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GPS and GSM Wireless Technology Implementation in Haze Monitoring

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ABSTRACT:

The heavy haze, described as a pall of smoke caused widespread health problems especially among the elderly, the young and kids. Haze is an atmospheric phenomenon where dust, smoke and other particles obscure clarit of sky. Pollution has implications serious health well as for the whole environment. This paper described a mobile monitoring system developed to detect the level of haze particulates. The basic idea of this project is to implement the new system that uses the advent technologies embedded systems, GSM, GPS.

Data collection was achieved with the use of gas sensor, and mobile alert implementation was developed with Global System Mobile (GSM) connection and Short Messaging System (SMS).

Introduction

The increase in the development of technology and the human race, we failed to take care about the surroundings in which we live in. Thus we polluted the environment and thereby reducing the quality of the place we live. Electronic noses were originally used for quality control applications in the food, beverage and cosmetics industries.

Current applications include detection of odors specific to diseases for medical diagnosis, and detection of pollutants and gas leaks for environmental protection. This project uses sensor like smoke sensor. These sensors are mounted on a PCB and visual indicator with audible buzzer is provided for alert signal. When the sensor is activated it sends the SMS using GSM modem. This project is much useful for mines detection and surveillance applications.

Hardware requirements

The **LPC2148** are based on a 16/32 bit ARM7TDMI-S™ CPU with real-time emulation and embedded trace support, together with 128/512 kilobytes of embedded high speed flash memory.

A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at maximum clock rate. For critical code size applications, the alternative 16-bit Thumb Mode reduces code by more than 30% with minimal performance penalty.

With their compact 64 pin package, low power consumption, various 32-bit timers, 4- channel 10-bit ADC, USB PORT,PWM channels and 46 GPIO lines with up to 9 external interrupt pins these microcontrollers are particularly suitable for industrial control, medical systems, access control and point-of-sale. With a wide range of serial communications interfaces, they are also very well suited for

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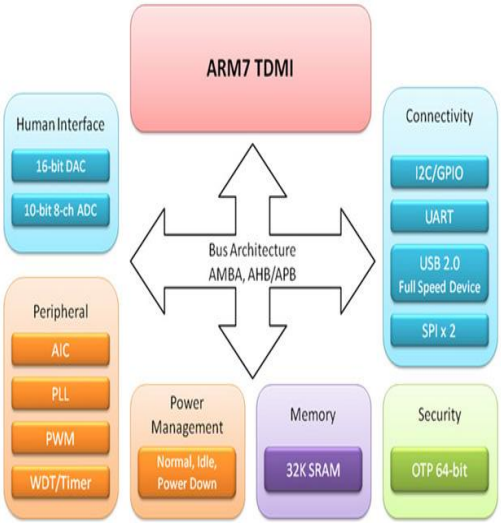
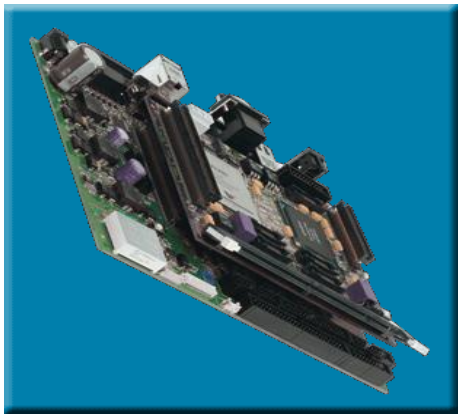
communication gateways, protocol converters and embedded soft modems as well as many other general-purpose applications.



Arm Processor



ARM7TDMI Processor Core

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

GPS TECHNOLOGY

The Global Positioning System (GPS) is a satellite based navigation system that sends and receives radio signals. A GPS receiver acquires these signals and provides the user with information. Using GPS technology, one can determine location, velocity and time, 24 hours a day, in any weather conditions anywhere in the world for free.

Global System for Mobile Communication (GSM)

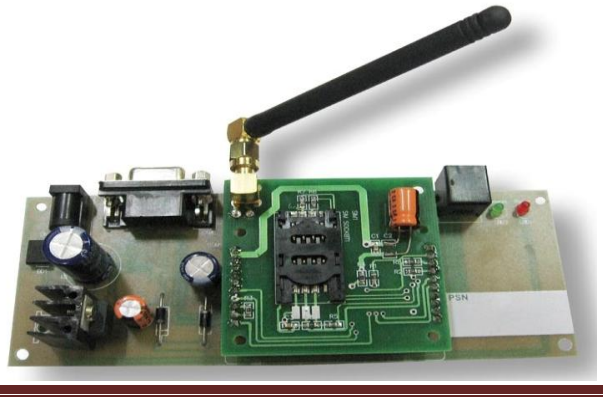
Definition:

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.

