MICROCONTROLLER AND VOICE BASED ALERT SYSTEM FOR BLIND PEOPLE WITH GPS ENABLED LOCATION IDENTIFICATION

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Introduction:

The Global Positioning System (GPS) is a U.S. space based radio navigation system that provides reliable positioning, navigation, and timing services to civilian users on a continuous worldwide basis. For anyone with a GPS receiver, the system will provide location and time. GPS provides accurate location and time information for an unlimited number of people in all weather, day and night, anywhere in the world. GPS based blind man device with user input interfacing (voice based) intellectually finds the current location and gives the alert to the blind man if it was his destination area. Microcontroller is the heart of the device.

It stores the data of the current location which it receives from the GPS system, so that it can make use of the data stored to compare with the destination location of the user. By this it can trace out the distance from the destination and produce an alarm to alert the user in advance. This device is designed to provide a voice based announcement for the user, i.e, the user gets the voice which pronounces his destination location as and when he is about to reach the destination. Here instead of an alarm sound the blind man can directly hear the location recorded by the user itself.

Objectives of the project:

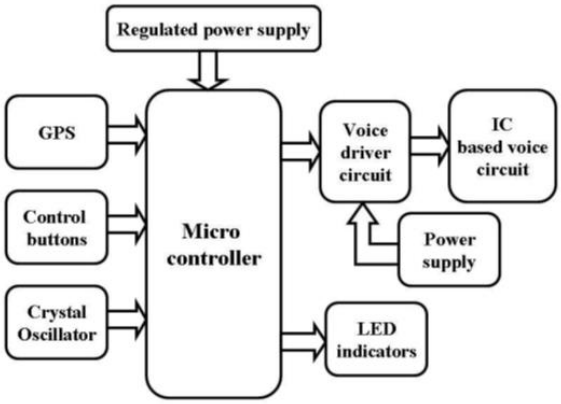
GPS is employed to find the position of the user on the earth. This information is provided by the GPS with the help of the data it receives from the satellites. GPS based voice alert system for the blind uses the current location and gives the alert to the blind man if it was his destination area. This paper describes the concept using a microcontroller based system. The system has a dynamic user interface and is easily operable.

The system is realized using a GPS module (SR-92) and a Voice Module (APR9600) interfaced with a PIC16F877 microcontroller. The working of the system incorporates two stages; first the location based audio recording stage and second, the navigation of the blind person using the signal from the GPS receiver. The system employs a user friendly design and provides for an automatic location name announcement system.

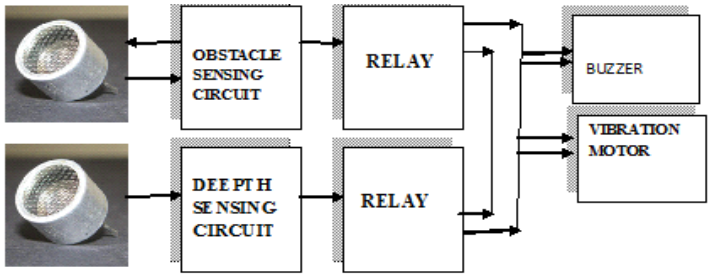
Blind stick uses ultrasonic sensors to detect obstacles ahead using ultrasonic waves. On sensing obstacles the sensor passes this data to microcontroller. The microcontroller then processes this data and calculates if the obstacle is close enough. If the obstacle is not that close the circuit does nothing. If the obstacle is close the microcontroller sends the signal to sound a buzzer.

Methodology:

Block Diagram



Blind stick



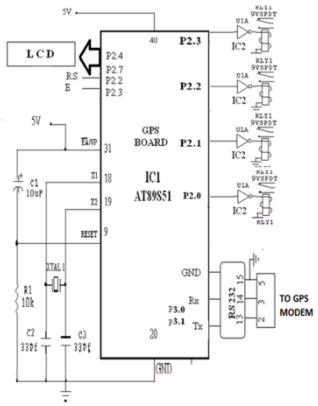
UV sensor

These sensors measure the intensity or power of the incident ultraviolet radiation. This form of electromagnetic radiation has wavelengths longer than x-rays but is still shorter than visible radiation.An active material known as polycrystalline diamond is being used for reliable ultraviolet sensing. UV sensors can discover the exposure of environment to ultraviolet radiation. The UV sensor works by transmitting an ultrasonic (well above human hearing range) burst and providing an output pulse that corresponds to the time required for the burst echo to return to the sensor. By measuring the echo pulse width, the distance to target can easily be calculated. Output is fed to buzzer for Indication.

