

A Vehicle-to-Vehicle Communication using can Network and ZIGBEE Technology

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Abstract: This project is designed for the usage of a driving assistance technology. The main intention of this operation is vehicle to vehicle and within the vehicle statistics sharing. The gadgets are primarily based on cloud to notify the driver about the basic data of nearby automobiles. Once specific space is identified by the driver he can drive the vehicle consequently. Vehicular system is a new subject of research it goals to examine remote agents (vehicles, people, robots) to interact, collaborate and to sense the surroundings. It process the information, disseminate the results and more usually share resources. During this project we tend to sense the parameters equivalent to pressure, fire, gas, object detection, and temperature. Even accident detection indicator and wireless communication can be added as an advantage to the system. Most of these parameters can be shared in a vehicular network and this could be monitored through any server application.

Keywords: ARM7, CAN, Sensors.

1. INTRODUCTION

In Intelligent Transportation System [1], a vehicle plays a crucial part of a country's information in infrastructure. The increasing city holdings of cars, that measure more and more traffic jams, thus necessities that measure Intelligent transportation, needs a lot of improvement. Vehicles is a new subject of research that goals to study distant agents (people, robots, vehicles) as they move and collaborate to sense the surroundings, course the data, propagate the results and more usually share the sources. However there are plenty of untrusted zones (cloud offerings). There may be probabilities of hacking all the non-public indicators. The driving behavior of various people is exclusive and we don't have any system that could monitor these situations. Here i provide security and privacy-retain get entry to control of users, which guarantees any member in a set to anonymously make use of that cloud resource. A driver behavior report system that works with the aid of accumulating and sending actual, real-time facts without any delay from nearby vehicle every time whenever it is driven. You should be aware of and informed, thus you'll be able to reinforce responsible driving habits, or right now deal with areas of concern.

Vehicular communication (VC) systems [2] will allow several exciting applications that allows to drive safe, and economically more comfortable. However this necessitates are the introduction for protection and privacy enhancing mechanisms. Throughout this paper we have a tendency to focus on sensitive aspects related to the implementation and preparation of such a secure vehicular communication system. We also offer an outlook to further study encounters. The proposed task is executed in two fragments. The First section recognized goes with an ARM as processing (master) and another as ARM information acquisition (slave) node and sensors are connected to it. Communications amongst the two nodes are maintained via undue rapidity of CAN communication technique. Sensors linked are fire, IR, temperature, pressure, LDR,

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PIR and Smoke sensors. The master node collects a majority of these measurements using CAN community. These results are displayed on the LCD Display system for easy understanding. This regional information is going to be displayed within the vehicle and the monitoring section by using ZIGBEE technology.