TABLE I. SOME COMMANDS USED IN GSM DATA TRANSFER MODULE OF THE SYSTEM

AT Command	Meaning
+CMGI	Module ok
+CMGS	Send message
+CMGW	Write message to memory
+CMGD	Delete message
+CMGC	Send command
+CMSS	Send message from storage



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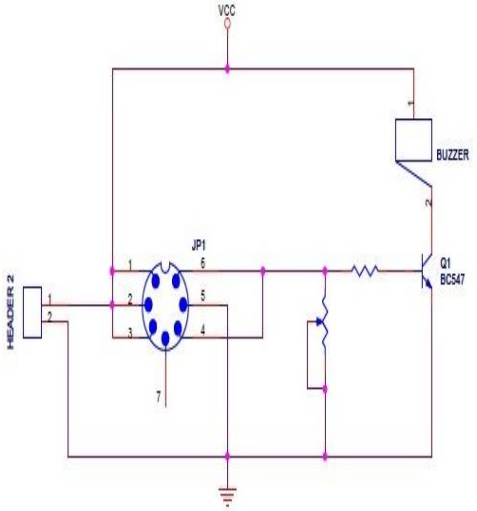
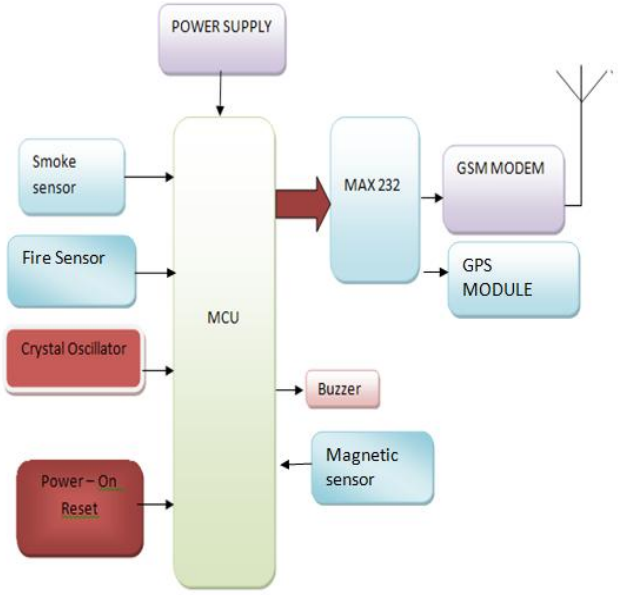
MQ-2 SMOKE SENSOR

Sensitive material of MQ-2 smoke sensor is SnO2, which with lower conductivity in clean air. When the target combustible smoke exist, the sensor's conductivity is higher along with the smoke concentration rising. Please use simple electro circuit, Convert change of conductivity to correspond output signal of smoke concentration.MQ-2 smoke sensor has high sensitive to LPG, Propane and Hydrogen, also could be used to Methane and other combustible steam, it is with low cost and suitable for different application.

Schematic representation of sensor



Block diagram



This project uses regulated 3.3V, 500mA power supply. Unregulated 12V DC is used for relay. 7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac out put of secondary of 230/12V step down transformer.

Software requirements

Keil compiler

Keil compiler is a 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.

Proload

Proload is a software which accepts only hex files. Once the machine code is converted into hex code, that hex code has to be dumped into the microcontroller placed in the programmer kit and this is done by the Proload. Programmer kit contains a microcontroller on it other than the one which is to be programmed. This microcontroller has a program in it written in such a way that it accepts the hex file from the keil compiler and dumps this hex file into the microcontroller which is to be programmed.

Data collected from three selective regions is read and these areas are highly congested with vehicles.The data collected by system is automatically converted into Air Pollution Index (API) reading in Parts Per Million (PPM).