Relay

Relay is an electromagnetic switch, which can be made on/off by giving the voltage to the coil of the relay. With the help of relay contacts the circuit is made

Circuit Diagram



Microcontroller

The AT89S51 is a low-power, high-performance CMOS 8-bit microcontroller with 4K bytes of in-system programmable Flash memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry- standard 80C51 instruction set and pinout. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S51 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications.

Global positioning system (GPS):

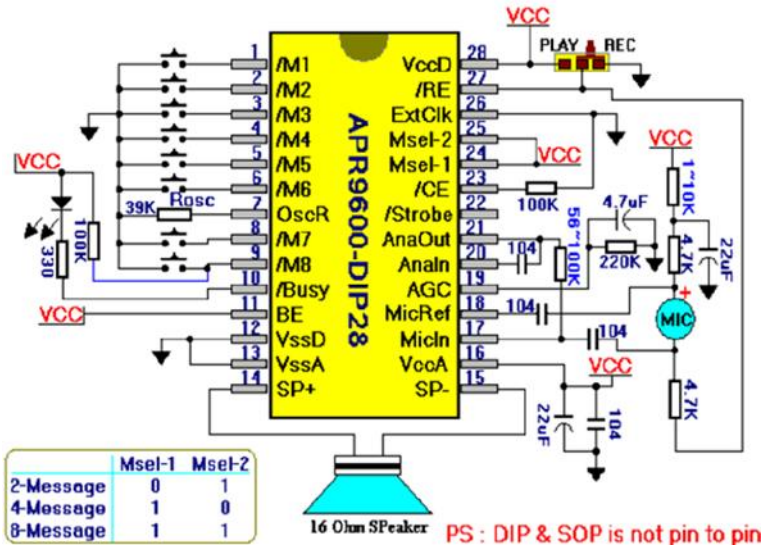
The Global Positioning System (GPS) is a space-based radio navigation system that provides reliable positioning, navigation, and timing services to users on a continuous worldwide basis -- freely available to all.

The GPS is made up of three parts:

1. Satellites which are orbiting the Earth
2. Control and monitoring stations on the Earth
3. The GPS receivers owned by the users**.**

GPS receiver

Voice Module (APR9600)



APR9600 is a low-cost high performance sound record/replay IC incorporating flash analogue storage technique. Recorded sound is retained even after power supply is removed from the module. The replayed sound exhibits high quality with a low noise level. Sampling rate for a 60 second recording period is 4.2 kHz that gives a sound record/replay bandwidth of 20Hz to 2.1 kHz. However, by changing an oscillation resistor, a sampling rate as high as 8.0 kHz can be achieved. This shortens the total length of sound recording to 32 seconds. Total sound recording time can be

varied from 32 seconds to 60 seconds by changing the value of a single resistor. The IC can operate in one of two modes: serial mode and parallel mode. In serial access mode, sound can be recorded in 256 sections. In parallel access mode, sound can be recorded in 2, 4 or 8 sections. The IC can be controlled simply using push button keys. It is also possible to control theIC using external digital circuitry such as microcontrollers and computers.

Miscellaneous items

- An LCD display is incorporated for a better user interface.Its primary use is to display the latitude and longitude of the current location.
- Two different coloured LED's for indicating the type of data received from the GPS receiver.
- A Speaker, for announcing the message's, recorded using the voice module.

Software Requirements

KEIL µVision3

µVision3 adds many new features to the Editor like Text Templates, Quick Function Navigation, and Syntax Coloring with brace high lighting Configuration Wizard for dialog based startup and debugger setup. µVision3 is fully compatible to µVision2 and can be used in parallel with µVision2.

Result:

The "GPS based voice alert system for the blind" is designed so as to alert the blind person through voice alerts when he enters into a particular location by announcing the location name. The locations names are prerecorded in the voice circuit and are announced when the person reaches those particular locations.

Conclusion:

The system designed consists of a GPS receiver and a voice circuit which is interfaced to the microcontroller. The microcontroller is programmed in such a way that depending on the satellite information of location the predefined location name will be announced. The only major disadvantage of this system is the time taken by the GPS to receive its initial signal from the satellite, i.e, when it is switched ON. The above disadvantage can be removed by using a higher efficiency GPS receiver.

Future scope:

This project can be extended by incorporating a GSM module. We can interface this module to send messages to the near and dear ones of the Blind person regarding his/her current position. Doing so, we can track the movement of the Blind person in a very efficient manner.