Implementation of ARM Based Automated Voice MMS Alert System for Vehicle Collision Using TTS Module with GPS Positioning System and GSM Network

M.Lenin, J.Gobinath

Abstract— In recent intelligent transport system they are several advancement achieved, like GPS, ABS implemented for safe driving, This paper is about, after the collision happen how to intimate a information about that particular vehicle and its location to respective person or authority. In past automatic SMS based information system is there but, In this proposed paper the implementation of the automated voice generated MMS along with detail status about the vehicle number and exact location of where the collision occurred through GPS, In this proposed system we utilize a low cost GPS, along with engine locking system (ECU) to prevent from fire catch up in vehicle, and a transmitting module of GSM/GPRS all these control in this operation is interfaced with ARM processor LPC2148.

Index Terms— Automated voice, low cost GPS, GSM, engine locking system, TTS Module and ARM 7

1. NTRODUCTION

In the past era of mankind the best invention is the wheel, it appears in the mid-4th millennium BC in Sumerian civilization, from on that day the evolution in the transport system have been explored to various level, and after oil source is discovered the transport system have become more effective and powerful but whatever improvement is done the accidental collision is occurred due to some human error or through machine error now in the present years many scientist are involved in the improving the intelligence in vehicle transportation for the safe journey and other term of emergency intimation to save life of the person in accidental trauma the technology is playing the vital role in alert systems like sensors and global positioning system to trace the vehicle and its condition to diagnosis it fault occurrences.

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The aim is to design a effective and powerful TTS module for automated voice generated MMS for emergency alert system, and using the low cost GPS to trace the exact location using its latitude & longitude, and controlling the fire actions occur after the collision through locking the ECU and petrol value locking system and to overcome the existing SMS based system for alert.

In this section we are going to see some brief explanation about this proposed system that listed below:

Section [2] Related Work.
Section [3] Proposed System and block diagram.
Section [4] Hardware & Software Requirements.
Section [5] Implementation and Test Bed.
Section [6] Conclusion and lab prototype images

2. RELATED WORK

Previous developments in this alert system is not effective, some case they not implemented in full effective ways like few existing paper, implemented the "design of real time vehicle positioning system using IMM filter in low cost GPS" in this paper the high accurate and reliable positioning GPS in low cost, To design the low cost GPS now implementing the new algorithm [IMM] interfacing multiple model, All Data information of the vehicle are achieved through sensor attached in vehicle, Working on the kinematic and dynamic vehicle model, And sending the exact location in emergency message, And idea of "An optimization framework for driver feedback systems" this system shows the Implementation of the electronic unit to engine control system, to improve the fuel economy condition in various range of road condition , And one more source of paper review the "vehicle localization on a digital map using particles filtering" describing the factor of Achieving the good localization by using cameras and GPS and combining with the reference map, the localization parameters are estimated using a particles filter making it possible to manage multimodal estimations, and in another paper shows "Subliminal Persuasion And Potential For Driver Behavior Adaptation "describe to support "ecodriving" by application of subliminal persuasion to change a driver's steering driving economy, safety belt interface, subliminal persuasion, tactile driver seat, vibrotactile stimulation , from this all basic element of the previous papers helped me to work on this alert system paper in full-fledged manner.

3. PROPOSED SYSTEM

In this proposal system Fig 1 it necessity to overcome the previous drawbacks and limitations and need a reliable and scalable implementation so the theme is described as implement brief effective and powerful TTS module for automated voice generated MMS, and controlling the fire actions occur after the collision through locking the ECU and petrol value locking system, all action of operation are done in the RISC based ARM processor,

And using a low cost GPS And along one disturbance sensor is implemented to sense the collision it is the initiation device in this process and working in software part is achieved using keilμvision. While implementing this projected work some advantages is achieved to gain its positive approach they listed below:

1. All this action done in one single shot in real time.
2. An automated voice based alert mms would share the exact location and vehicle detail to all concern department and to family persons.
3. Reducing 50% fire accident while vehicle in collision through controlling through ECU system, we can obtain the reliable and exact positioning of the accidental vehicle through [IMM] based GPS.

