An Automated Safe Route Finder For Cars And Pedestrians In Emergencies

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Abstract-*The objective of the project is to implement safe driving within lanes in vehicles using highways. The proposed model is designed is to automatically detect accidents and inform vehicles across on both sides of the road and prevent further accidents and pile ups in addition to safe rescue of pedestrians in times of rescue. A number of systems have been developed in order to signal events to emergency points and designed to supply drivers with information about roads conditions to avoid approaching risks. The important emergence of smart mobile technologies and their usage on a large scale, deploying these technologies within Advanced Driver Assistance Systems "ADAS" becomes a needed approach to significantly reduce road casualties. Next the focus is on pedestrians and rescues them from natural and manmade disasters using the same network technologies by providing facilities like camps.*

Keywords-road accidents, signaling, impact sensor, pedestrians, Victim rescue, camps.

I. INTRODUCTION

With the constantly increasing number of road casualties, improving road safety is one of today's governments major tasks in all countries. Accidents and road events are unpredictable. They often yield to a sequence of accidents from the fact that other drivers are not notified about the suddenly occurring situation. Consequently, drivers are not able to take preventions like slowing down or changing their routes. Therefore, supplying drivers with vital road information is a principal step towards safer roads. At the same time, building low cost, accurate and low power consuming systems is essential. These latter should be flexible, easy to operate and rapidly deployable for improving road safety on a large scale. Nowadays, different systems and mobile applications address traffic and accidents issue. As the world becomes more dependent on mobile technologies, these systems are expected to gain high popularity among users. In addition, they are integrated gradually by car manufacturers to help drivers avoiding car accidents and acting smartly when any dangerous situation is expected or has occurred.

The Disaster management (or emergency management) is the term used to designate the efforts of communities or businesses to plan for and coordinate all personnel and materials required to either mitigate the effects of, or recover from, natural or man-made disasters, or acts of terrorism. Disaster management does not avert or eliminate the threats, although their study is an important part of the field. Events covered by disaster management include acts of terrorism, industrial sabotage, fire, natural disasters (such as earthquakes, hurricanes, etc.), public disorder, industrial accidents, and communication failures. If possible, emergency planning should aim to prevent emergencies from occurring, and failing that, should develop a good action plan to mitigate the results and effects of any emergencies. As time goes on, and more data becomes available, usually through the study of emergencies as they occur, a plan should evolve. The development of emergency plans is a cyclical process, common to many risk management disciplines, such as Business Continuity and Security Risk Management, as set out below: Recognition or identification of risks ranking or evaluation of risks responding to significant risks Tolerate Treat Transfer Terminate Resourcing controls Reaction Planning Reporting & monitoring risk performance reviewing the Risk Management framework. The following project helps in setting up relief camps and monitoring such camps, volunteer management, rescue missions, locating missing persons and also coordinating relief supplies etc. It also visualizes the above mentioned camps and rescue operations in real time Google maps.

Unlike active safety where the detection or prediction should be done either real time or before the actual event occurs, drive quality analysis is performed on the entire data after it is collected at the end of the drive. This implies that both past and future data from the time of occurrence of an event can be used for data analysis.

1.1.PIC16F877A

PIC16F877A is the heart of this system. It consists of clock circuit and power on reset circuit. Clock circuit is build around crystal oscillator and ceramic capacitor. Purpose of crystal oscillator is to stabilize the frequency and the capacitor is to stabilize the amplitude if the clock. This circuit determines the operating speed. Here we use 4MHz crystal oscillator, so the microcontroller will work at the speed of

1uSec. Purpose of the microcontroller is to control the speed of the DC shunt motor according to the load. It uses internal ADC and complete one port for reading load and control the speed. That is it reads voltage output and produces the digital output according to this input voltage. This microcontroller will set the load limit and terminate the DC shunt motor to prevent from over load.

