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CAR CRASH SAFETY SYSTEM

PROJECT DOMAIN: SAFETY

ABSTRACT:

India being set to overtake China in human population has already overtaken in terms of most numbers of accidents annually. Given the highly dense populated living conditions it is not surprising to see those numbers but still technologies like BMW car assistance, Air bag system have failed in preventing such life threatening accidents. This motivated us to look for innovative and better **VEHICLE CRASH ALERT SYSTEM (VCAS)** which places a simple black box in the car which alerts the PCR, Ambulance in case it has met with an accident immediately. In V.C.A.S. we use accelerometer, thermal & smoke sensor which generates different signals for different orientations, overheating of the vehicle. But V.C.A.S. does ask questions about its practicality and reliability over other existing technologies which is answered most easily by its:

- Cost
- Effectiveness
- Maintenance
- Future scope

The salient features of the system are:

1. Use of micro-controller.
2. Accelerometer sensor to detect orientation of vehicle.
3. Temperature Sensor at all vulnerable areas of the car from TI.
4. Smoke sensor to prevent fire.
5. Glass breakage sensor.
6. System warnings should result in a minimum load on driver attention.

DESCRIPTION

We have following ***intentions*** through this project:

Since the numbers of road accidents are increasing rapidly due to poor driving skills and poor attention, therefore it is necessary to equip our vehicles with such technology which can alert authorities in accident scenario.

Security in travel is primary concern for everyone. This Project describes a design of effective alarm system that can monitor an automotive / vehicle / car condition in travelling. The project name "VEHICLE CRASH ALERT SYSTEM" shows that project is designed to prevent the accident and to inform emergency about an accident that has occurred.

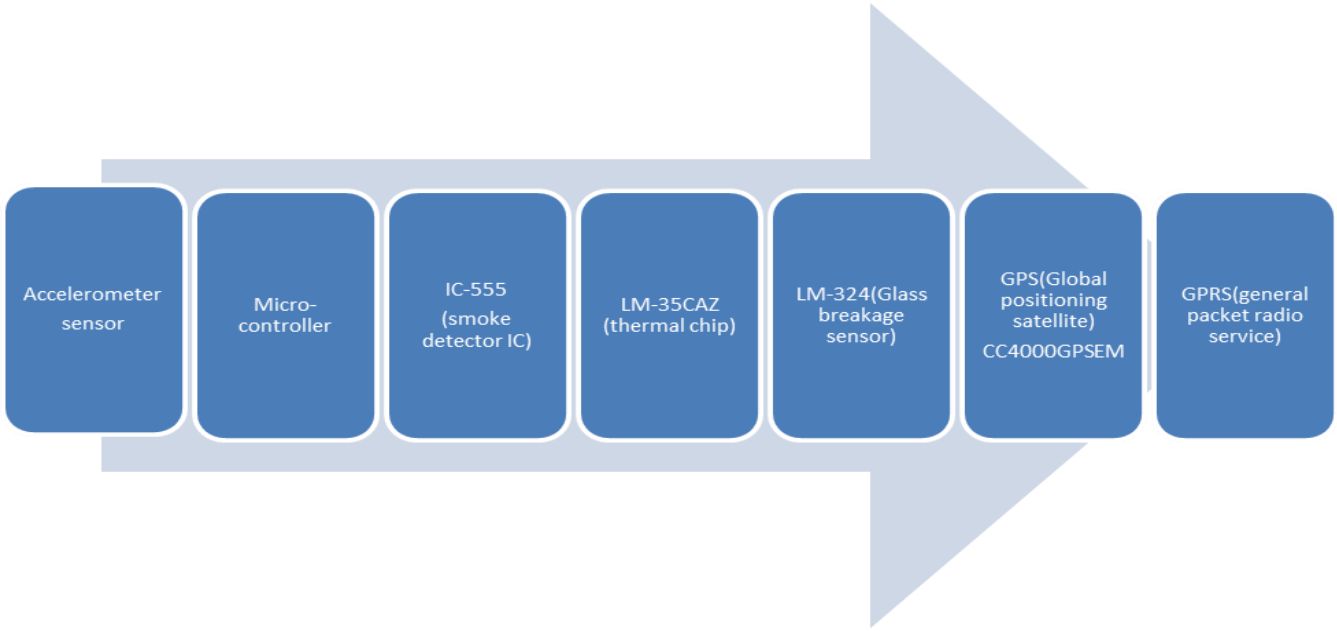
It is envisioned that the V.C.A.S. will assist in the development of a comprehensive car crash warning system, which is capable of detecting and warning the driver of potential accidents and overheating that may cause fire. The system will incorporate the use of accelerometer and thermal sensors that are capable of detecting potential accidents creating situations.

