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Military emergency alert system using Raspberry Pi

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Abstract—since as you all know every time in emergency you cannot contact the nearest person as soon as possible on call or by land phone. This project is to reach out the help with the fastest way so that you can send the message as soon as possible about the emergency in your place. At the military or the medical emergencies this application is very much helpful for the needy as they can send immediate information for help. Since we know that the hospitals some critical condition patients are admitted who cannot even move from a particular place so this emergency panic system is best suited for them in requesting immediate help. Same ways in military or defense where the group of militants go to war field with all ammunitions, required food and also first aid kits. When war is going on, if the team or the group of militants need any kind of emergency like back up for medicines, hospitality, or ammunitions, or back team for fight back this system can be very useful in sending the information to the base camp which is near by located so that the immediate response is obtained. Every emergency one cannot send all information on walkie talkie, and if a person is injured badly he cannot speak properly so this system does the sending message easily.

Keywords—emergency panic system, emergency call, war field secured information system, back up call system.

I. INTRODUCTION

A panic system is used to provide a basic cry for help. Typically used in Intrusion Detection Systems for Hold-up alarm applications, panic buttons provides important messages capabilities for many critical conditions. In a Hold-up system, the button typically invokes a policy at a distant monitoring station such as, In Fire Alarm systems; the Manual Pull Station is a type of panic button that specifically requests emergency service from the Fire Department. In addition, it invokes basic policies by activating Notification Appliances. Because a panic button can cause policies to be invoked at a distance, and locally, it is ideal before being initial trigger for any kind of policy.

Panic buttons can be used to invoke a pre-determined policy in response to a given critical event. You can choose to send the pre-defined emergency message to display and acknowledge critical events from the user hand held device, to the monitoring station, or both. Consider applying a panic system to laboratories. Materials stored at laboratories may be acids, gases, bases, or bio-toxins. For each chemical, there is a specific its own handling conditions, storage, clean up, fire suppression, or medical treatment. So if something goes wrong with the handling procedures and some disasters happen then this system if invoked would be a major life saving system. Proper local notification is essential in a crisis. To speed up the assistance during a crisis, the person should notify others in the local building or department by using a panic system. In laboratories, when a particular panic button is pressed, the emergency system activates a particular notification for the crisis is sent to the control station for the immediate response. This particular notification initiates a particular local procedure to clean up or repair that which caused the crisis.

Furthermore, proper authority notification is essential in a crisis. It is important for immediately responding for the authorities to be prepared for a specific crisis. Equipment and tool requirements varies based upon the type of the crisis. What if only one person is working in the lab and the crises occur with the chemicals or other equipment? Due to the human reaction on the crisis can him not to take right decisions which can create critical event for his life.

II. OVERVIEW OF PROJECT

Human life is lot more precious, if this saving can be done using technology than that can be a great contribution to the humanity. This project is based sending the information of current situation of the present location to the control station with using the radio frequency signals, so that the control station in turn responses as soon as possible physically. A small wrist watch like hand held device having priority based tactile input switches which could be wore on the user‘s wrist. This device can the taken over anywhere the user wishes like war fields, hospitals, large scale industries, mining areas, small sector industries, construction regions etc.

The Raspberry pi board as computer with the display monitor, key board and mouse can be used at the base station for the response of the request of the user for his emergency. The communication is used is radio frequency. Here no third party like GSM service providers are not involved for the communication since the communication delay is not entertained in the emergency need of the users. The main objective of this project is to provide immediate help for the needy and to save their lives. Since every time one cannot speak on call and ask for the help if his/her life is in danger, so if this device is attached to one’s wrist so person can ask for immediate help from his locality. Communication is very fast, i.e. the frequency of operation is too fast. The RF

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communication is used here which involves the direct link between the base station receiver and the hand held transreceiver. The other network service provider is not involved in this communication. If these service providers network is used then the communication can be competitively very slow as with RF communication.