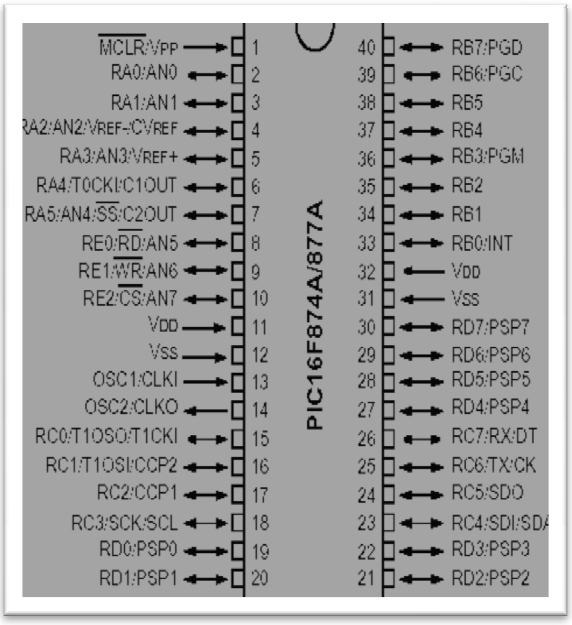
1.2.BOARD FEATURES

- Includes 3 Zip Sockets to Program various series of PIC
- Microcontrollers
- PIC16F877A Microcontroller provided along with the chip
- A Serial Port for In-System Programming
- A Serial Port for RS232 Communication
- Connector provided to connect LCD
- 4 , 7-Segment Displays with chip select facility using a Dip Switch
- LED's Connected to all I/O's
- Keys Connected to all I/O's
- Pin outs for Port extension for users ease

1.3. CHIP FEATURES

- High-Performance RISC CPU.
- Only 35 single-word instructions to Learn.
- 10-bit, up to 8-channel Analog-to-Digital Converter (A/D).
- Self-reprogrammable under software control.
- Operating speed: DC – 20 MHz clock input.
- Low-power consumption.
- Up to 8K x 14 words of Flash Program Memory.
- Up to 368 x 8 bytes of Data Memory (RAM).
- Up to 256 x 8 bytes of EEPROM Data Memory and 14 interrupt, 3 timers.

1.4.PINDIAGRAM



1.5. UNIVERSAL SYNCHRONOUS ASYNCHRONOUS RECEIVER TRANSMITTER (USART)

The Universal Synchronous Asynchronous Receiver Transmitter (USART) module is one of the two serial I/O modules. (USART is also known as a Serial Communications Interface or SCI) The USART can be configured as a full duplex asynchronous system that can communicate with peripheral devices such as CRT terminals and personal computers, or it can be configured as a half duplex synchronous system that can communicate with peripheral devices such as A/D or D/A integrated circuits, serial EEPROMs etc.
The USART can be configured in the following modes:

- Asynchronous (full duplex)
- Synchronous - Master (half duplex)
- Synchronous - Slave (half duplex)

Bit SPEN (RCSTA<7>) and bits TRISC<7:6> have to be set in order to configure pins RC6/TX/CK andRC7/RX/DT as the Universal Synchronous Asynchronous Receiver Transmitter. The USART module also has a multi-processor communication capability using 9-bit address detection.

1.6. A/D CONVERTER

Clearing the GO/DONE bit during a conversion will abort the current conversion. The A/D result register pair will NOT be updated with the partially completed A/D conversion sample. That is, the ADRESH: ADRESL registers will continue to contain the value of the last completed conversion

(or the last value written to the ADRESH: ADRESL registers). After the A/D conversion is aborted, a 2TAD wait is required before the next acquisition is started. After this 2TAD wait, acquisition on the selected channel is automatically started. The GO/DONE bit can then be set to start the conversion.