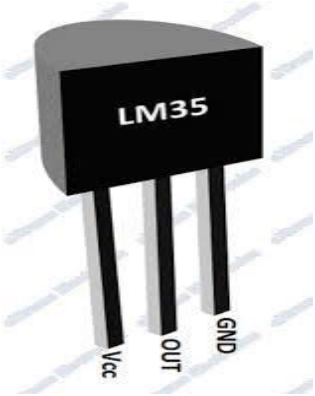
It simply generates the signals in case of accident or crash. There is no need to press any kind of switch or telling user how to use it. It`s just an box which is kept inside car and will be activated when the collision will occur.

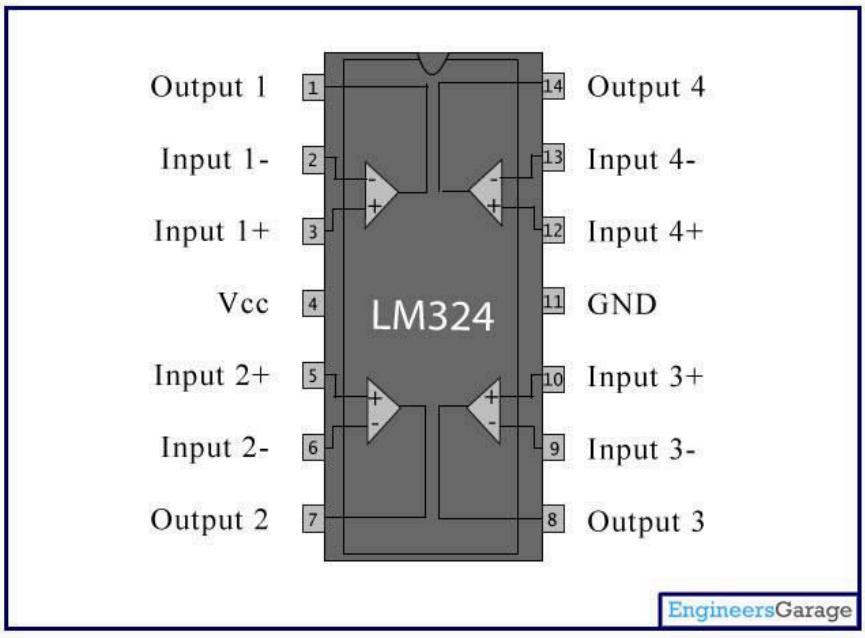
NEED

- India has the highest number of road accidents in the world
- Road accidents have earned India a dubious distinction. With over 130,000 deaths annually, the country has overtaken China and now has the worst road traffic accident rate worldwide.
- Most of the people lost their lives due to no medical facility at correct time.

BLOCK DIAGRAM:







SENSING ORIENTATION

Disorientation of the car during accident is the main criteria on which VCAS works. Accelerometer sensor which can be placed either in the front or back of the car detects the alignment of the car continuously/regular intervals of time and compares with the normal alignment of the car which in turn will generate the corresponding alert signals. As soon as the coordinates of the car changes it is interfaced with microcontroller to which accelerometer sensor is connected and rescue message is sent to the rescue teams through GPS. In such a situation post-accident life-saving measures can be acted quickly. The whole system includes with the thermal and smoke sensors can be directly connected to the car battery or can be externally powered by the combination of external cells (batteries) optimizing the power consumption of the micro-controller.

