DESIGN AND IMPLEMENTATION OF TRACKING SYSTEM FOR WOMEN AND CHILDREN'S SECURITY BASED ON LOCATION

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Abstract: The main aim of the project is to provide security for woman and children. The purpose of the project is to provide security for women and children. In case of emergency situations woman or children will press an emergency button which will activates the GPS for location tracking and a SMS is sent to the police and family members of woman or child along with time.

Index Terms: SMS, GPS, GSM.

I. INTRODUCTION

The misbehaviors against children and women are increasing day by day. They are under the threat of easily being kidnapped. In such unsafe situations there must be a mechanism that is easily affordable to handle those situations. Hence this system combines both GPS and GSM technology to provide a hand in such situations. The GPS is used for identifying the locations and GSM is used for sending them as a message.

Global Positioning System (GPS): GPS receiver is a navigation system. It works based on satellite signals. It pinpoints the geographical location of itself. The GPS satellite rotates around the earth and transmits signals to the earth. These signals are received by the GPS receiver to calculate user's exact location using the methodology called "Triangulation". In triangulation the exact position can be computed in 2 dimensions as well as in 3 dimensions.

Exact calculation of Time and Position: In order to calculate its position and time, the space based GPS receiver receives the time stamp or time on atomic clock, satellite's position and arrival time at different points from the satellite which are all in view. From this information the distance between those satellites are accurately computed by GPS receiver. It also calculates the velocity and speed.

Global System for Mobile communication (GSM): GSM stands for Global System for Mobile communication. It was originally developed with the help of digital technology which can carry data up to the rate of 64kbps to 120mbps. It uses the variations of Time Division Multiple Access (TDMA) technique for transmission of signals. GSM provides many services; some basic services are voice and data services including roaming services. The working of GSM starts with digitization and compression of user data then sending the user data stream through a channel. Its frequency band limit is either 900MHz or 1800MHz. In our system, one of the services of GSM is Short Message Service (SMS) which is used to share the location information from the system to helper's mobile.
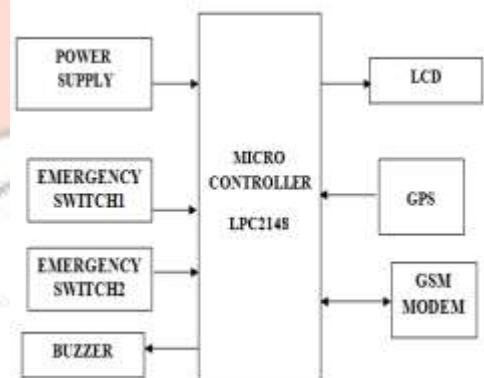
II. BLOCK DIAGRAM AND DESCRIPTION

Fig.1. Block diagram

Brief Description: Now a day's attacks on woman and child kidnapping is increasing day by day and in the case of where she can't take a mobile and dialup to police or other family members, our proposal will be very much helpful in such cases in not only informing about attacks but also in giving the exact location of the women to nearby police station for necessary action. Women or child will be provided with a equipment which is not visible to others the equipment consists of GPS (Global Positioning System) module by which we can get the geographical location and these location values are displayed on the LCD (Liquid Crystal Display). In the case of any emergency conditions she can press a button once then the

location information will be tracked and sent to police and family members so that she will be protected in proper time and we can easily trace out the kidnapped children with the GPS location.

III. MODULE AND DESCRIPTION

A. Modules

1. Regulated Power Supply
2. ARM LPC2148 Microcontroller
3. Liquid Crystal Display (LCD)
4. GSM Module
5. GPS Modem
6. Switches
7. Buzzer

B. Modules Description

1. Regulated Power Supply

The power supplies are designed to convert high voltage AC mains electricity to a suitable low voltage supply for electronic circuits and other devices. A power supply can by broken down into a series of blocks, each of which performs a particular function. A DC power supply which maintains the output voltage constant irrespective of AC mains fluctuations or load variations is known as "Regulated DC Power Supply". The 5V regulated power supply system as shown below:
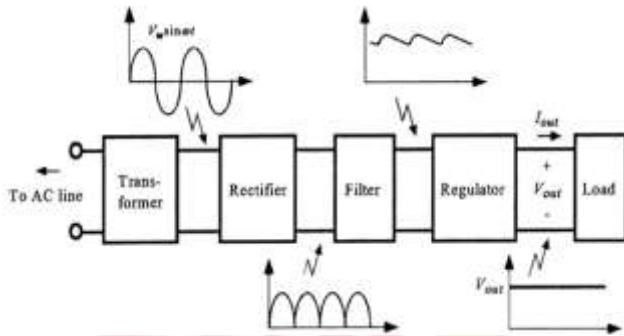