4. MATERIAL SPECIFICATION

4.1 HARDWARE REQUIREMENTS:

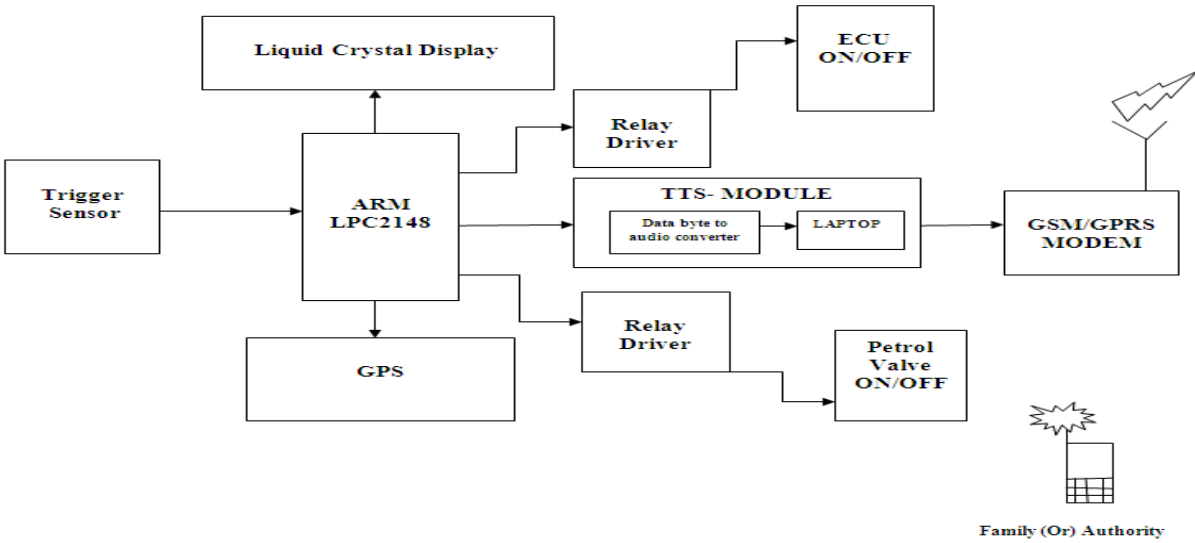
1. ARM processor [LPC2148].
2. GPS module [L10 Module].
3. Vibration sensor [Piezo accelerometer sensor].
4. GSM module.
5. 12V-D.C Motor.

ARM [LPC2148]:

The LPC2148 microcontrollers are based on a 16-bit/32-bit ARM7TDMI-S CPU with real-time emulation and embedded outline support, that combine the microcontroller with embedded high-speed flash memory ranging upto 512 kB. A 128-bit wide memory interface and sole accelerator architecture enable 32-bit code execution at the highest clock rate. For critical code size applications, the another 16-bit Thumb mode reduce code by more than 30 % with minimum performance penalty Due to their tiny size and low power consumption, LPC2148 are perfect for applications where miniaturization is a key necessity, such as access control. Serial communications interfaces ranging from a USB Full-speed device, multiple UARTs, SPI to I2C-bus and on-chip SRAM up to 40 kB, build these devices very well suited for communication gateways and soft modems, protocol converters, voice recognition and

low end imaging, providing equally large buffer size and high processing power.

