Automated Control System for Accident and Air Pollution Detection in Vehicle by using GSM and GPS modem

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Abstracts

The Rapid growth of technology and infrastructure has made our lives easier. The advent of technology has also increased the traffic hazards and the road accidents take place frequently which causes huge loss of life and property because of the poor emergency facilities. Our project will provide an optimum solution to this draw back. A Vibration sensor can be used in a car alarm application so that dangerous driving can be detected. According to this project when a vehicle meets with an accident immediately Vibration sensor will detect the signal. Microcontroller sends SMS to the predefined mobile number can be checked in an android application to get the location name directly instead of values. In case of accident then the vehicle should stop and immediately the information will be available in the webserver using IoT module connected to the controller. This project is designed with ARM7TDMI processor. A smoke sensor is included to detect the pollution caused from the vehicle in that case also the car stops and the location details will be sent to the predefined mobile numbers and then IoT module will update the information. A buzzer alert will also be given. This is an autonomous vehicle which is driven by itself using obstacle sensor to avoid damage. A temperature sensor is also interfaced to detect the raise in temperature so that controller will intimate with a buzzer alert and the updated through IoT module. As there is a scope for improvement and as a future implementation we can add a wireless webcam for capturing the images which will help in providing driver`s assistance.

Keyword: - *Automated Control System, Accident detection, Air Pollution, GSM, GPS, Vibration sensor etc.*

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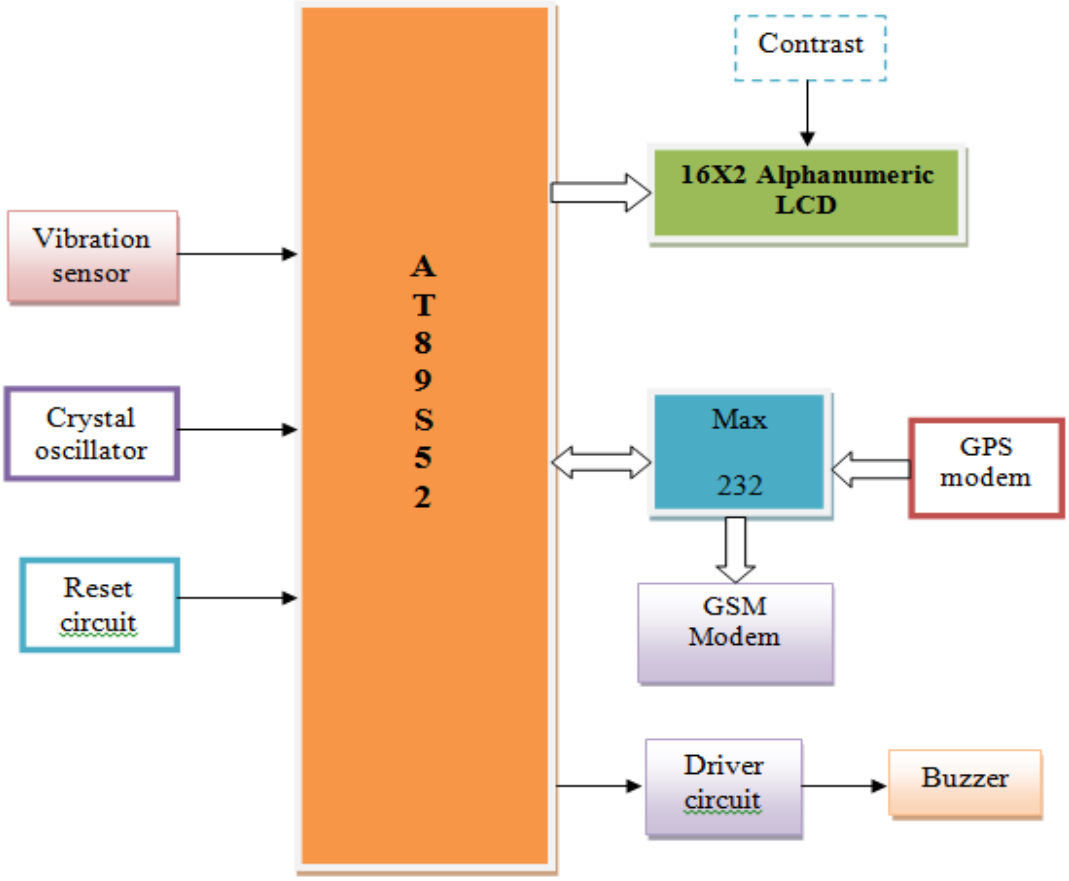
1. INTRODUCTION

Security in travel is primary concern for everyone. This Project describes a design of effective alert system that can monitor an automotive / vehicle / car condition in traveling. This project is designed to inform about an accident that is occurred to a vehicle to the family members of the traveling persons. This project uses a vibration sensor which can detect the abrupt vibration when an accident is occurred. A buzzer alert will also be given. This sends a signal to microcontroller. It has also provided polluted gas emission sensor to detect the pollution caused from the vehicle in that case also the car stops and the location details will be sent to the predefined mobile numbers and then IoT module will update the information.