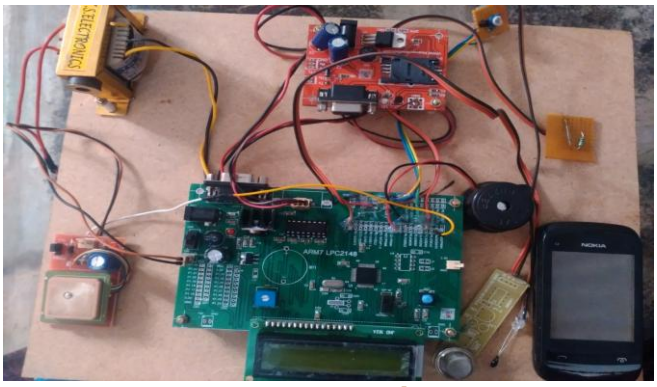


Fig18: Transmitter and Receiver

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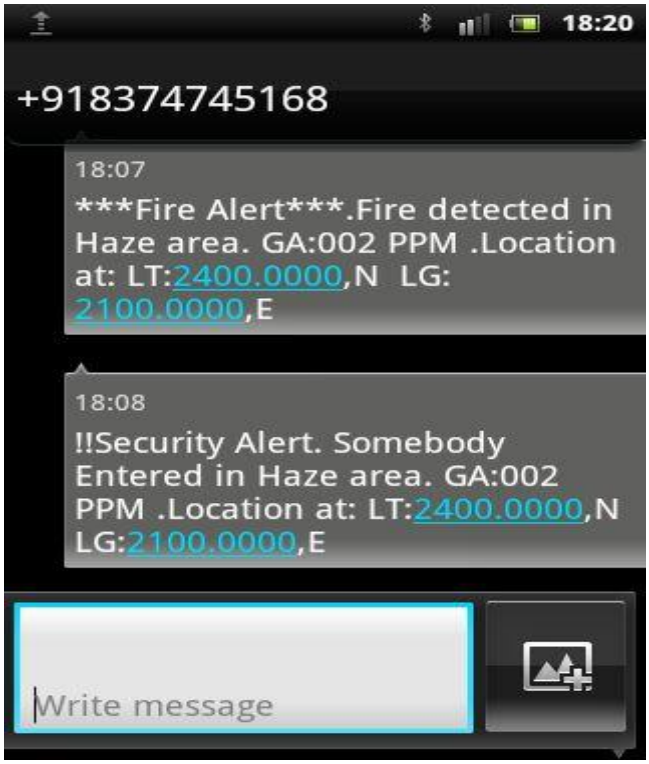

Fig19:SMS alert on security and fire

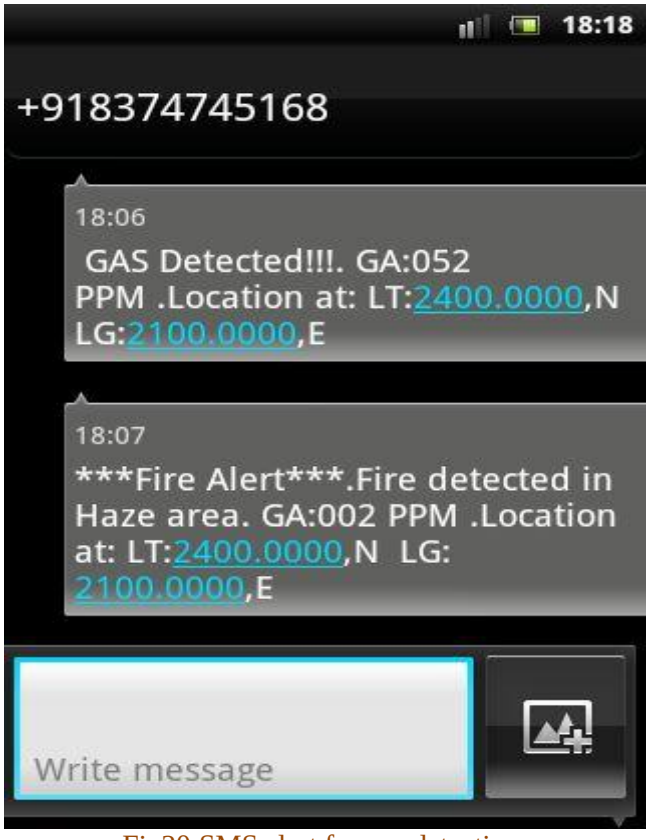

Fig20:SMS alert for gas detection.

The above figure shows that the SMS alert is recived and stored in the mobile.The message alert received depends up on the levels of readings at that instance. It also shows the readings of the air quality.If the air quality readings exeeds 50PPM sms alert is given to the mobile.It also ensures the area by showing the readings of latitude and longitude of the selective region.

ADVANTAGES AND APPLICATIONS

ADVANTAGES

- It can send data to multiple users at a time.
- It updates the environment conditions and notifies the user whether it is safe to conduct outdoor activities.
- It avoids health problems in humans, especially elders, young and kids.
- It reduces the man power
- Smoke detecting efficiency is high
- Accuracy is high

APPLICATIONS

- It is used in Industries where haze appears very often**.**
- It can be used in mining detection.
- It can be widely used in hospitals, pharmacies etc.

Conclusion

The system was completed and tested successfully and able to detect haze particles data for air quality measuring with the implementation of SMS alert, user will be updated with the latest haze measurement and thus notify user whether it is safe to conduct outdoor activities .The fire sensor as well as the magnetic sensor is also tested successfully with the implementation of SMS alert using GPS system .The developed systems offers flexibility and cost effective. With the use of mobile phones, the user will get the opportunity to get the latest update of the environmental conditions.

The haze monitoring system in future involves advent technologies like introducing camera and other vedio

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capturing devices at the transmitter part of the system so that people can understand easily. It can also introduce a voice module at the the receiver part of the system.

This system can also use the recent and advanced technology android at both transmitter part as well as the receiver part of the system.

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