices are allowed to drive the clock line. At the physical layer both SCL and SCA lines are in open-drain, hence the pull-up resistors. Increasing the number of devices on the I2C bus will also increase the line capacitance and thus reduce the slew-rate. The slew-rate can be controlled by changing the drive strength in the GPIO module for the I2C pins.

Originally, the I2C bus was designed to link a small number of devices on a single card, such as to manage the tuning of a car radio or TV. The maximum allowable capacitance was set at 400 pF to allow proper rise and fall times for optimum clock and data signal integrity with a top speed of 100 kbps. All I2C devices are designed to be able to communicate together on the same two-wire bus and system functional architecture is limited only by the imagination of the designer. But while its application to bus lengths within the confines of consumer products such as PCs, cellular phones, car radios or TV sets grew quickly, only a few system integrators were using it to span a room or a building

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