Fig 1: OVERVIEW OF PROPOSED SYSTEM IN BLOCK



REPRESENTATION

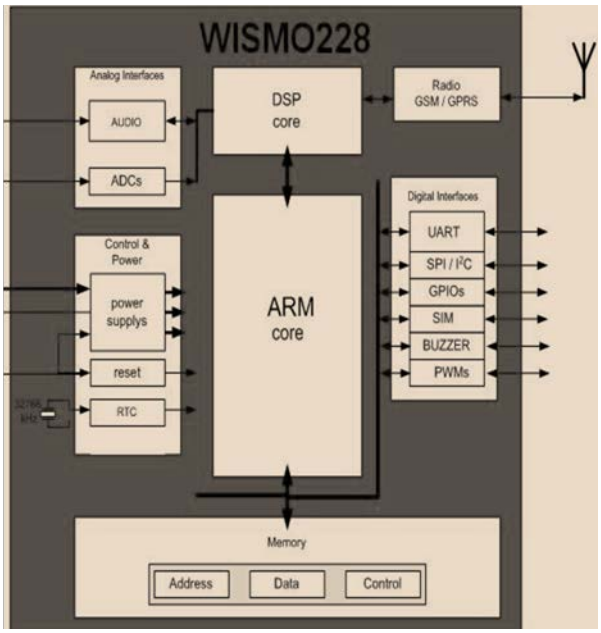
GPS module:

The L10 GPS module brings the high performance of the MTK positioning engine to the industrial standard. Fig 2 The module supports 210 PRN channels. by means of 66 explore channels and 22 concurrent tracking channels, it obtain and track satellites in the shortest time even at indoor signal level. This adaptable, stand-alone receiver combines an extensive array of features with flexible connectivity. The embedded FLASH memory provides capacity for storing user-specific configuration settings, L10 advanced jamming suppression mechanism and innovative RF architecture provides a high level of immunity for jamming, ensuring maximum GPS routine. The component supports navigation and tracing location.

Fig 2: GPS module

GSM (SIM900):

FIG 3 GSM module with SIM900 is designed with a very powerful single-chip processor integrating, AMR926EJ-S core, Quad - band GSM module with a size of 24mmx24mmx3mm, An embedded Powerful



TCP/IP protocol stack, Supply voltage range 3.4 to 4.5 V.

Fig 3: GSM module Functional Architecture

4.2 SOFTWARE REQUIREMENTS

Using Keil μ Vision to Create Project File of Keil- ARM:

Write program by using C Language Program that is Keil-C ARM. It is used to interpret command under Program Text Editor of Keil,. We only mention about going on to configure Option value for connection commands of interpretation program mutually by using Keil-CARM during Keil uVision-3. For more detailed commands and functions usage for writing program by Keil-CARM, listed below:

1. Open program Keil uVision3 that is a program Text Editor of Keil-CARM, it use to write C Language Source Code program and the attribute of this program.
2. Configure default value to interpret commands of uVision3 and can be used with Program Keil uVision3 and Keil-CARM. Click **Project → Components,** and then select default value for Compiler from the title **Select ARM Development Tools** that has 3 modes; **Use Keil-CARM Tools, Use ARM Tools** and **Use GNU Tools.** In such case, we must select **"Use Keil ARM Tools"**, and we must construct up position of folder to store default values of program Keil ARM. Generally, it is in **"C:\Keil\ARM\"** but if we install Keil in other folder.
3. Copy File named **"Startup.s"** that ETT has already provided in CD-ROM and is saved in Example named **"Startup.s"**, then to place it in the same position folder of new Project File that we created completely. File **"Startup.s"** is a file that contains Assembly Language Commands of ARM7 to configure the necessary default value for MCU, to configure position Vectors of MCU and to configure value into MAM Function. For using with Board "CP-JR ARM7", we insert File **"Startup.s"** from Keil software or Copy this File from further positions, it will be effected on the operation of program in Startup because some operations are different.
4. Configure Option value of Project File by using command **Project → Option for Target 'Target 1'** and then select Tab of Target to configure value of MCU Target.

5 IMPLEMENTATION AND TEST BED

5.2 WORKING STEPS FOR THIS PROJECT:

First when the vehicle collide or accident occur the trigger sensor sense the disturbance and initiate the ARM processor to extract the location of LAT & LONG through low cost GPS and in simultaneous process of relay act on the ECU and petrol valve to lock automatically to avoid the fire accident .later the GPS location is derived to the TTS module to encrypt into an voice format along with the vehicle number and owner name these data is transmitted through GSM sim 900 to particular authority and family person. Let we see the interfacing process for the lab mode prototype (FIG: 4):

1. Interfacing the trigger sensor to the ADC pin (channel 0 of ADC0).Interfacing the relays to the PORT0 by transistor relay driving circuit. Interfacing the LCD in PORT1 with exact control signals activated, connecting the GPS module RS232 based to the UART0 of the ARM7 LPC2148 through RS232 Port. and interfacing the GSM SIM 9oo module to the TTS module in parallel.

