IJISET - International Journal of Innovative Science, Engineering & Technology, Vol. 1 Issue 3, May 2014.
www.ijiset.com
ISSN 2348 - 7968

Guide Systems for the Blind Pedestrian Positioning and Artificial Vision

J.Jafnie Evangeline[1]

[1]PG Student, Department of ECE, CSI Institute of Technology, Thovalai.

Abstract

In current scenario mobility appears to be the most problematic issue in the visually impaired population. With about nine persons out of ten having strong difficulties. Navigation in the blind population raise problems related to orientation (knowing where one is and being able to go to the desired destination) and mobility (example: obstacle avoidance, maintaining consistent headings, estimate distance and angles). Assistive technologies based on Global Positioning System (GPS) could provide them with a remarkable autonomy. Unfortunately, GPS accuracy, Geographical Information System (GIS) data and map-matching techniques are adapted to vehicle navigation only, and fail in assisting pedestrian navigation, especially for the Blind. In this paper, we designed an assistive device for the Blind based on adapted GSM, and fusion of GPS and vision based positioning.

KEYWORDS: Global Positioning System (GPS), Global System for Mobile Communication (GSM)), Personal Computer (PC), Peripheral Interface Controller (PIC), Electronic orientation Aid (EOA), Electronic Travel Aid (ETA), Passive Infrared (PIR)

1. Introduction

As shown in numerous studies, mobility appears to be the most problematic issue in the visually impaired (VI) population. In the largest survey made in France by Ministry of Health, 58% report troubles in outdoor and almost one third of the whole VI population confess not being able to move by themselves. If we only consider subjects with severe impairment or total blindness, these proportions dramatically increase, with about nine persons out of ten having strong difficulties.

Navigation in the Blind population raise problems related to Orientation (knowing where one is, and being able to go the desired destination) and Mobility (e.g. obstacle avoidance, maintaining consistent headings, estimating distances and angles). Several approaches have been conducted over the last 40 years to address the key issues relevant to Blind mobility and orientation they can be classified into two main categories: Electronic Travel Aids (ETAs) and Electronic Orientation Aids (EOAs). ETAs are designed to improve mobility by detecting obstacles in the surrounding. They are usually based on ultrasonic or laser telemeters that measure the distance to features, and resituate distance information by tactile vibrations on the fingers or sound generation. In order to improve autonomy, EOAs provide the Blind with some degree of situational awareness and guidance in unknown environments. Up to now EOAs are mainly based on GPS and Location Based Services. Some commercial devices are available but in most cases, their use has been limited by relatively high price and limited precision especially in urban areas. In this paper, we focus on the issue of positioning that is the most problematic limitation in EOA for the Blind.

2. Literature Survey

An Electronic Orientation Aid for the Blind is usually made of 3 important components: 1/ A positioning module based on GNSS; 2/ a Geographical Information System (GIS) with a spatial database and analytical tools like route selection or user-tracking; and 3/ a User Interface (UI) that relies on non-visual (e.g. speech or tactile) interaction. However, positioning precision is rarely better than 10 to 20 meters, in many environments such as areas with high buildings, or trees, and under certain climatic conditions these performances can even drop to 30 to 50 meters error. As a result, those devices are not accurate enough to guide visually impaired users, and most EOAs based on regular GPS have shown to be unusable in real life conditions.

To overcome these limitations, different research projects suggested using Differential GPS (DGPS) that reduces the nominal error range from 10-20 meters to less than 1 meter in ideal conditions [6-8]. This technology requires an expensive network of fixed, ground-based reference stations that are not available everywhere.

3. Problem Statement

Blind people suffer a lot to move from one place to another. They depend on sticks or other people to reach their destination. In previous papers EOA and ETA are designed to improve mobility for blind people. Under certain climatic condition EOA performance can even drop to 30 to 50 meters error.

In this paper we designed an assistive device based on artificial vision and geo located visual landmarks. In this device we use GSM, GPS and vision based positioning. The precise localization method combined with a GSM adapted to blind needs for the visually impaired population in terms of mobility and space representation. So this will be helpful for the blind people to reach their destination.