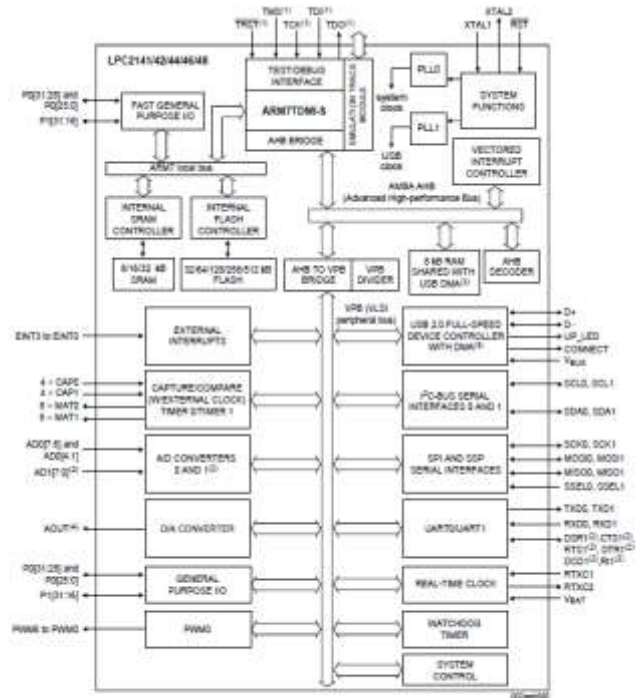**Fig.2. Components of a typical linear power supply**

2. ARM LPC2148 Microcontroller

The LPC2148 microcontroller is based on a 32/16 bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, that combines the microcontroller with embedded high speed flash memory ranging from 32 kB to 512 kB. A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at the maximum clock rate. For critical code size applications, the alternative 16-bit Thumb mode reduces code by more than 30 % with minimal performance penalty. Due to their tiny size and low power consumption, LPC21418 is ideal for applications where miniaturization is a key requirement, such as access control and point-of-sale. A blend of serial communications interfaces ranging from a USB 2.0 Full Speed device, multiple UARTS, SPI, SSP to I2Cs and on-chip SRAM of 8 kB up to 40 kB, make these devices very well suited for communication gateways and protocol converters, soft modems, voice recognition and low end imaging, providing both large buffer size and high processing power. Various 32-bit timers, single or dual 10-bit ADC(s), 10-bit DAC, PWM channels and 45 fast GPIO lines with up to nine edge or level sensitive external

interrupt pins make these microcontrollers particularly suitable for industrial control and medical applications.

Features:

- 16/32-bit ARM7TDMI-S microcontroller in a tiny LQFP64 package.
- 8 to 40 kB of on-chip static RAM and 32 to 512 kB of on-chip flash program memory.128-bit wide interface/accelerator enables high speed 60 MHz operation.
- In-System/In-Application Programming (ISP/IAP) via on-chip boot-loader software. Single flash sector or full chip erase in 400 ms and programming of 256 bytes in 1 ms.
- Embedded ICE RT and Embedded Trace interfaces offer real-time debugging with the on-chip Real Monitor software and high speed tracing of instruction execution.
- USB 2.0 Full Speed Compliant Device Controller with 2 kB of endpoint RAM. In addition, the LPC2146/8 provide 8 kB of on-chip RAM accessible to USB by DMA.
- One or two (LPC2141/2 vs. LPC2144/6/8) 10-bit A/D converters provide a total of 6/14 analog inputs, with conversion times as low as 2.44 μs per channel.
- Single 10-bit D/A converter provide variable analog output.
- Two 32-bit timers/external event counters (with four capture and four compare channels each), PWM unit (six outputs) and watchdog.
- Low power real-time clock with independent power and dedicated 32 kHz clock input.
- Multiple serial interfaces including two UARTs (16C550), two Fast I2C-bus (400 Kbit/s), SPI and SSP with buffering and variable data length capabilities.

(1) Pins shared with GPIO.
(2) LPC2144/6/8 only.
(3) USB DMA controller with 8 kB of RAM accessible as general purpose RAM and/or DMA is available in LPC2146/8 only.
(4) LPC2142/4/6/8 only.