1.1 Existing method

The GSM modem sends an SMS to the predefined mobile number and informs about this accident. This Enable it to monitor the accident situations and it can immediately alerts the police/ambulance service with the location of accident. The project is built around the AT89S52 micro controller from Atmel.
This micro controller provides all the functionality of the SMS alert system. It also takes care of filtering of the signals at the inputs. The uniqueness of this project is, not only alerting the neighbors by its buzzer, but also it sends a caution SMS to stored mobile numbers.



Diagrame-1. Block diagram of accident detection in vehicle by using GSM modem

1.2 Draw backs

There is no IoT for remote monitoring.

No sensor to check the pollution.

1.3 Proposed method

This Project presents an automatic vehicle accident alert system using GPS and GSM modems. The system can be interconnected with the car and alert the owner on his mobile phone. This detection and messaging system is composed of a GPS receiver, Microcontroller and a GSM Modem. GPS Receiver gets the location information from satellites in the form of latitude and longitude. SMS sent to the predefined mobile number can be checked in an android application to get the location name directly instead of values. In case of accident then the vehicle should stop and immediately the information will be available in the webserver using IoT module connected to the controller. This project is designed with ARM7TDMI processor. A smoke sensor is included to detect the pollution caused from the vehicle in that case also the car stops and the location details will be sent to the predefined mobile numbers and then IoT module will update the information. A buzzer alert will also be given. This is an autonomous vehicle which is driven by itself using obstacle sensor to avoid damage. A temperature sensor is also interfaced to detect the raise in temperature so that controller will intimate with a buzzer alert and the updated through IoT module. In this project, vehicle owner can send a SMS to move the car in case if it is stopped by any of the above reasons this is to move the car to service station if it is nearby. This is only for shorter distances only.

