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EMBEDDED MICROCONTROLLER BASED REAL TIME SUPPORT FOR DISABLED PEOPLE USING GPS

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ABSTRACT

This paper contains prototype system which comes to handy for the blind .the prototype system is based on the microcontroller and GPS receiver module with the usage of which the blind person will be able to be guided to the preloaded locations. There will be a proxy sensor through which the person will be alerted by the voice module if he comes across an obstacle. Here we are using the RF camera through which the video can be received by the RF receiver and can have a visual of the surroundings of the blind person. Here we are using the GSM modem so that the prototype system carried by the person will send the message to the already loaded mobile numbers which might belongs to the relations of the blind person.

INTRODUCTION

In today's life we sense many things through the eyes. Most of the information regarding the surroundings are analyzed through the data that is consumed through the eye. The people who lack their vision experiences many hurdles in their day-to-day life. In order to make ease of the problems that the blind people are facing many scientists are experimenting on the nature of the eye and its internal construction. However they are unable to reach to a perfect conclusion regarding the blindness problem. So in order to do their daily work they needed a personal assistant or a trained animal without which they will not be sure of what they are going to do.

The main objective of this paper is to demonstrate a system so that the blind people can perform their activities without anybody help. Here we are using a microcontroller assisted by the GPS so that there will be a continuous comparison of the present and preloaded values. So that the person will be assisted by the voice module regarding the location that the person is situated. The GSM modem used here will be sending the messages from that location to his relatives continuously, so they can have a real time track of the blind person. Walking securely and self-confidently without the help of any sighted person in unknown or urban environments is a challenging job for visual impaired people. India's have enormous population. Because of this tremendous population, traffic lying on the roads is more and in today's world nobody has time even to speak with one another particularly in metropolitan cities. Conventional and former mobility aids for blind people are guide dogs and white cane. Visually impaired people for moving from one place to another place should depend on these traditional aids such as white cane, people information, guide dogs etc.

DESIGN DESCRIPTION

In this design LPC2148 microcontroller is used which is ARM 7 TDMI processor GPS receiver, voice playback module, wireless RF camera, GSM modem.

The usage of the wireless camera is that the relatives of the blind person can have the visual monitoring of the location. The RF camera will continuously transmits the visuals of the surroundings he is present this requires RF camera, monitor, RF receiver with antenna, tuner box.

Navigation for the blind using GPS along with GSM module and Proximity sensor based real time monitoring device has transmission section and receiving section. The device which was carried by the user has ARM7, Voice Module, and Proximity sensor. GPS Receiver acts as a transmission section and at the receiving section to know about user current staying location or user situation the user relatives or a remote operator monitors him by the mobile messages transmitted by the GSM module.

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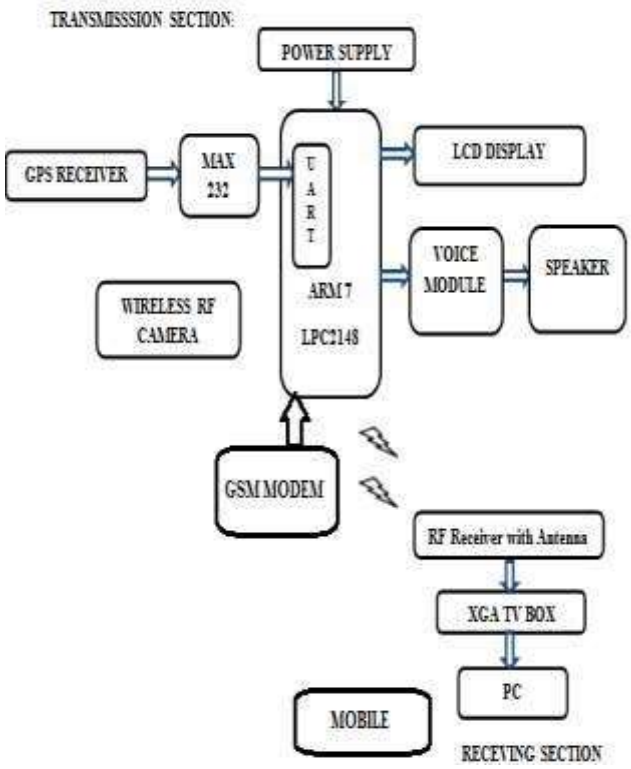
Location names audio recording stage involves the user desired destination location names was recorded in the voice module. In the voice module maximum of 8 voice messages i.e. 8 location names was recorded.