1.7.INTERRUPTS OFPIC16F877A

The PIC16F877 A family has up to 14 sources of interrupt. The interrupt control register (INTCON) records individual interrupt requests in flag bits. It also has individual and global interrupt enable bits. A global interrupt enable bit, GIE (INTCON<7>) enables (if set) all unmasked interrupts, or disables (if cleared) all interrupts. When bit GIE is enabled, and an Interrupt's flag bit and mask bit are set, the interrupt will vector immediately. Individual interrupts can be disabled through their corresponding enable bits in various registers. Individual interrupt bits are set, regardless of the status of the GIE bit. The GIE bit is cleared on RESET. The "return from interrupt" instruction, RETFIE, exits The interrupt routine, as well as sets the GIE bit, which re-enables interrupts. The RB0/INT pin interrupt, the RB port change interrupt, and the TMR0 overflow interrupt flags are contained in the INTCON register .The peripheral interrupt flags are contained in the special function registers, PIR1 and PIR2. The corresponding interrupt enable bits are contained in special Function registers, PIE1 and PIE2, and the peripheral interrupt enable bit is contained in special function register INTCON. When an interrupt is responded to, the GIE bit is cleared to disable any further interrupt, the return address is pushed onto the stack and the PC is loaded with 0004h. Once in the Interrupt Service Routine, the source(s) of the interrupt can be determined by polling the interrupt flag bits. The interrupt flag bit(s) must be cleared in software before re-enabling interrupts to avoid recursive interrupts. For external interrupt events, such as the INT pin or PORTB change interrupts, the interrupt latency will be three or four instruction cycles. The exact latency depends when the interrupt event occurs. The latency is the same for one or two-cycle instructions. Individual interrupt flag bits are set, regardless of the status of their corresponding mask bit, PEIE bit, or GIE bit.

1.8.POWER DOWN MODE

Power-down mode is entered by executing a SLEEP instruction. If enabled, the Watchdog Timer will be cleared but keeps running, the PD bit (STATUS<3>) is cleared, the TO (STATUS<4>) bit is set, and is turned off. The I/O ports maintain the status they had before the SLEEP instruction was executed (driving high, low, or hi-impedance).For lowest current consumption in this mode, place all I/O pins at either VDD or VSS, ensure no external circuitry is drawing current from the I/O pin, power-down the A/D and disable external clocks.

1.9. PIC 16F877A INSTRUCTION SET

PIC has a RISC based instruction set consisting of about 35
Instructions. Almost all the data movements must be carried though the *w*
Register. Instruction set can be categorized as

1. Data movement instructions
2. Data processing instructions
3. Execution change instructions
4. Processor control instructions

Microchip's mid-range 8 bit microcontroller family uses a 14-bit wide instruction set. This instruction set consists of 36 instructions, each a single14-bit wide word. Most instructions operate on a file register, f, and the working register, W (accumulator). The result can be directed either to the file Register or the W register or to both in the case of some instructions. For byte-orientedinstructions, 'f' represents a file register designator and 'd' represents a destination designator. The file register designator specifies which file register is to be used by the instruction.

- fr: one of the 80 memory ram positions implemented as 8 bit registers (File Register Set or FRS) (0 =< fr <= 4f). The first 12 are special purpose registers (SFR) and the other 68 are general purpose registers (GPR).
- W: 8 bit accumulator of the Arithmetic Logic Unit (ALU)
- d: mnemonic for the destination of one operation, which can be 1 (a file register f) or 0 (the accumulator w)
- b: 3 bit literal identifying one bit of a byte (0: least significant bit, 7: most significant bit). Example: f(7)
- addr: 11 bit literal representing an instruction address
- C: Carry bit = STATUS(0)
- Z: Zero bit = STATUS(2)
- DC: Digit Carry bit = STATUS(1)
- opr: mnemonic for one of the following binary operations:
  - add - addition
  - sub - subtraction
  - and - logical and
  - or - logical or

II. OBJECTIVE

With the constantly increasing number of road casualties, improving road safety is one of today's governments' major tasks in all countries. Accidents and road events are unpredictable. They often yield to a sequence of accidentsfrom the fact that other drivers are not notified about the suddenly occurring situation. Consequently, drivers are not able to take preventions like slowing down or changing their routes. Therefore, supplying drivers with vital road information is a principal step towards safer roads. At the same time, building low cost, accurate and low power consuming systems is essential. These latter should be flexible, easy to operate and rapidly deployable for improving road safety on a large scale. Nowadays, different systems and mobile applications address traffic and accidents issue. As the world becomes more dependent on mobile technologies, these systems are expected to gain high popularity among users. In addition, they are integrated gradually by car manufacturers to help drivers avoiding car accidents and acting smartly when any dangerous situation is expected or has occurred.