Block Diagram

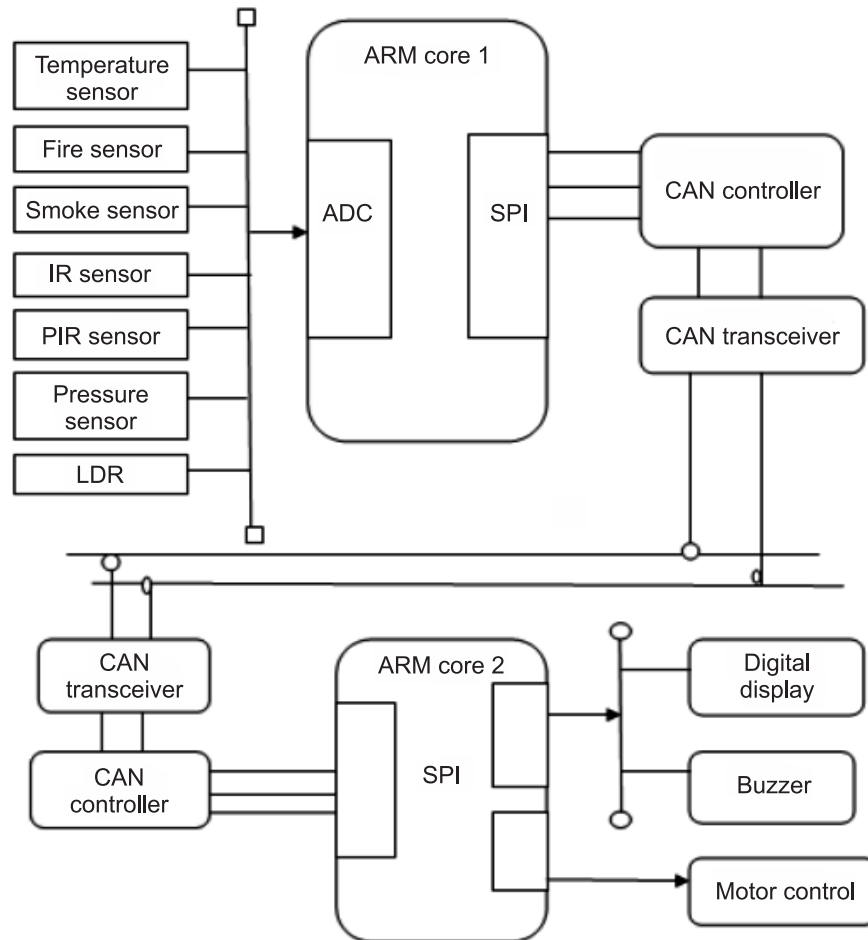


Figure 1: inter vehicular system

2. DESIGN AND IMPLEMENTATION

A vehicle System [3] which worked on by collecting and sending actual, real-time data right from the car, when it is driven and upload in a cloud network. In this type of wireless vehicle communication system we are going to use different types of sensor modules such as temperature, gas, fire, IR, accident detection, Person detection sensors. This total vehicle communication system is divided into two nodes. First node is acquisition node that nodes all the sensors connected to it and other one is processing node. This node contains only ZIGBEE, GSM and LCD display. All the sensor modules information and alert messages are displayed on LCD and the receiver section or monitoring section using ZIGBEE communication.

The LM35 [12] collection is a temperature sensor, whose output voltage is linear proportional to the Celsius (Centigrade) temperature. The LM35 generates a high output voltage compared to thermocouple. It does not want that output voltage to be amplified.

Temperature sensor [12] is used to find out the temperature level within the vehicle system. The Temperature sensor is connected to ADC 1st channel of the LPC2148. When the temperature exceeds to

maximum level then automatically the alert message “temperature exceeds” displayed on LCD screen to the user by using the GSM module and the monitoring section using ZIGBEE module.

To find any gas (smoke) leakages in the automobile we use the gas sensor. In this future work, we are using a MQ6 sensor[16] which elicits heat changes in the sensor element in response to change the gas parameter like methane. The GAS sensor is connected to 2nd channel of the LPC2148. Gas sensor finds any gas leakages in the automobile and spontaneously send alert message “gas exceeds” to the user. The detector has ideal sense united with a fast retort time. The detector capable of detecting iso-butane, LNG, propane and cigarette smoke.

Fire sensor is used to sense any of the fire accidents occurred in automobiles and the nearby stations. Any fire occurs then immediately buzzer rings and alert message “fire exceeds” is send to user.

A light detection resistor (LDR) [14] mechanize on the standard of photo conductivity. Photo conduction is a physical phenomenon for the duration of which the fabrics conduction (as a result resistivity) reduces as soon as light-weight is absorbed by the fabric. [14] While light-weight falls i.e. once the photons fall at the tool, the electrons in the valence band of the semiconductor material excited to the conductivity band. These photons inside the incident light need to have more strength than band gap of the semiconductor material ,to make the electrons barricade from the valence band to the conductivity band. As a result once light-weight electrons having sufficient energy is incident on the device then electrons are excited to the conduction band which ends up in wide range of charge providers. The effects of this methodology increased in edge-cutting and hence the resistance of the device has decreased.

PIR sensors [15] allow us to experiment movement, almost continuously used to look at whether or not someone is moving in or out of the sensors range. They are cheap, tiny, low-strength, simple to use and do not wear out. Due to this reason they’re typically found in home equipment and the devices used in houses and companies. They may be frequently called PIR, “Passive Infrared”, “Pyroelectric” or “IR motion” sensors.

An Infrared detector [13] is an electronic device that radiates with the intention to sense a few components of the surroundings. An IR sensor can sense the heat of an item and detects the movement. These type of sensors measures closest infrared radiation, as opposed to emit than referred to as a passive IR detector.