Fig.3. Block diagram of ARM LPC2148

Architectural Overview:

The LPC2148 consists of an ARM7TDMI-S CPU with emulation support, the ARM7 Local Bus for interface to on-chip memory controllers, the AMBA Advanced High-performance Bus (AHB) for interface to the interrupt controller, and the VLSI Peripheral Bus (VPB, a compatible superset of ARM's AMBA Advanced Peripheral Bus) for connection to on-chip peripheral functions. The LPC2148 configures the ARM7TDMI-S processor in little-endian byte order. AHB peripherals are allocated a 2 megabyte range of addresses at the very top of the 4 gigabyte ARM memory space. Each AHB peripheral is allocated a 16 kB address space within the AHB address space. LPC2148 peripheral functions (other than the interrupt controller) are connected to the VPB bus. The AHB to VPB bridge interfaces the VPB bus to the AHB bus. VPB peripherals are also allocated a 2 megabyte range of addresses, beginning at the 3.5 gigabyte address point. Each VPB peripheral is allocated a 16 kB address space within the VPB address space. The connection of on-chip peripherals to device pins is controlled by a Pin Connect Block. This must be configured by software to fit specific application requirements for the use of peripheral functions and pins.

3. Liquid Crystal Display (LCD)

Fig.4. Liquid Crystal Display

Liquid crystal displays (LCD s) have materials which combine the properties of both liquids and crystals. Rather than having a melting point, they have a temperature range within which the molecules are almost as mobile as they would be in a liquid, but are grouped together in an ordered form similar to a crystal. An LCD consists of two glass panels, with the liquid crystal material sand witched in between them. The inner surface of the glass plates are coated with transparent electrodes which define the character, symbols or patterns to be displayed polymeric layers are present in between the electrodes and the liquid crystal, which makes the liquid crystal molecules to maintain a defined orientation angle. One each polarizeris pasted outside the two glass panels. These polarizers would rotate the light rays passing through them to a definite angle, in a particular direction. When the LCD is in the off state, light rays are rotated by the two polarizers and the liquid crystal, such that the light rays come out of the LCD without any orientation, and hence the LCD appears transparent. When sufficient voltage is applied to the electrodes, the liquid crystal molecules would be aligned in a specific direction. The light rays passing through the LCD would be rotated by the polarizers, which would result in activating / highlighting the desired characters. The LCD's are lightweight with only a few millimeters thickness. Since the LCD's consume less power, they are compatible with low power electronic circuits, and can be powered for long durations.

The LCD s won't generate light and so light is needed to read the display. By using backlighting, reading is possible in the dark. The LCD's have long life and a wide operating temperature range. Changing the display size or the layout size is relatively simple which makes the LCD's more customer friendly. The LCD s used exclusively in watches, calculators and measuring instruments is the simple seven-segment displays, having a limited amount of numeric data. The recent advances in technology have resulted in better legibility, more information displaying capability and a wider temperature range. These have resulted in the LCD s being extensively used in telecommunications and entertainment electronics. The LCD s has even started replacing the cathode ray tubes (CRTs) used for the display of text and graphics, and also in small TV applications.

4. GSM Module

This is a GSM/GPRS-compatible Quad-band cell phone, which works on a frequency of 850/900/1800/1900MHz and which can be used not only to access the Internet, but also for oral communication (provided that it is connected to a microphone and a small loud speaker) and for SMSs. Externally, it looks like a big package (0.94 inches' x 0.94 inches' x 0.12 inches) with L-shaped contacts on four sides so that they can be soldered both on the side and at the bottom. Internally, the module is managed by an AMR926EJ-S processor, which controls phone communication, data communication (through an integrated TCP/IP stack), and (through an UART and a TTL serial interface) the communication with the circuit interfaced with the cell phone itself. The processor is also in charge of a SIM card (3 or 1,8 V) which needs to be attached to the outer wall of the module. In addition, the GSM900 device integrates an analog interface, an A/D converter, an RTC, an SPI bus, an I²C, and a PWM module. The radio section is GSM phase 2/2+ compatible and is either class 4 (2 W) at 850/ 900 MHz or class 1 (1 W) at 1800/1900MHz.