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III. PROPOSED SYSTEM

In the proposed model when an accident happens, the location is identified. The pictures of the accident or block are taken and transmitted to the network by the Highway Patrol. Such notifications are shown to the vehicles ahead on both sides of the road. The vehicles are also shown alternate paths in Google Maps along with places of stay and food. Speech notifications are also made available. The proposed disaster relief mechanism is a novel one in those camps for various purposes can be added dynamically to the list of a disaster epicenter and the various agencies coordinating the tasks can view them dynamically on google maps. Thus the relief efforts would be managed much more efficiently and will enable the users to more effectively rescue trapped or missing persons. Also the volunteers can be located or relocated to different camps based on the need. The entire process is centrally administered and hence there is no misuse of essential commodities or relief items or supplies. The whole process is controlled by an administrator who necessitates the disaster relief and management very effectively. Another important aspect of the proposed system is that it can be used for multiple disaster relief purposes and not just confine to one disaster. The visual spotting of camps and to be rescued persons also makes it easy for volunteers and rescue teams to spot people and camps easily on the maps itself. The purpose of the camps is also highlighted on the maps.

- Vehicles can be notified immediately and alternate routes can be used.
- Camps can be added dynamically after occurrence of a disaster.
- Google Maps are used to locate different camps.
- Volunteers and relief materials are coordinated.
- Any persons requiring assistance can be rescued.
- Missing persons can be searched.
- The entire process is centrally administered and hence there is no misuse of Essential commodities or relief items or supplies**.**

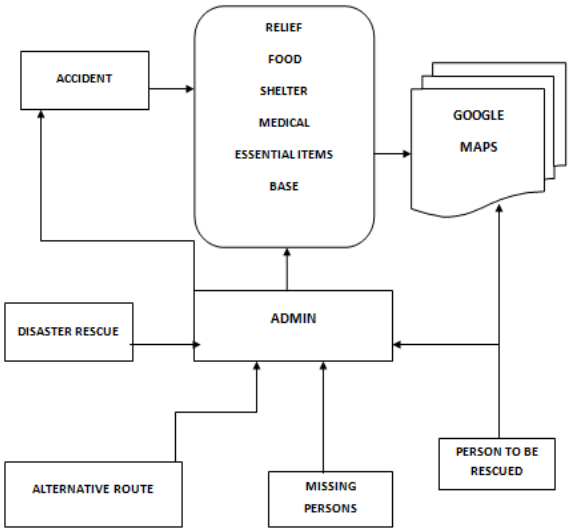

Fig 3.1 System Architecture

The following are 5 major modules in this proposed system

- Road accidents
- Alert notification
- Vehicle notification
- Pedestrian signals
- Victim rescue.

1) ROAD ACCIDENT BLOCK

A sensor is used to detect the amount of shock/impact produced on it.

A Picture is uploaded to the website of the working block by the Highway Patrol.

This is posted on the block.

2) VEHICLES NOTIFICATION

The vehicle receives notification alerts of the accidents and blocks with pictures.

All the alerts present links of alternate routes, food, stay etc.

The users upon clicking on links are provided more details with maps.

3) ALERT NOTIFICATION

The alerts show alternate routes based on their present location.Text to speech options are also provided to make it easy for the driver.

4) PEDESTRIAN SIGNALS:

Pedestrian tourists when lost in inclement weather cannot view or recognize surroundings They can send their rescue signals with their locations. The admin receives emergency notifications.

5) VICTIMS RESCUE:

The admin views the notification alerts in Google Maps.Then rescue teams are sent and the pedestrian tourists are rescued. Their status is changed from rescue to safe and intimated to their relations and family.

IV. CONCLUSION

Thus application can be used to report and receive warnings about accidents or other road events. The website that offers emergency operators a tool to control and track received alerts. The disaster relief project has been completed successfully and it has outlined the objectives for which it was set out to. The visualization of the various points in the map like camps added and purpose of the camp, including rescue person and their respective locations has added a lot of dimensions to the project. It has added and enriched a new dimension to the process of rescue and disaster relief operations and management in the country. Disasters have impacts on critical infrastructure leading to power outrage and network failure. The model devices are vulnerable to post-disaster power outage and wet conditions. Backup for device consumables and waterproof measurement are necessary for future use of the post-disaster condition. In the future, this will automatically rescue persons by information technology, and this will result in less turnaround time and more efficiency in post-disaster settings. The centralized process adds both security and at the same time accurate utilization of resources and essential items. The arrangements of the items are also convenient without any clutter and can be used by most of the users in the project without any problems.

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