3. SYSTEM HARDWARE

A. LPC2148 Processor

The ARM7TDMI-S is a general purpose 32-bit microchip [17], that bids high performance range and very low power consumption. The ARM design depends up on Reduced Instruction Set Computer (RISC) moralities, and therefore the instruction set is related to decode mechanism. This measure gives less complication than one of small programmed instruction Set computers (CISC). This ease finally end by passing high instruction output and tremendous amount of time interrupt reaction witha tiny low and cost-powerful processor.

[17] Pipeline strategies are applied so that all factors of the procedure and memory structures will function unnecessarily. Generally, when one instruction is lifeless, its successor will be decoded, and next instruction is fetched from ruminaton. The ARM7TDMI-S processor likewise employs a unique subject to observe method such as Thumb, which produces an ideal fitting. High-volume programs with memory restrictions or bids whereas code complexity could likely be a disadvantage. The vital installation at the back of Thumb is awesomely decreased to schooling set. Mostly, the ARM7TDMI-S processor consists of two instruction sets:

1. A general 32-bit ARM set.
2. A 16-bit Thumb set.

B. LDR(GL55) Sensor

A Light Dependent Electrical device (LDR)[14] or a photograph electrical device may be a device whose electrical occurrence may be a perform of the incident electromagnet. Subsequently, they are light-weight touch devices. They're combined together called photo conductors, picture conductive cells or photocells. They're made of semiconductor affluences with more resistance. There are plenty of unconventional symbols infer on LDR, one of the most generally used photograph electrical device is as below.

C. PIR Sensor

Passive Infrared sensors (PIRs) [15] are digital devices. They are engaged in some protected fright configurations to sight movement of an infrared light, commonly a person frame. The pyroelectrical detector is manufactured from a crystalline cloth that spawns a surface electrical phenomenon to uncovered the heat inside of the infrared emission. Once the amount of crystal radiation changes, the price also changes and then it can be measured with a sensitive FET tool engineered within the detector. This radiation (electricity) is obscure to the human eye but is detected by means of digital devices designed for this kind of motive.

D. Smoke Sensor

Ideal detector [16] used to discover the presence of a dangerous LPG leakage in your automobile or in an out station or tank atmosphere. This part will be simply fused into associate alarm unit, or provides a graphical indication of LPG application. The detector has outstanding sensitivity combined with a fast expectancy. The detector capable of sensing iso-butane, LNG, propane and roll of tobacco smoke.

E. Temperature Sensor (LM35)

The LM35 [12] is added within the same method as an alternative micro circuit temperature sensors. It may be fixed or hooked up to a level and its temperature may be around the range of zero Celsius 01°C of the level temperature. This deduces the air temperature is approximately similar to the surface temperature. If the air temperature has been precise or lower than the surface temperature, the particular temperature of the LM35 is probably in the middle of surface temperature and the air temperature. The temperature sensors have popular packages in environmental and custom manipulation and also in test, measurement and communication.

F. Pressure Sensor (Accident Detection Sensor)

[18] It is important to keep in mind the risk of inadvertent activation as a result of earthquakes, in areas such as construction traffic and different vibration grounds to activate the sensor.

G. IR (IR 333-A) Sensor

IR sensor portion [13]includes two elements; one is emitter circuit and the other is receiver circuit. The emitter circuit is nothing but absolutely an IR LED (light Emitting Diode) and the detector circuit is certainly an IR photodiode that is sensitive to IR mild of equal wavelength that is released through IR LED. whilst IR light falls on the receiver, its resistance and correspondingly its output voltage amendments share to the significance of the IR slight obtained.

