

HEALTH MONITOR AND TRACKER FOR VI PEOPLE

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ABSTRACT: *This system primarily focuses on tracking the visually challenged individual. An overall requisite for navigational aids recommended a variety of features for a GPS based device that would prove useful in the visually impaired (VI) community. This paper focuses on tracing the location of visually challenged people who face serious ailment internally or through any external agency and has most afthought on their safety.*

The transmitting end consists of the blink sensor, heart-beat sensor, dsPIC microcontroller, GPS module, Bt module and GSM module. The receiving end is a guardian Mobile that receives a message alert with exact location coordinates when a warning feedback system is triggered in the microcontroller.

KEYWORDS: Blink Sensor, Heart Beat sensor, dsPIC, Visually Impaired (VI)

1. INTRODUCTION

Each visually impaired individual faces different challenges based on their specific level of vision. In the developing world, there are about 50 million people born with the inability to view things around them. There are different types of types of visually impaired people via severely sight impaired, moderate sight impaired and low vision. With the rise of various support-based systems more visually impaired people have been given the opportunity to education and many other means, but still there is an immense population of the visually impaired around the globe, technology has not advanced enough to cater to their needs. But many organizations pave a way for these people to get an education and to work like a normal person. This prototype is to trace and monitor the health and location of visually challenged people to for any serious illness internally or through any external agent ensuring the security of the individual.

2. OVERLOOK OF THE TRADITIONAL SYSTEMS

Several methods were followed and proposed by many scientists across the globe both technically and non-technically to help the mobility of the visually impaired and visually impaired person. The traditional mobility aids developed for the well-being of visually

impaired people like white cane and guide dogs do. As a first step to achieve the goal, researchers decided to make a navigation system for the visually impaired by the inventing new embedded device that can be used to detect local obstacles such as walls/cars/etc. Using 2 ultrasonic sensors to detect the obstacles and vibrator motors to give tactile feedback to the visually impaired. The walking cane that is being used by the visually challenged people is a white cane along with a red tip, which is the symbol of the visually impaired community. The stick is used to detect the obstacles on any land or uneven surfaces^{[1][4]}. Visually impaired people usually tap their guiding stick on the ground, and the resulting vibrations indicate the nature of the surface. Thus the tapping produces the sound, which is reflected from the nearby obstacles^[2]. The only very perfect travelers are able to detect these echoes with their direction of origins through the headphones. Ultrasonic Proximity Sensors are being used to detect the presence of objects which come in the range of their oscillating field. And in addition to the sensors, a separate voice message is played back through the ear phone to intimate the visually impaired about the obstacle.

3. PROPOSED SYSTEM

About 161 million people in the world, the visually impaired are accounts for 6.7 billion people (approx.). Tracking the visually impaired person helps them a lot when there is an emergency in order to get help from their guardian itself. Through our paper, we aim to develop a prototype with a dsPIC microcontroller which will incorporate technologies such as GPS and GSM along with eye blink and heartbeat sensors that can communicate with each other to increase the accuracy of the system. Operations such as location detection with an accurate latitude and longitude coordinates and navigation for the user and monitoring their health condition are the prime objectives of our prototype. This Paper is designed to measure the location of the individual feasibly and reliably for creating a real-time system with health monitoring. Finally, after testing, our aim is to measure the feasibility of the device to replace the cane stick or the guide dog.

4. IMPLEMENTATION

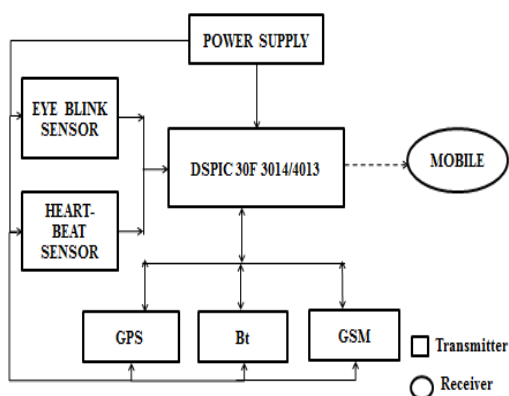


Fig 1: Block diagram of the proposed system

A. DSPIC30F3014/4013

PIC initially refers to Programmable Intelligent Computer which is used in a wide variety of embedded systems. This microcontroller is of low cost, with re-programmable flash memory, extensive collection of application notes, Serial communication. The dsPIC30F3014/4013 devices contain extensive Digital Signal Processor (DSP) functionality within high-performance 16-bit microcontroller (MCU) architecture.