Fig.5.GSM SIM900 Module

The TTL serial interface is in charge not only of communicating all the data relative to the SMS already received and those that come in during TCP/IP sessions in GPRS (the data-rate is determined by GPRS class 10: max. 85,6 kbps), but also of receiving the circuit commands (in our case, coming from the PIC governing the remote control) that can be either AT-standard or AT-enhanced SIM Com type. The module is supplied with continuous energy (between 3.4 and 4.5 V) and absorbs a maximum of 0.8 A during transmission.

5. GPS Modem

GPS receivers use a constellation of satellites and ground stations to compute position and time almost anywhere on earth.
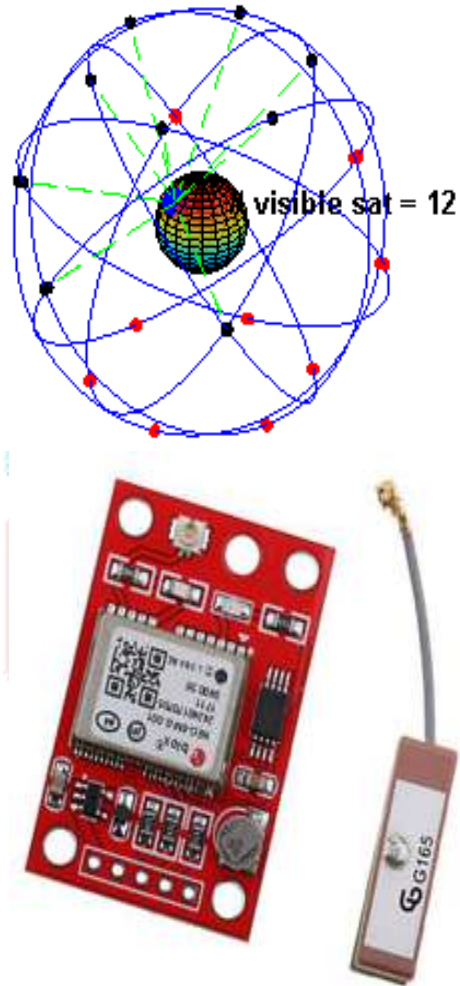

Fig.6. GPS Modem

Notice the moving point on the globe and the number of visible satellites. At any given time, there are at least 24 active satellites orbiting over 12,000 miles above earth. The positions of the satellites are constructed in a way that the sky above your location will always contain at most 12 satellites. The primary purpose of the 12 visible satellites is to *transmit* information back to earth over radio frequency (ranging from 1.1 to 1.5 GHz). With this information and some math, a ground based *receiver* or GPS module can calculate its position and time.

6. Switches

A switch is a mechanical device used to connect and disconnect an electric circuit at will. Switches cover a wide range of types, from sub miniature up to industrial plant switching megawatts of power on high voltage distribution lines. In applications where multiple switching options are required (e.g., a telephone service), mechanical switches have long been replaced by electronic switching devices which can be automated and intelligently controlled. The switch is referred to as a "gate" when abstracted to mathematical form. In the philosophy of logic, operational arguments are represented as logic gates. The use of electronic *gates* to function as a system of logical gates is the fundamental basis for the computer i.e. a computer is a system of electronic switches which function as logical gates. A railroad switch is not electrical, but a mechanical device to divert a train from one track to another.
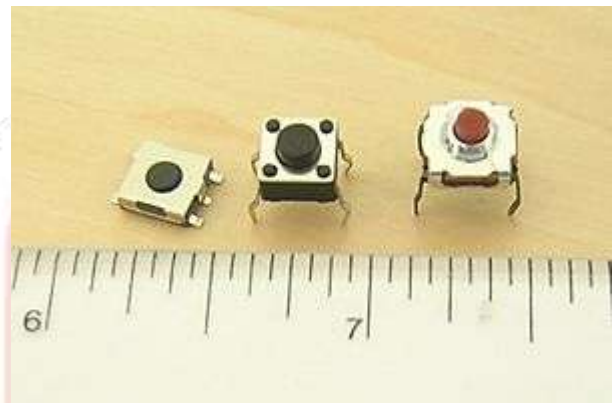

Fig.7. Three tactile switches.

7. Buzzer

A **buzzer** or **beeper** is a signalling device, usually electronic, typically used in automobiles, household appliances such as a microwave oven, or game shows.