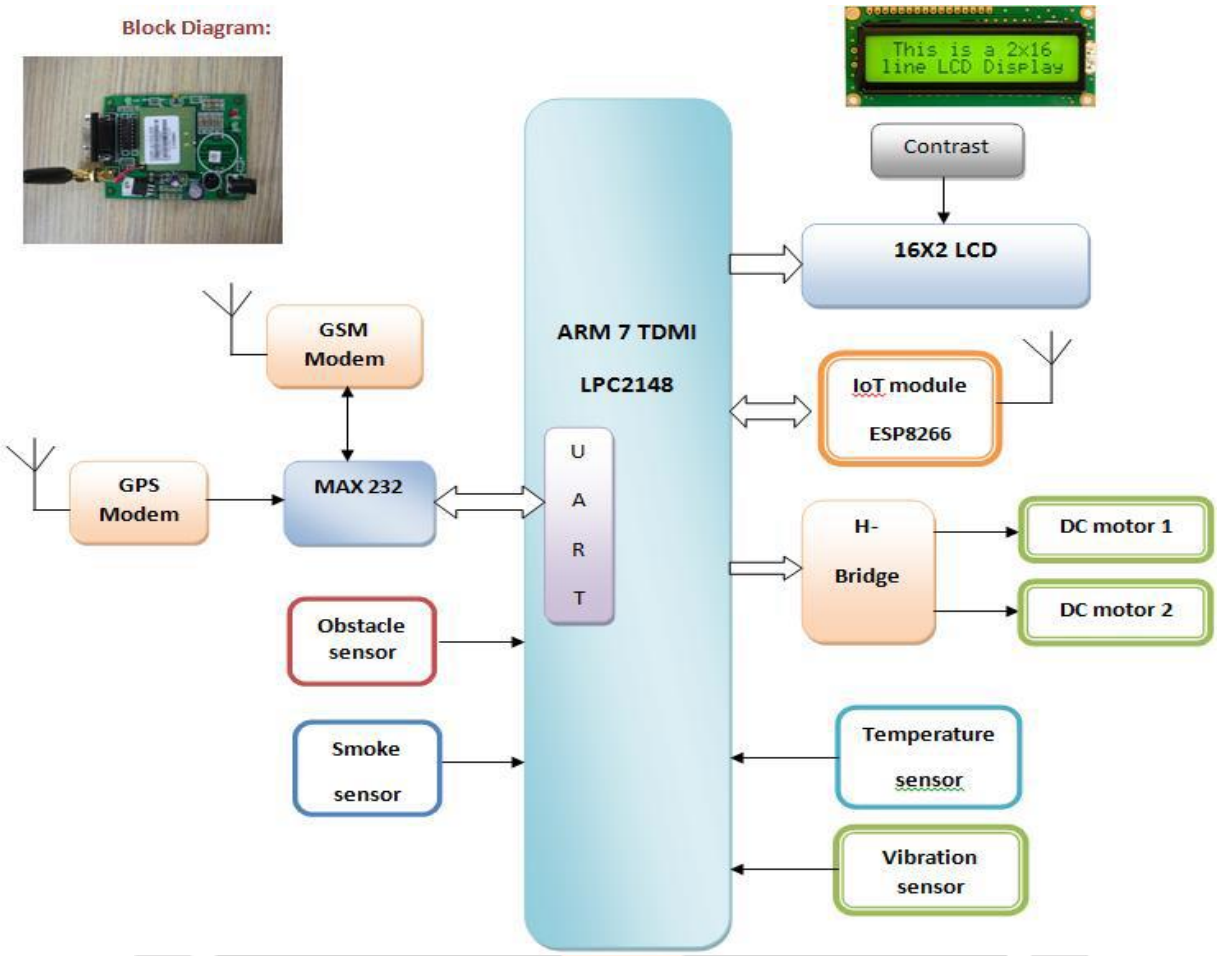


Diagram-2. Block diagram of accident detection in vehicle by using GSM and GPS modem

2. MODULES USED IN THIS PROJECT

2.1. ARM7TDMI Processor Core

- Current low-end ARM core for applications like digital mobile phones
- TDMI
  - o T: Thumb, 16-bit compressed instruction set
  - o D: on-chip Debug support, enabling the processor to halt in response to a debug request
  - o M: enhanced Multiplier, yield a full 64-bit result, high performance
  - o I: Embedded ICE hardware
- Von Neumann architecture

2.2. **GSM**

GSM, which stands for Global System for Mobile communications, reigns (important) as the world's most widely used cell phone technology. Cell phones use a cell phone service carrier's GSM network by searching for cell phone towers in the nearby area. Global system for mobile communication (GSM) is a Globally accepted standard for digital cellular communication. GSM is the name of a standardization group established in 1982 to create a common European mobile telephone standard that would formulate specifications for a pan-European mobile cellular radio system operating at 900 MHz. It is estimated that many countries outside of Europe will join the GSM partnership.