If the user relatives or a remote operator wants to know user information related to user currently staying locations and surroundings and user current situation a GSM module acts as transmission section which continuously transmits the information in the form of messages to user. RF receiver acts as receiving section. RF receiver with antenna receives that messages and displays it on the Mobile. Read the messages user relatives or a remote operator can identify the user current situation such as his/her staying location surroundings or whether the user was staying in safe locations are not. In that user audio was also transmitted if the user needs any emergency help such as medical help then user will communicate to user relatives or a remote operator so, user relatives or a remote operator can directly help to the user immediately. Device which was carried by the user acts as

"Transmission Section". User relatives or a remote operator monitoring the user on the Mobile which was connected to RF receiver acts as "Receiving Section". The user has to make sure that for receiving a messages from GSM module transmission section to the RF receiver at the receiver section the distance between to them is no limitation.

LPC2148 contains 2 UARTS. In addition to that the data line of a standard sending and receiving, the UART1 (LPC2148) supports a full modem controlling over handshake an interface. Compared to earlier LPC2000 microcontrollers, UARTs in LPC2148 presents a fractional baud rate generator for both UART0, UART1, empowering these microcontrollers to attain standard baud rates such as 115200 with any crystal frequency above 2 MHz.

The block diagram of the proposed system will be as shown in the below figure



HARDWARE DESCRIPTION

ARM7 Microcontroller:

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Impact Factor (PIF): 2.243

IJESMR
International Journal OF Engineering Sciences & Management Research

In this system we use LPC2148 where LPC represents low power consumption. It contains ARM 7 TDMI processor through which it can support thumb mode. Thumb mode is used for increasing the coding efficiency .it has a flash memory of 128/512KB.it supports 32 bit and 16 bit in the thumb mode.LPC2148 contains 64 pins with two ports port 0 and port 1. The CPU is a real time and ICE logic environment. Regarding the count of the port pins port 0 contains 32 pins whereas the port 1 contains only 16 pins. The pin configuration will be from P0.0 to P0.32,but the pins P0.24,P0.26,P0.27 are not available and for port 1 the pins available are from P1.16 to P1.31.

Voice module:

It is a APR9600 series. This module helps us to record the voice and when the pin is made high the audio is played back. It contains 8 channels that is from M0-M7. Each channel can store an audio message, so that we can record up to 8 messages. It contains onboard MIC and speaker. The module will have two facilities, one with recording and another with playback facility. We have to choose whether to use recording or playback facility. The two modes that are present in the module: series and parallel modes. In series mode 256 segments can be recorded, whereas in parallel mode 2,4,and 8 segments can be recorded. In this module parallel mode with 8 segments is present.

Table 1:APR9600 has 6 message management modes

Mode	MSEL1	MSEL2	/M8 option
Random Access 2 fixed duration messages	0	1	0 or1
Random Access 4 fixed duration messages	1	0	0 or 1
Random Access 8 fixed duration messages	1	1	1
Tape mode, Auto rewind operation	0	0	1
Tape mode, Normal operation	0	0	1
Tape mode : Replay ,Next ,Restart Operation	0	0	0

The parallel mode is also called random access mode. The reason for this mode is we can select randomly either to record or to play according to the requirement.

LCD:

LCD is connected to the controller in order to display the coordinates. LCD known to be liquid crystal display can be used in two modes 8-bit and 4-bit . the change we observe in the two modes is the number of the data lines that will be communicated between the LCD data lines and the microcontroller. So in the 4-bit we are using 4 pins from the microcontroller which serves as the data lines to the LCD.

GPS:

GPS known to be global positioning system is a satellite based application. GPS values of a location can be given by the readings of three satellites such that the latitude and longitude of a specific location will be generated. In order to record the latitude and longitude of a specific location one must contain the GPS receiver which gives the value. Here using the prerecorded GPS values the controller compares the recorded and the present values of the person and generates the voice accordingly through the payback module. Generally the satellite navigation system is maintained by the Department of Defense of U.S. military.