Fig.8.Buzzer

It most commonly consists of a number of switches or sensors connected to a control unit that determines if and which button was pushed or a preset time has lapsed, and usually illuminates a light on the appropriate button or control panel, and sounds a warning in the form of a continuous or intermittent buzzing or beeping sound. Initially this device was based on an electromechanical system which was identical to an electric bell without the metal gong. Often these units were anchored to a wall or ceiling and used the ceiling or wall as a sounding board. Another implementation with some AC-connected devices was to implement a circuit to make the AC

current into a noise loud enough to drive a loudspeaker and hook this circuit up to a cheap 8-ohm speaker. Nowadays, it is more popular to use a ceramic-based piezoelectric sounder like a Son alert which makes a high-pitched tone. Usually these were hooked up to "driver" circuits which varied the pitch of the sound or pulsed the sound on and off. In game shows it is also known as a "lockout system," because when one person signals ("buzzes in"), all others are locked out from signalling. Several game shows have large buzzer buttons which are identified as "plungers". The word "buzzer" comes from the rasping noise that buzzers made when they were electromechanical devices, operated from stepped-down AC line voltage at 50 or 60 cycles. Other sounds commonly used to indicate that a button has been pressed are a ring or a beep.
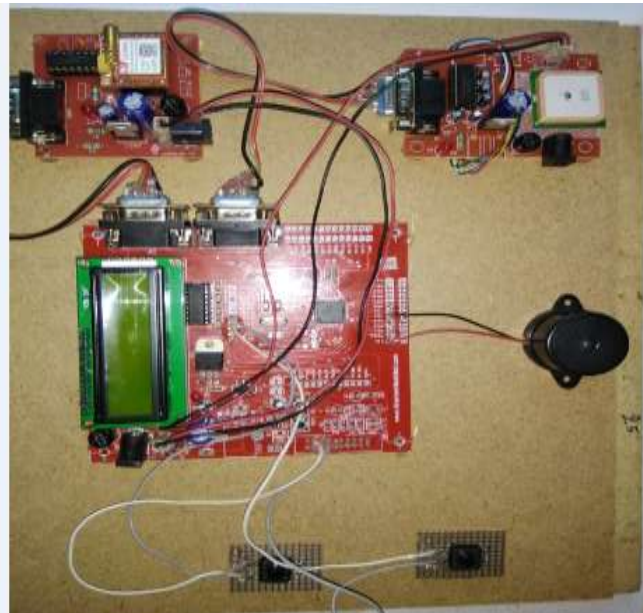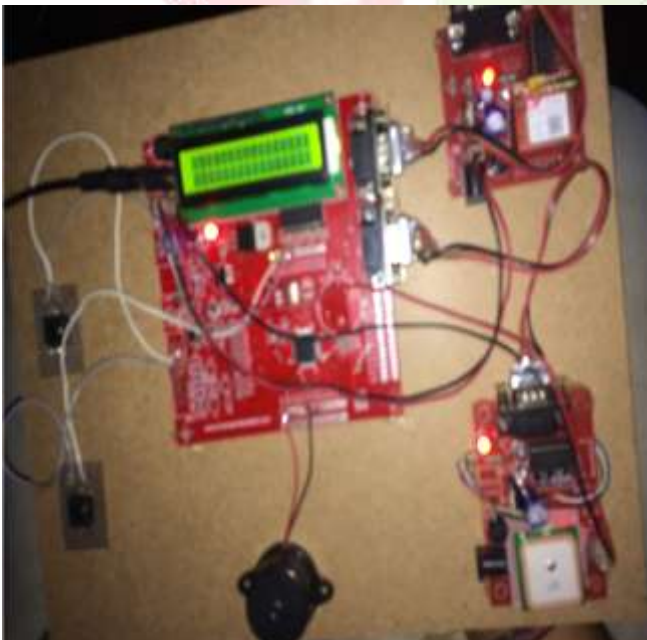
IV. RESULTS

Fig.9

Fig.10

V. CONCLUSION and FUTURE SCOPE

CONCLUSION: This system is very helpful when a person doesn't have any device for communication. It is a smaller and portable system and it cannot be identified easily as a communication device that is, only the user has the knowledge about the system, third person will not be aware of it as a security system. It can be easily fit within smaller gadgets like watch. It can track the person even if they are in a less coverage area. So this system can be carried anywhere easily and used at anytime without much user interaction and with best functionality.

FUTURE SCOPE:

By adding GPRS to this design we can maintain the data base of the kidnapers and thief's.

VI. REFERENCES

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