4. Proposed System

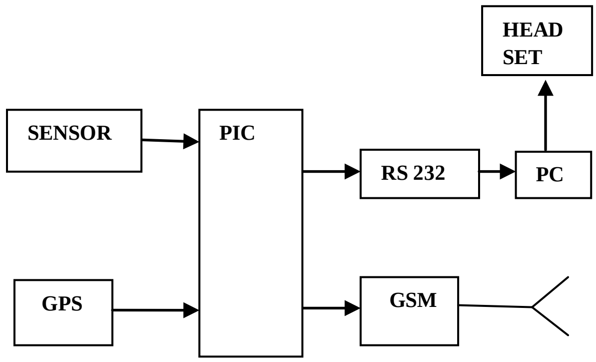

Fig.1 Block diagram

PIR describes as Passive infrared sensor. It is sensing the light radiated from the object. Normally the source containing one temperature based on light. If human or anything else crossed in front of the PIR sensor it will sense and respond as per its construction. The name PIC initially referred to "Peripheral Interface Controller". In our paper, mainly we focus Analog to digital conversion in the sensor parameter conversion. PICs are popular due to their low cost, wide availability, large user base, extensive collection of application notes, availability of low cost , and serial programming (and re-programming with flash memory) capability. PIC 16c6x/16c7x is used for learning purpose. PIC 18Fxx is also popular and widely used series today. The Global Positioning System (GPS) is a space-based satellite navigation system that provides location and time information in all weather.GPS is the backbone for modernizing the global air traffic system. The GPS project was developed in 1973 to overcome the limitations of previous navigation systems. GSM (Global System for Mobile Communications), is a standard set developed by the European Telecommunications Standards Institute (ETSI). The GSM standard originally described a digital, circuit switched network optimized for full duplex voice telephony.

The GPS tracking system is giving one of the numerical value for each place in the entire world from our satellite. This numerical value has been read at the PIC micro controller through RS232 serial communication. In RS232 serial communication the data is transferred or received based on ASCII code which was generated by it serially. This same serial data ASCII procedure is implemented in the transmission of the number which was read by GPS to Mobile communication. At the same time this transmission is happening to the personal computer even. Based on the number which was received, in the dot net data base we have assigned one voice (depends on place name) for each number. This voice automatically transmitted to the head set. Then the PIR sensor is giving different analog parameter value according to the variation of obstacle coming across the PIR sensor. This analog parameter value is read through the Analog to digital convertor pin which was assigned (1 means ADC if 0 means I/O pin) at the PIC micro controller. Base on these different values in the dot net coding we have assigned voice as obstacle at the database along with the condition. While this interference is present automatically the saved obstacle voice has been feeded to the head set. So that, the blind peoples can easily identify whether the obstacle is present or not and can identify which place they are.

5. Result

Thus GSM, GPS and vision based positioning provides an accurate positioning, compatible with blind mobility and guidance. It also matches the needs of blind users in terms of space perception. Thus an assisted navigation for the visually impaired was designed.

6. Conclusion

This paper presented the most problematic issue in the visually impaired (VI) population. This approach eliminates the problem of blind pedestrians. We designed an assistive device for the Blind based on adapted GSM, fusion of GPS and vision based positioning. The assistive device improve user positioning, the estimated position would compatible with assisted navigation for the blind positioning. The future work enhances autonomous robots or vehicles localization.

REFERENCES

[1] Joonyoung Jung1 , Kiryong Ha1, Jeonwoo Lee1,Youngsung Kim2 and Daeyoung Kim3. Wireless Body Area Network in a Ubiquitous Healthcare System for Physiological Signal Monitoring and Health Consulting. International Journal of Signal Processing[J].Image Processing and Pattern Recognition.2008,pp47-54(2008)

[2] Pei Zhi-jie, Ding Xiao-di. Development of Wireless Remote Medical Monitoring System [J]. Computer & Digital Engineering, 2008,12, 55-58

[3] Li Wen-zhong, Duan Chao-yu,et al. The Introduction and Actual Combat of Zigbee Wireless Network Technology[M].Bei Jing: Aerospace University Press, 2007.4

[4] Guo Shi-fu, Ma Shu-yuan, Wu Ping-dong, Chen Zhi-long. Pulse Wave Measurement SystemBased on ZigBee Wireless Sensor Network[J]. Application Research of Computers, 2007.4,258-260

[5] Wang Cai-feng, Liu Zhi-gui, Meng Gang. Design of Medical Monitoring System based Bluetooth Technique and GSM Communication[J]. Control and Automation Publication Group, 2008,24,6-1,134- 135,77