H. LCD Module (2 x 16 Characters)

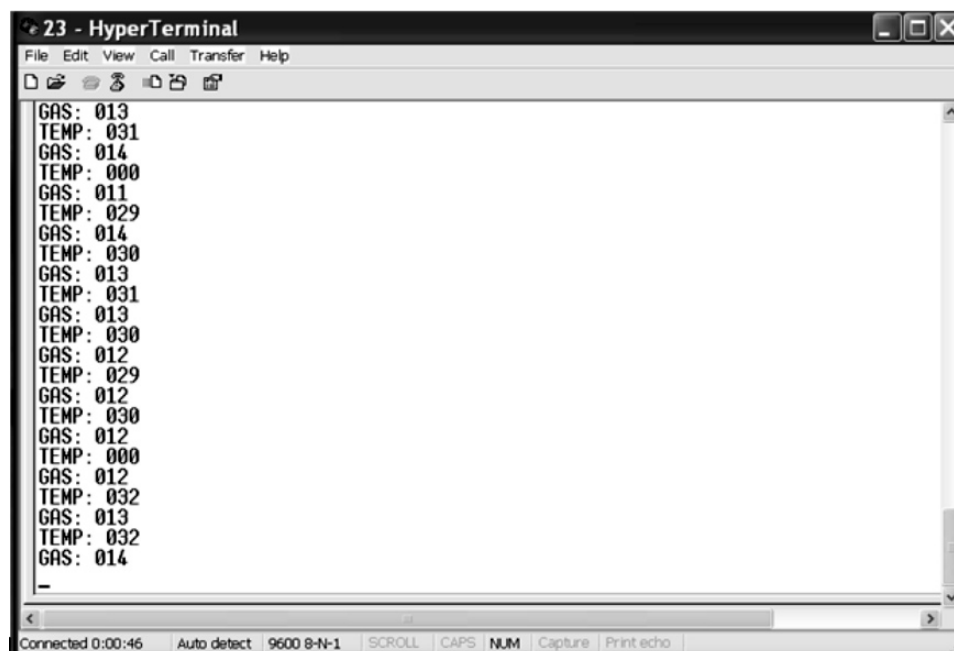
Alphanumeric display [10] is hired to visualize the parameters and error conditional 16 characters and a couple of strains. It has the controller that interfaces information and alphanumeric show panel. Liquid crystal presentation (liquid crystal display) have materials that mix the properties of every infusions and crystals. An alphanumeric display contains two glass panels, with an liquid material present between them. The inner part of the glass plates measure lined rectangular with clear electrodes that outline the character, symbols or styles to be displayed. Chemical compound rectangular layers present in the electrodes and the liquid molecules are outlined for orientation attitude.

4. WIRELESS COMMUNICATION

Can Overview

The development of CAN [11] launched out while increasingly more virtual gadgets were applied in modern cars. For example such gadgets includes engine control systems, energetic suspension, gear management, ABS, air condition, light management, air bags and crucial locking. All these suggests fairly a few safety and a total of comfort for the pressure and in fact a discount of gasoline intake and exhaust emissions. To boost the conduct of the car further, it have been necessary for control structures (and their sensors) to trade facts. This became generally accomplished via wonderful interconnection in precise systems (i.e. factor wiring through point). The requisite of information change has grown to a quantity that a cable community with a certain length and lot of connectors are needed. This created a rising issues regarding fabric charge, manufacturing time and consistency. The answer to this drawback is modified by connecting the systems via a serial bus. This bus need to fulfill a few special necessities because of its utilization in an automobile. By using CAN, end-to-end connection is modified via one serial bus connected to all control structures. That is executed by adding some CAN-explicit hardware to every manage unit that gives the “protocol” or the rules for transmitting and receiving information through bus.

5. RESULTS



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23 - HyperTerminal
File Edit View Call Transfer Help
GAS: 013
TEMP: 031
GAS: 014
TEMP: 000
GAS: 011
TEMP: 029
GAS: 014
TEMP: 030
GAS: 013
TEMP: 031
GAS: 013
TEMP: 030
GAS: 012
TEMP: 029
GAS: 012
TEMP: 030
GAS: 012
TEMP: 000
GAS: 012
TEMP: 032
GAS: 013
TEMP: 032
GAS: 014
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Figure 2: Sensor readings in display system



Figure 3: LCD screen shot

6. CONCLUSION

The project used two ARM core with a CAN bus communication. From the engine part ARM core, the sensed readings will be endlessly transmitted to the dash board part ARM core. In dash board, the threshold comparison will be done and sensing elements failure maybe identified. Using fuel level and the engine speed, we can predict the distance to which the vehicle goes . If any hardware system is failed within the vehicle, then by load current we can determine the fault. The dash board display provides trouble shooting information to the user. By this project work we are going to maintain the health of an automobile system to extend level.

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