III. BLOCK DIAGRAMS

Block diagrams of two modules

- Hand held Transreceiver
- Base station receiver

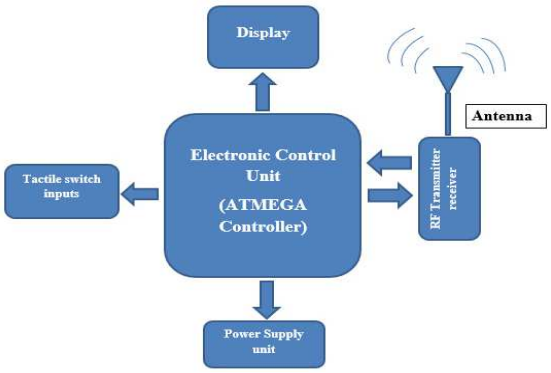

Figure 1. Block diagram of hand held transreceiver.

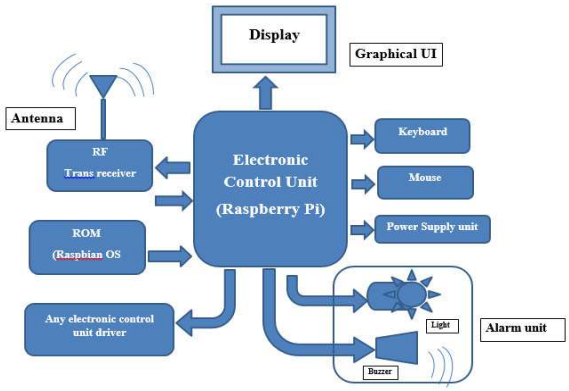

Figure 2. Block diagram of base station receiver.

IV. HARDWARE ARCHITECTURE.

This complete system consists of two modules i.e.

- Hand held transreceiver
- Base station receiver

The hand held transreceiver embedded with the electronic control unit such as ATMEGA controller is processing unit in this system, to which the tactile switch inputs connected for sending the pre-defined message to the base station, RF transreceiver with antenna, a portable display for reading the notification from the base station for the sent message and a power supply unit.

The base station receiver system is embedded with the credit card sized, linux operating system based computer called raspberry pi with the display monitor which used in displaying the received pre-defined message by the sender from hand held device, Keyboard is used to type the reply for the message sent by hand held device, mouse is used for operating the computer, alarm unit (buzzer and emergency indicating colored lights) is used for indicating emergency at the base station for immediate response, RF transreceiver with antenna for the communication establishment and power supply unit.

V. HARDWARE DESCRIPTION

A. *Electronic control unit at hand held transreceiver – ATMEGA.*

The ATMEGA48PA/88PA/168PA/328P is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. While executing powerful instructions in a single clock cycle, the ATmega48PA/88PA/168PA/328P can achieve throughputs approaching 1 MIPS per MHz allowing the system designers to optimize power consumption with the processing speed.

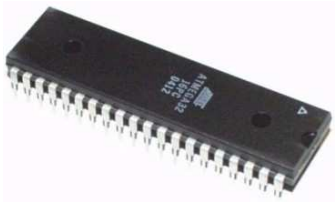

Figure 3. ATMEGA controller – 40 pin IC.

B. *RF transreceiver – Tarang RF transreceiver.*

Tarang module are designed with low to medium transmit power and for high reliability wireless networks. These tarang modules require minimal power and provide reliable delivery of data between devices. These modules operate within the ISM 2.4-2.4835 GHz frequency band with standard IEEE 802.15.4 base band.

Figure 4. Tarang RF Transreceiver module.

It provides the range up to 50kms in outdoors line of sight with high gain, directions antennas. Since it is the hand held small unit so the high gain directional antennas cannot be used so the range lies below 1km. Transmitting power is up to 1 watt / 30 dbm nominal. Receiver sensitivity is up to approximately 107dbm. Tarang module uses the direct sequence spread spectrum technology. It is supportive to analog to digital conversion and digital I/O line. The supply voltage is 5V to 5.5V, transmit current 450mA, idle/ receive current 65mA. This module provide the RF data rate 250kbps,

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and serial interface data rate is 1200,2400, 4800, 19200, 38400, 57600, 115200 baud. This supports network such as point to point, point-to-multipoint and peer-to-peer. It has 16 direct sequence channels.