Fig 3: dsPIC

The DSPIC30F4013 is designed with newly modified Harvard Technology, 16 bit architecture, 30 input, output pins, 84 base instructions with flexible addressing modes, enhanced Flash program memory, 7.37MHz internal Oscillator frequency, in circuit serial programming. It provides 2 RS 232 serial port connection for GPS and GSM modules. Depending on the specific variant, the dsPIC30F device family offers several 16-bit timers. Each timer module is a 16-bit timer/counter consisting of the following readable/writable registers: Each timer module also has the associated bits for interrupt control.

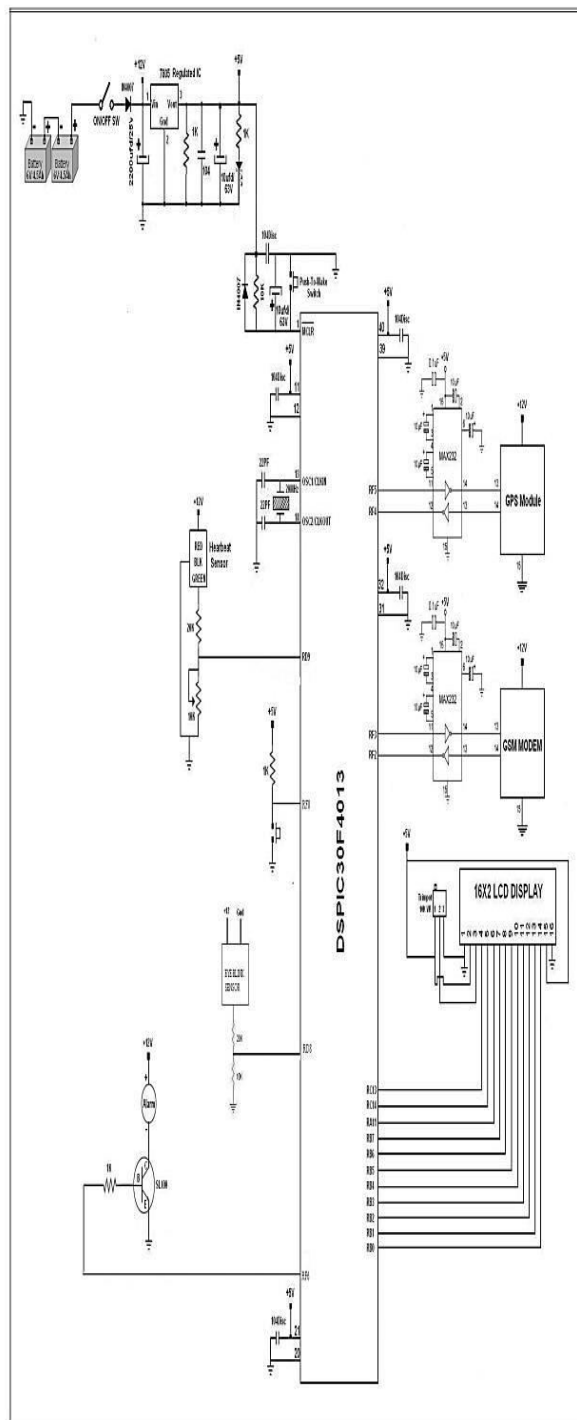
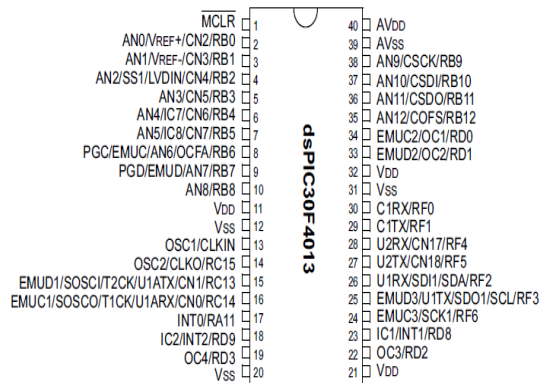


Fig 2: Circuit diagram of the system

Features:

- Low power consumption
- Operating voltage 2.5V to 5.5 V
- High speed Flash Technology
- High-Performance Modified RISC CPU
- Modified Harvard architecture
- 2 KBytes of on-chip data RAM
- 1 Kbyte of non-volatile data EEPROM
- Dual data fetch

DsPIC30F4013 Pin diagram:



- Modulo and Bit-reversed modes
- Up to two addressable UART modules with FIFO buffers
- Enhanced Flash program memory
- Self-reprogrammable under software control
- Power-on Reset (POR), Power-up Timer (PWRT) and Oscillator Start-up Timer (OST)
- Fail-safe Clock Monitor operation - Detects clock failure and switches to on-chip low power RC oscillator
- Programmable code protection
- In-Circuit Serial Programming (ICSP)

B. EYEBLINK SENSOR

The blinking of the eye is the primary input in this paper, since it is used to drive the device and to operate events. The blinking rate of the visually impaired person is necessary in order to know whether the person is at risk. The variation across the eye will be varied as per the eye blink if there is no eye lid movement found in the certain period of predetermined time, i.e. time greater than the normal human eye blinking time, then considers an event called “blink”, for which the set of operations will be followed.