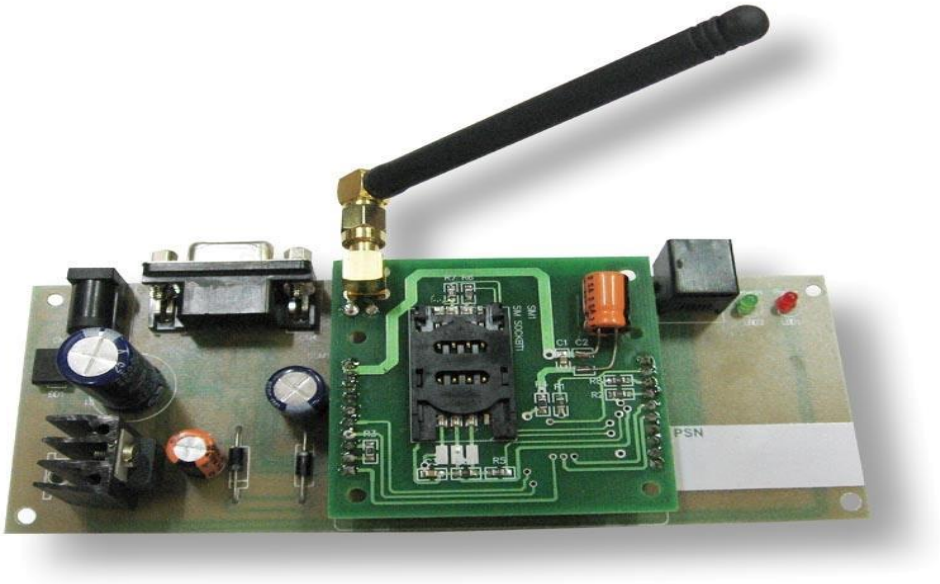


Diagram-3. Global System for Mobile communications

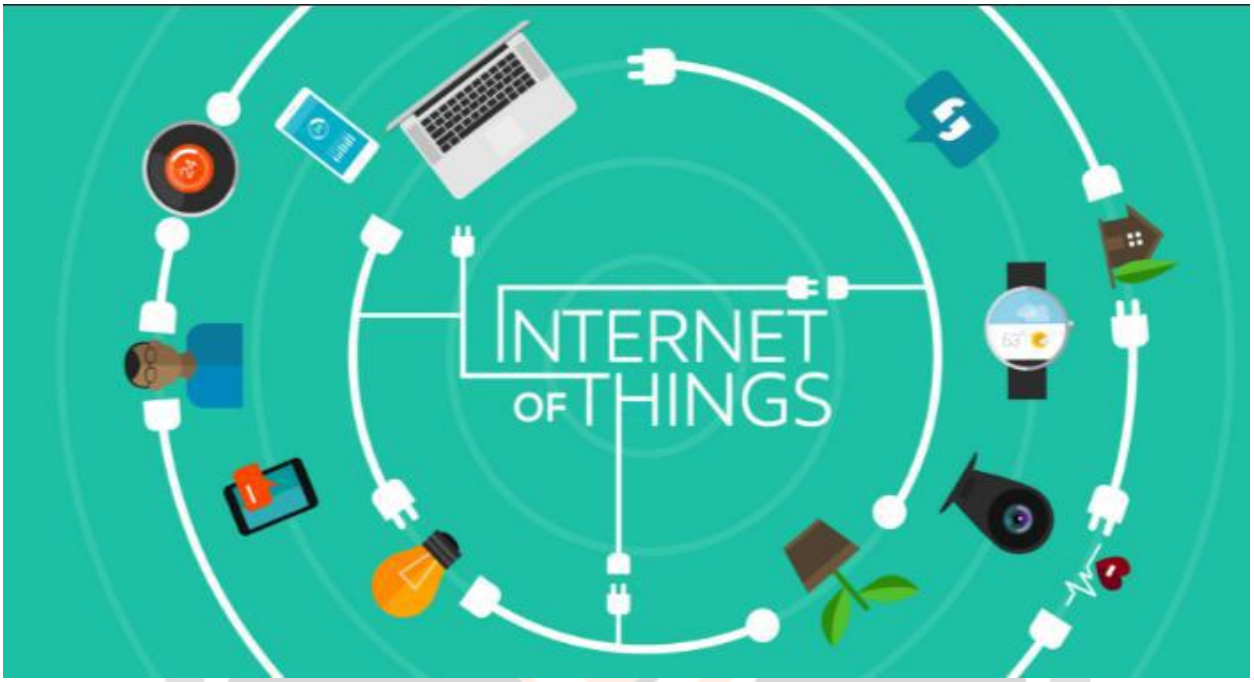
2.3. Global Positioning System

The **Global Positioning System** (**GPS**) is a U.S. space-based global navigation satellite system. It provides reliable positioning, navigation, and timing services to worldwide users on a continuous basis in all weather, day and night, anywhere on or near the Earth which has an unobstructed view of four or more GPS satellites.

Diagram-3. Global Positioning System

2.4. Internet of things

Internet is helping people to communicate each other using different applications