C. LCD display at hand held transreceiver.

The display unit here is the 16x2 LCD display, which has features with 16 characters, 2 lines display, and 5x8 dots with cursor. It has built in controller with display mode and backlight variations. Interfaces are 4 bit or 8bit MPU. Its operating voltage is at 7.0V.

Figure 5. 16x2 LCD display.

D. Tactile switches.

Tactile switches are the small switches which are very small in size, low power absorber, good tactility. These can be used for on/off purposes, these are used in applications in which the scaling is very small.

Figure 6. Tactile switches.

E. Power supply

The power supply unit has to be very small in size as well as with sufficient power for the hand held transreceiver to run for much longer time. For this purpose, LI ion battery is used.

Figure 7. Li-ion battery for hand held transreceiver.

F. Electronic control uint – Raspberry Pi

The raspberry pi is a credit card- sized single board computer developed in the UK by the Raspberry Pi Foundation. The raspberry pi has a Broadcom BCM 2835 system on chip (SoC).which includes an ARM1176JZF-S700 MHz processor. The firmware includes a number of “turbo” modes so the user can attempt overclocking, Up to 1GHz, without affecting the board. Video Core IV GPU was originally manufactured with 256 megabytes of RAM, later it was upgraded to 512MB. It does not include built in hard disk or solid state drive, but raspberry pi uses an SD card for booting and long term storage.

Figure 8. Raspberry Pi module.

Its operating power is about 2.5 W for model A and 3.5 W for model B. Raspberry Pi can dynamically increase clock speeds and can temporarily reach speeds up to 1GHz. For external memory, SD card slot is provided. Up to 64 GB external memory can be connected. Its operating system is Raspbian, Debian GNU/Linux, fedora, and Arch Linux ARM). The tools are available for Python as the main programming language, with support for BBC BASIC (via the RISC OS image or the Brandy Basic clone for Linux), C and Perl languages.

Eben Upton of the Raspberry Pi Foundation have spent his past eight years in trying to produce a $25 (or cheaper) computer specifically designed to show young people what’s inside and to inspire them to write programs to, say, control a microwave oven, manipulate a thermostat, or even create their own video a game.

G. Key Board and mouse

Most standard USB keyboards and mice will work with the raspberry pi.

Figure 9. Wireless keyboard and mouse.

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Wireless keyboard/mice should function, and needs a single USB port for an RF dongle. In order for full functionality of a Bluetooth keyboard or mouse one would need to use a Bluetooth dongle, which again uses a single port. The Model A has a single USB port and the Model B only has two (typically a keyboard and mouse will use a USB port each).

H. Alarm unit

Alarm unit consists of the beeping buzzer and different colored lamps.

Figure 10. Buzzers with different color lamps.

Buzzer beeps when the high priority based emergency message is received, whereas the lamps are assigned to glow with the priority levels or the message received. Such as if medical help is requested then orange lamp is glowing, if the ammunitions shortage is the message the blue lamp is on and if the person is seriously hit or immediate medical emergency then the buzzer keeps on beeping and the red lamp glows.

I. Display for base staion receiver

The HDMI enabled monitors can be used for displaying. Raspberry pi allows the user to connect through HDMI cable and other connectors also.

There are two main connection options for the raspberry pi display, HDMI (high definition) and Composite (low definition).

Figure 11. High definition screen at base station for monitoring the request.

CONCLUSION

The range of communication can also be improved by using the satellite communication for military purpose. The range can be improvised by using very high rated RF communication module. This project can be implemented all over many fields like chemical laboratories, bio medical laboratories, mining areas, hospitals, etc. On improvising and on using reliable electronic devices which can make this project as a product so as released into market. GPS system can also be implemented to know the position of the user. The other sensors like temperature sensors can also be connected to the user's hand held transreceiver to obtain live environmental conditions.

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