2. Creating a New project environment using Keil uvision-4 IDE and developing the code as modules, developing the code in EMBEDDED C Language as modules such as adc.c file for converting the trigger analog value to digital and setting the threshold to the digital value to identify the triggering as accident. Developing I/O programming module for ON/OFF the relays connected with the port 0 in main.c file itself by PINSEL0 and IODIR0 registers.

3. Configuring the UART0 for receiving the GPS value through UART0 using U0LCR register

with baud rate of 9600 and start bit as 1,None parity, and 2 stop bits as frame, Writing the LCD code for 4-bit mode in PORT0 with control signals RS,EN and R/W pins. Integrating all the modules by calling in the main file with global declared functions and variables also.

4. Checking for the error by build command in the Keil uvision-4 IDE for 0 warning and 0 errors, If build successful checking for sample simulation in the IDE itself for accuracy of the codes to work with the developed hardware, Then finally downloading the hex file to the LPC2148 controller using 20 pin universal J-TAG.

TEST BED:

Fig 4: Final Kit in Prototype Section

module based automated voice MMS action achieved and transmitted through 3G with the support of GSM (SIM900) and evaluation result for relay response and data sending is derived through graph . In future idea of risk free driving module design with combination of live TTS module.

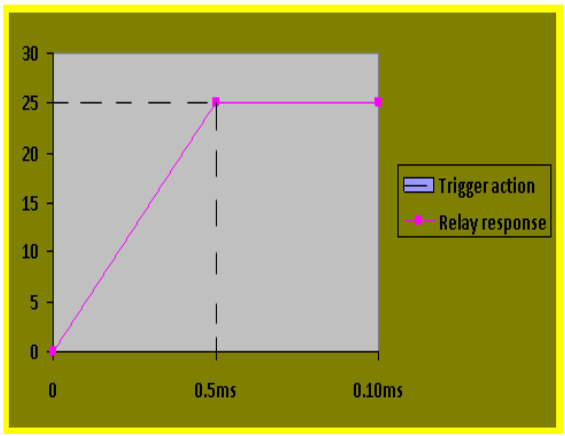


Fig 5: Relay Response

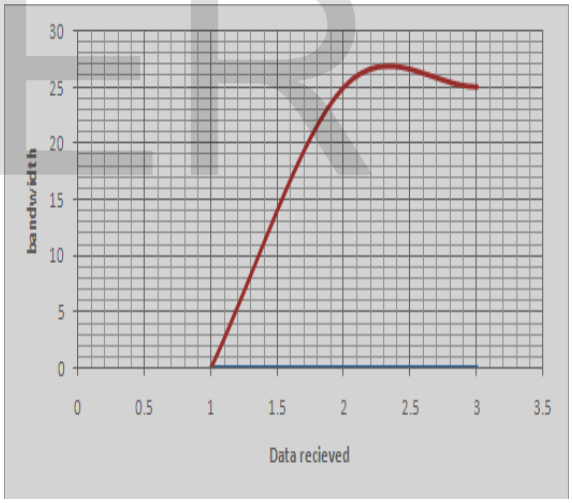


Fig 6: MMS bandwidth evaluation

6. CONCLUSION & LAB PROTOTYPE IMAGES

In this proposed system the implementation of vibration sensor for trigger and tracing the GPS location of collision and derive LAT & LONG value and controlling the ECU and PETROL VALVE from 50% fire accident all these have been interfaced to the ARM LPC2148 and tested in controlled condition.

And experiment result (image) are given as effective in the lab testing mode and further TTS

Fig 7: INTIAL STATE

Fig 8: GPS VALUE OF ACCIDENTAL LOCATION

Fig 9: AUTOMATED VOICE MMS FROM ACCDIENT VEHICLE

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