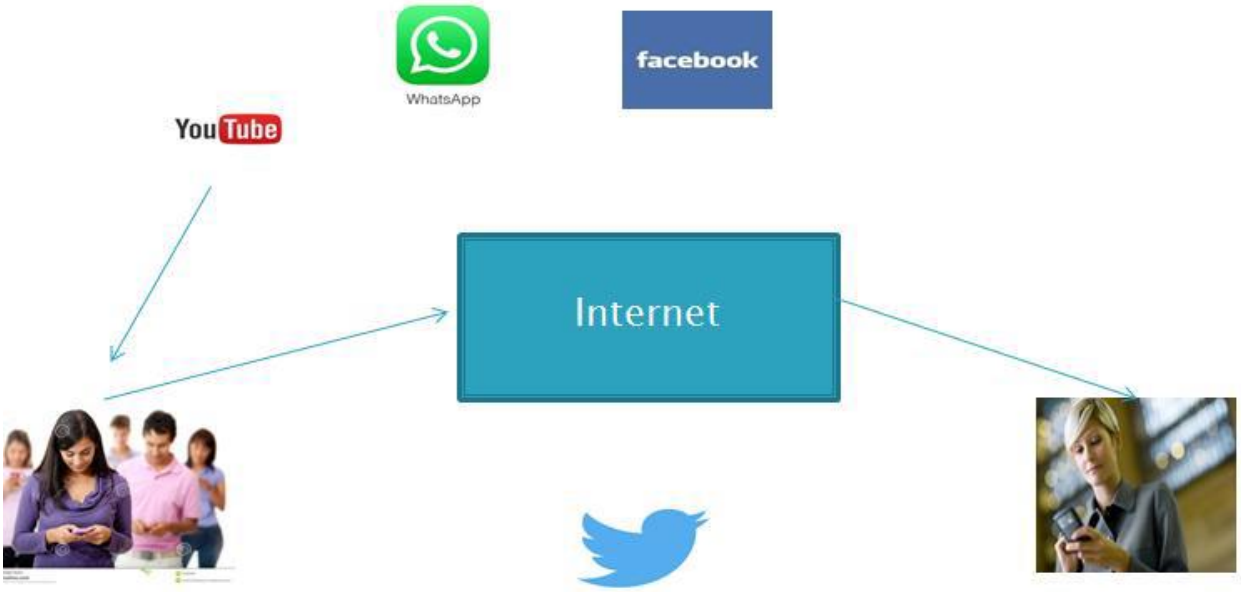


Diagram-4 Internet of things

Internet of things helps the things to communicate each other using IoT module

2.5. ESP8266EX

The Internet of Things (IoT) is the network of physical objects or "things" embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data.

Diagram-5 IoT ESP8266EX

2.6. Modules interfaced to ARM7

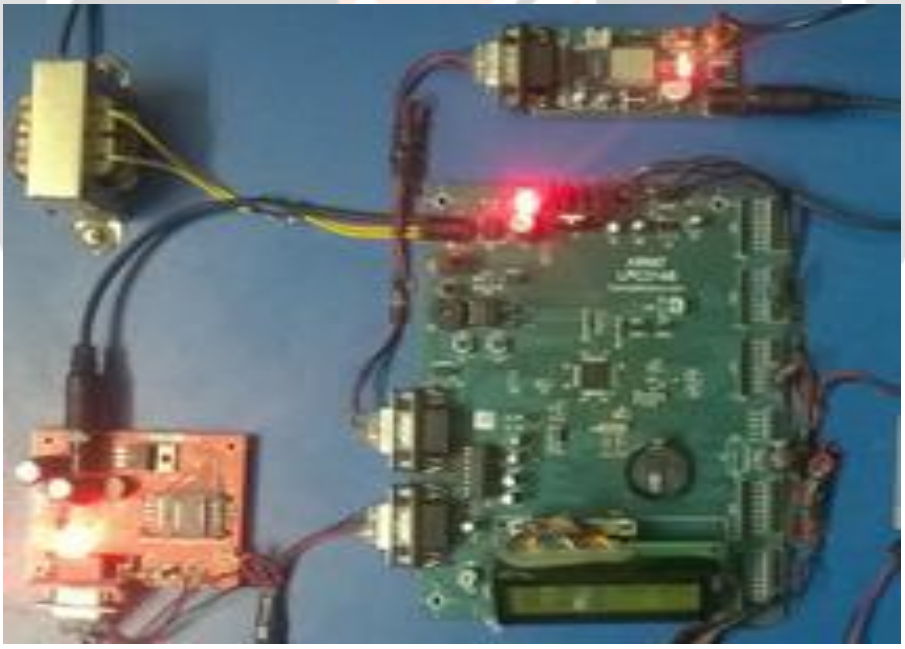


Diagram-5 Modules interfaced to ARM7

3. SOFTWARE TOOLS

Keil compiler is software used where the machine language code is written and compiled. After compilation, the machine source code is converted into hex code which is to be dumped into the microcontroller for further processing. Keil compiler also supports C language code.