The GPS receiver utilizes the message received from the satellites and then finding the travel time of every message and using the speed of light it calculates the distance to every satellite. The distances and locations of every satellite define a sphere. If the satellites distances and the locations are correct the receiver is on the surface of each of these spheres. These satellites distances and the locations are used to calculate the location of the GPS receiver by utilizing the navigational equations. Then displaying this location maybe with a display of moving

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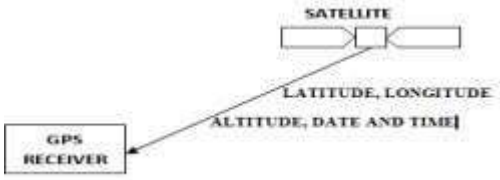
major longitude and latitude ; may be including altitude or elevation data , based on the height over the geoids (e.g. EGM96).Basically GPS estimations produce only a position, but not the speed or direction. But, most the GPS units can consequently determine direction and velocity of movement from 2 or more measurements of position. This standard has the disadvantage that speed or direction changes must be calculated with the delay, and that determined direction was erroneous when the travelling distance between 2 position estimations drops near or below the random error of position estimation. To calculate received signals velocity more accurately GPS units used Doppler shift measurements. More progressive navigational systems utilize extra sensors equipment such as a compass or an inertial navigational system to supplement the GPS. In the common operation of GPS, 4 or more GPS satellites should be noticeable to acquire a precise result. The result of the navigation calculations gives the receiver position as well as the variance between the on-board receiver's clock time and the correct day time, thus reducing the requirement for a more accurate and perhaps unrealistic receiver dependent clock. GPS applications such as timing of the traffic signal, and stations synchronization, make utilization of this modest and profoundly precise timing. A few applications of GPS utilize this time for the purpose of display or except for the calculations of the basic position. Though 4 satellites are needed for usual operation, remaining can be needed in special situations. If already only one variable is known, by using only 3 GPS satellites a receiver can find its position.



Here SR-92 GPS receiver is used as it is highly efficient and it consumes less power. Generally GPS receiver is connected to the UART as it transmits data in a serial manner.

GSM Modem:

GSM modem is used to send the messages regarding the location of the person carrying the prototype. The messages will be sent to the preloaded numbers that are dumped into the controller at a regular interval of time regarding the location of the blind person, so that the relatives have a real track of the location of the person.

Proximity Sensor:

This sensor is used to detect the obstacles in its path. The proximity sensor generates an electromagnetic beam, if there is an obstacle there will be a change in the field or there will be a return signal by this the sensor generates a signal regarding the obstacle. The normal range is generally defined as the distance of which the sensor detects the obstacle. It is used to warn the blind person regarding the obstacle that comes along the way. Proximity sensors are highly reliable.

IMPLEMENTATION

1. The controller contains the some preloaded GPS values such that the person will be guided to the desired location as assisted by the voice module that compares the present and loaded values.
2. Proximity sensor that is mounted on the prototype when detects an obstacle generates a voice alert to avoid collision of the person with the obstacle.
3. The RF camera that is placed continuously generates the visuals that will be received by the RF receiver through the antenna and the tuner is tuned to receive the video signal and the visuals are seen in the monitor that is connected to the tuner through the cable.
4. The GSM modem will send the messages regarding the location to the dumped numbers in the controller so that the relatives will have the track of the locations about the blind person.

SOFTWARE DESCRIPTION

The software tool that is used in developing this project is: Keil uvision IDE.

The keil IDE provides the platform for writing the source code, editing, compiling, debugging as well as to generate the hex file .the hex file that is generated will be copied into the disk drive of the LPC 2148, so that the

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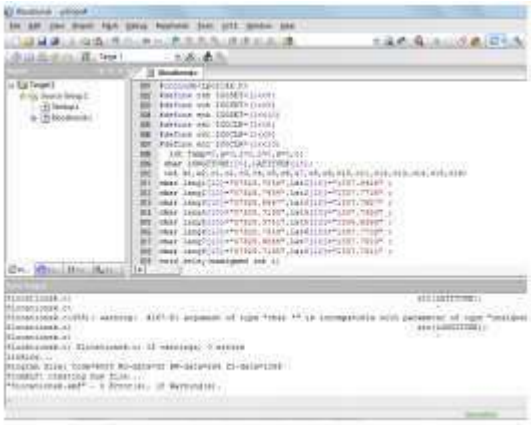
controller will work according to that hex file. Before copying the hex file we have to clear the existing file just by deleting it. After that we have to copy the desired hex file.
The keil window will be as shown in the figure below:



In this way we will have the file dumped into the controller and the device will work.

RESULT

The prototype of the paper as described above will be as shown in the figure below:

CONCLUSION

With this method we can develop a system that is with minimal cost and that will best assists the blind people . It comes in handy for the blind people in harsh conditions where the personal assistant for them is not present. That to the blind person can go to the desired locations without help of any person or through any trained animal. And in the sense the relatives can have a visual feedback as well as the relatives will have a messages relating to the locations of the person continuously.

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