Here, in this Paper we need to set time as 15 seconds or above it for 60 seconds, as “blink event” is different from “common eye blinking”. We need to conduct testing for only blink event, and not to find a common blinking of the human eye. The eye blink sensor is IR based and to determine the abnormal blink event of a visually impaired person this is used in our system.

Features

- Operating voltage +5V
- Eye blink indication by LED
- TTL output +5V or 0V
- Compact size
- Directly connect with microcontroller for instant output.



Fig 4 : Eye Blink Sensor

The variation across the pulses will be varied as per the regular beat if there is rate goes high/ low for the certain predetermined time, i.e. normal rate of 72 pulses per min is set as a reference and if it exceeds 72, it is said to be HIGH BP and lower than 72 is said to be LOW BP, which is a risky situation.

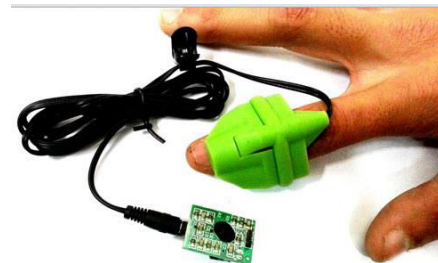


Fig 5: Heart beat Sensor

Features

- Operating voltage +5V
- Pulse rate detection
- TTL output +5V or 0V
- Compact size

C. GPS MODULE

The SKYLABSKG 13C is a complete GPS module with high sensitivity, low power. The GPS signal is applied to the antenna input, and complete serial data with exact position, time and velocity information is presented at the serial information with NMEA protocol or custom protocol. Its tracking sensitivity extends to the place where GPS system was not available before like dense foliage environment and urban canyons. The small form factor and lower power consumption make the module to get integrated easily with portable systems like mobile phones, vehicle navigation system.

Features

- Superior Sensitivity
- Low power consumption
- Operating voltage +5V

D. BLUETOOTH MODULE

HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent

wireless serial connection setup. The HC-05 Bluetooth Module can be used in a Master or Slave configuration, making it a great solution for wireless communication. This serial port bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses CSR Bluecore 04-External single chip Bluetooth system with CMOS technology and with AFH (Adaptive Frequency Hopping Feature).

Features

- Typical -80dBm sensitivity.
- Up to +4dBm RF transmit power.
- 3.3 to 5 V I/O.
- PIO(Programmable Input/Output) control.
- UART interface with programmable baud rate.
- With integrated antenna.
- With edge connector

E. GSM MODULE

The GSM is a cellular network 2nd generation standard, employing TDMA (Time Division Multiple Access). It works on the frequency of GSM850/900/1800/1900MHz featuring an industry standard interface with high performance in voice, SMS, data with low power consumption. The module is managed by the AMR926EJ-S processor that controls the data communication, phone communication. This processor is also in charge of the SIM card which is used to get connected with the guardian cell phone. GSM900 integrates an analog interface, A/D converter, an RTC, an SPI bus, and PWM module. This module absorbs a maximum current of 0.8A during transmission and 3.5 to 4.5 V of energy is supplied.

Features

- Operating voltage +5V
- Built in SIM card holder
- Built in network status LED
- High Quality product
- Quad band

5. WORKING PROCESS

For the detecting stage, the eye blink sensor always monitors the eye blink moment and the heart-beat sensor which monitors the pulse rate to alert if the rate goes high or low indicating the BP level. The monitored data is sent to the microcontroller. During monitoring, the blink rate and the pulse rate recorded are compared with the reference set in the microcontroller, the collected data will be transmitted to the dsPic microcontroller and the microcontroller digitizes the analog data for processing. If the warning

feedback system is triggered, the microcontroller gets the location details from GPS and makes a decision to transmit the alert message through GSM by buzzing on the alarm. Purpose of Bt is used to track the location when it is nearby. The data stored in the Transmitter, in case of emergency, is sent as an alert message to the receiver.

6. CONCLUSION AND FUTURE STUDY

The primary objective of this paper is to assist and ensure the safety and security of the visually impaired people. To investigate the performance of the whole strategy, several trials have been conducted on the different locations in order to get the GPS coordinates. The assistive device in this work will inform the guardian if the individual is at risk. In the distant future, it can be extended to a system to suit outdoor environments and can be made compact for usage and future works may be carried on for developing android application to avoid message throwback. The secondary aim of this paper is to help elderly people who have reduced vision due to age factors

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