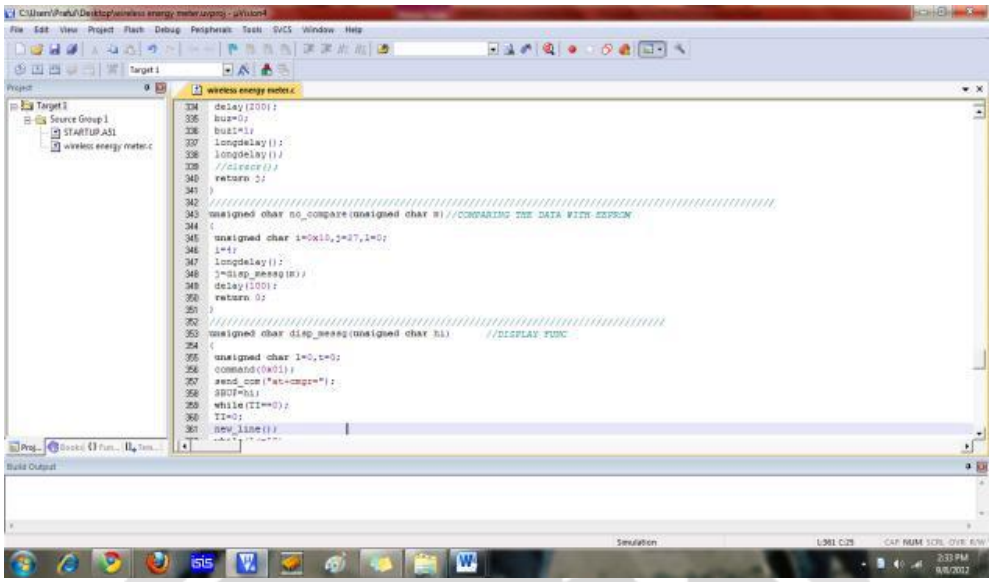


Diagram-6 Software tools

Flash Magic

Flash Magic is a tool which is used to program hex code in EEPROM of micro-controller. It is a freeware tool. It only supports the micro-controller of Philips and NXP. It can burn a hex code into that controller which supports ISP (in system programming) feature. Flash magic supports several chips like **ARM Cortex M0, M3, M4, ARM7 and 8051.**

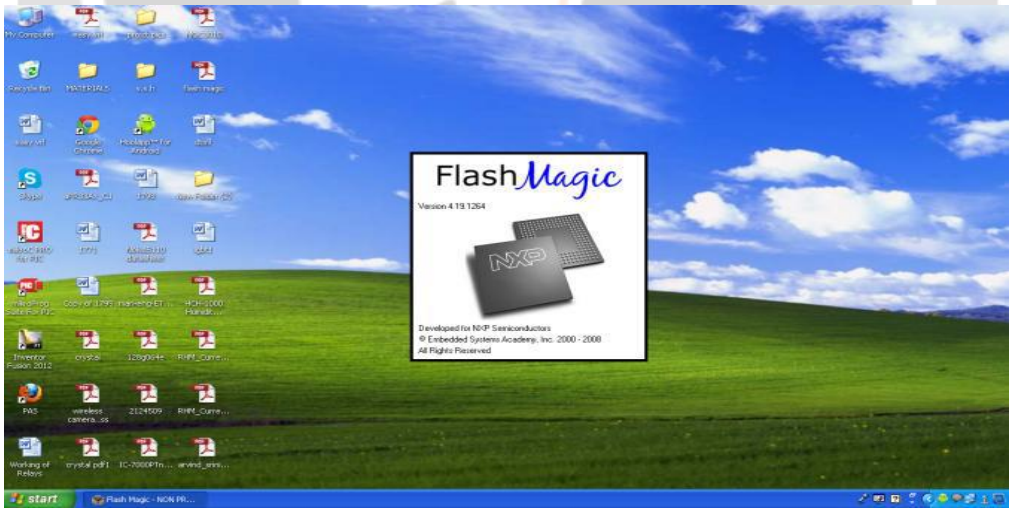


Diagram-7 Flash Magic Software tools

4. ADVANTAGES

- Sophisticated security
- Monitors all hazards and threats
- Alert message to mobile phone for remote information

5. APPLICATIONS

- Automotive and transport vehicles
- Security, Remote monitoring, Transportation and logistics.

6. CONCLUSION

This whole project mainly focuses on two things. The First thing is the concept of detecting the Pollution and indicating it to the driver. There is an increase in the level of Pollution over the last couple of decades, leading to several Environmental problems. So, this system will be highly beneficial is curbing this problem. The second reason is that this project presents vehicle accident detection and alert system with SMS to the user defined mobile numbers. The GPS tracking and GSM alert based algorithm is designed and implemented with LPC2148 MCU in Embedded system domain. The proposed Vehicle accident detection system can track geographical information Automatically and sends an alert SMS regarding accident. Experimental work has been carried out carefully. This will make easier to employ this system in the existing vehicles.

7. REFERENCES

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