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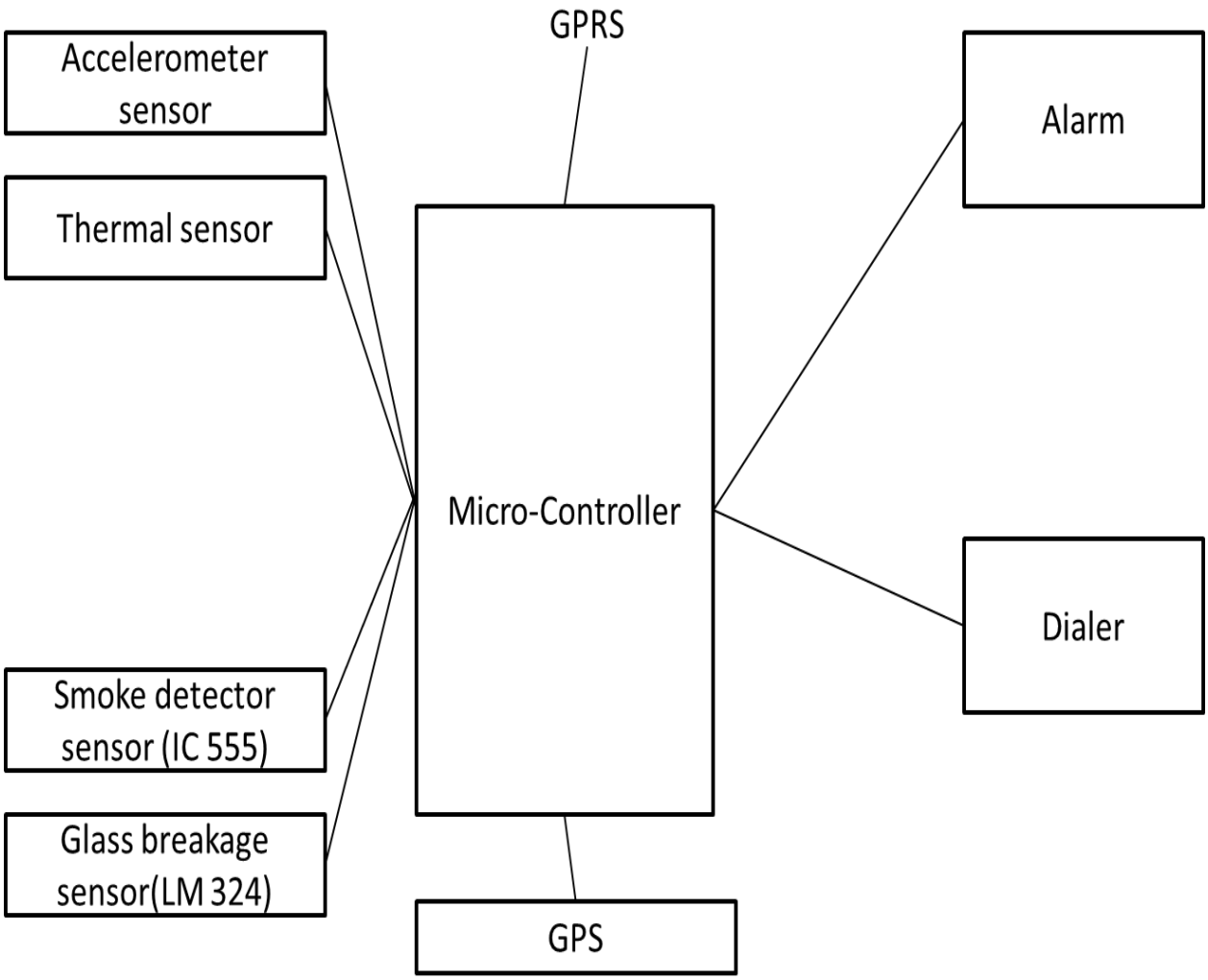
THERMAL SENSING

Thermal sensors used in VCAS are positioned near the engine monitoring the engine temperature with the optimal engine temperature so as to indicate the driver the need of cooling down the engine or possible damage to engine due to over-heating. Thermal Sensor being placed near engine is suitably insulated so as to protect from damage from heat of engine ensuring correct and accurate readings from sensor.

SMOKE CONTROL

Smoke Detectors here is designed for Wireless Connectivity implementation where power consumption is a very critical aspect because they need to be able to run for very long periods of time on a battery. This makes microcontrollers like the ideal for the application; their high level of system integration also simplifies the design and reduces system cost. An infrared (IR) diode and IR receiver are used inside a smoke chamber to detect the presence of smoke. The IR diode is pulsed periodically, and the IR receiver signal is examined to determine if smoke is present in the chamber. Between sampling periods, the operational amplifier and IR circuitry are shut down, and the microcontroller is in a standby mode, consuming less than 1-mA current.

WORKING



The Accelerometer sensor will be interfaced to using its ADC, and the microcontroller will compare its value to programmed threshold. The microcontroller will also be connected to the thermal sensor thus warnings and alert signals would be generated accordingly, interfaced using 4-wire protocol. The code for micro-controller would be programmed by us.

COMPONENTS REQUIRED

We plan to use following components:

- Microcontroller
- LM35CAZ-Temp sensor (From TI's National Semiconductor portfolio)
- LM 324 glass breakage sensor
- CC4000 GPS(global positioning system) from TI
- GPRS(general packet radio service)
- Voltage regulator from TI
- Op-Amps TI

CHALLENGES

It was desired to design **VEHICLE CRASH ALERT SYSTEM**. Specifically, the frequency of warnings and adaptability of the system to various conditions (e.g. weather and driving styles) needed to be considered. The system must be useful for the driver and other passengers in case the vehicle has met with an accident so that appropriate steps can be taken by the concerned authorities thus making VCAS as lifesaving project.

The smoke detector has drawbacks in that they sometimes malfunction when exposed to the smoky weather conditions and also when someone smokes inside a car.

APPLICATION

1. Automotive and transport vehicles.

2. With advance technology, it can be use in broad areas of transportation.

ADVANTAGES

1. Sophisticated security.

2. Monitor all hazards and threats.

3. Mobile number can be changed with changing some settings

REFERENCES

- http://grouper.ieee.org/sa/sec/public/nsf_grant/Student%20Application%20Papers/Scott%20Weiner/CarAccidentAlertSystem>
- http://www.pcworld.com/article/171680/article.html>
- http://wardsauto.com/eu-considers-imposing-car-crash-alert-system
- http://www.ijens.org/Vol%2011%20I%2002/116102-2929%20IJECS-IJENS.pdf