IoT based Blind Person's Stick

Article *in* International Journal of Computer Applications · September 2018

DOI: 10.5120/ijca2018917824

CITATIONS
0

READS
1,896

3 authors:

Md. Wahidur
Mawlana Bhashani Science and Technology University
6 PUBLICATIONS **3** CITATIONS
SEE PROFILE

Rahabul Islam
Mawlana Bhashani Science and Technology University
4 PUBLICATIONS **3** CITATIONS
SEE PROFILE

Md. Harun -Ar- Rashid
Mawlana Bhashani Science and Technology University
3 PUBLICATIONS **3** CITATIONS
SEE PROFILE

IoT based Blind Person's Stick

Md. Wahidur Rahman
Department of CSE
Mawlana Bhashani Science and Technology University, Santosh, Tangail-1902, Dhaka, Bangladesh

Rahabul Islam
Department of CSE
Mawlana Bhashani Science and Technology University, Santosh, Tangail-1902, Dhaka, Bangladesh

Md. Harun-Ar-Rashid
Department of CSE
Mawlana Bhashani Science and Technology University, Santosh, Tangail-1902, Dhaka, Bangladesh

ABSTRACT
This research paper emphasizes on the blind persons of our society. We built our paper with prototyping the features and also real life application. We mainly focus IoT in our research. Enriching our research with variety of sensors. We embellish our project with (i) GSM, the core of IoT this can detect the location of the blind person and makes necessary messages based on the values of different sensors which are transmitted to relatives of the user (ii) Utilizing multiple sensors our stick have ability to make command that can be compared as eyes of blind person (iii) also Using some indicator to prove that user is blind. This stick can find out any type of obstacles around the blind person like left, Right, Up and Down. Controlling system is very facile. Thus, any blind can have ability to operate it.

Keywords
GSM, Sensor, Arduino, intellectual stick, LDR, Ultrasonic sensor, Speaker.

1. INTRODUCTION
In accordance of recent statistics, 263 million people spent their life with visual disability and 36 million of them are blinds. This is a matter of regret for those peoples who can't visualize this beautiful world. Even they can't go anywhere without the help of others. Often we see in the daily newspaper about blind person accident while crossing road. Their members are very concern about their visual deprivation.

This paper focuses on the solution of this problems. We build a prototype where the existing sensor can read the obstacle and produced the appropriate message to the blind person. This stick can also detect the hole on the street, having ability to detect water, tracking the location the location of the blind person and also produce message while occurred an accident to the blind person. The blind person take a response of the sensors from the speaker in their mother tongue. In paper [3] only focuses the obstacles detection. But in this, main focus on IoT. In paper [4] mention only the Differential Global positioning system (DGPS). But in this research, we strongly focus on the GPS. In paper [6] the authors of this paper strongly focus on the obstacle detection through micro controller and other sensor. But in this article, full system mainly focuses all about what needs are required for a blind person.

2. WORKING PRINCIPLES
Basically we divide our project in four significant part. Every part of this this project is connected to each other. At the items required in this research must place in a small box on the stick. Visual disable person can fold it as their wishes.

2.1 Detecting Obstacles
Firstly, as blind can't see the obstacle while walking, so the most significant part of this project is to detect the obstacle around the user. We use three ultrasonic sensor around the stick LEFT, RIGHT and FRONT. This sensor can measure the distances of the obstacle by performing echo. Maximum range of detection is 4m and Minimum, detection 2cm.

I. If this sensor detect an obstacle within 30cm towards the FRONT of the stick, it sends data to the arduino and the speaker produce a sound same as the user's mother tongue like "Obstacle in the front"

II. If this sensor detect an obstacle within 30cm towards the LEFT of the stick, it sends data to the arduino and the speaker produce a sound same as the user's mother tongue like "Obstacle in the LEFT".

III. If this sensor detect an obstacle within 30cm towards the RIGHT of the stick, it sends data to the arduino and the speaker produce a sound same as the user's mother tongue like "Obstacle in the RIGHT".

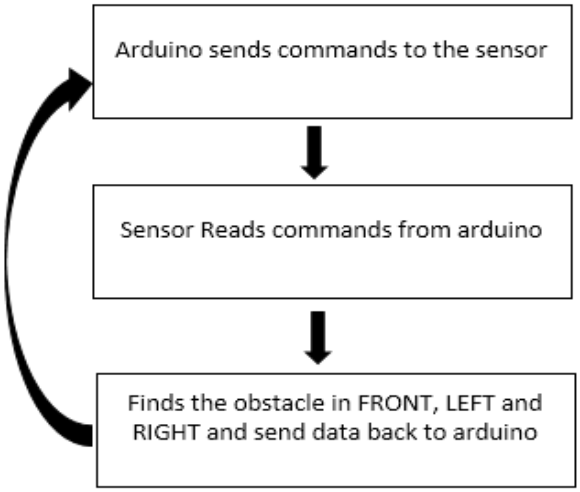

Fig 1: Working procedures for detecting obstacles

2.2 Hole detection in street
Secondly, our stick can detect any type of hole in the street while walking. In our developed model, we placed a minimum distance from stick's sensor to the street. When, the distance level is larger than the minimum distance, it automatically knock the user and alarm about the detection in the street.

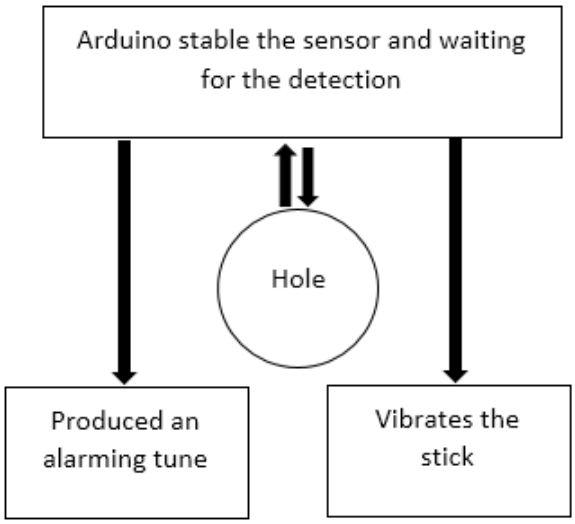

Fig 2: Working procedures for detecting holes

2.3 Location Tracking

Thirdly, our stick can track the location of the disable person using GSM. We placed a button in the stick. If the blind person face any trouble or accident, by pressing the button he/she can send a SMS through the GPRS module to their relatives. So, the relatives of the user can easily find them. Thus they can be out of concerned.

3. BLOCK DIAGRAM

This section emphasizes the architecture of our developed project. As previously discussed, our developed system is divided into three interconnected features. In Fig 3. There is an additional feature called light detection. Basically, this portion is not for the blind person. The feature is only for the persons whose are capable of visualize this world. In this feature, placed an LDR sensor to control some LED automatically. When a blind person wants to walk at in the street, this LED will alarm other people that someone is walking in the street. Thus they can help the blind person.

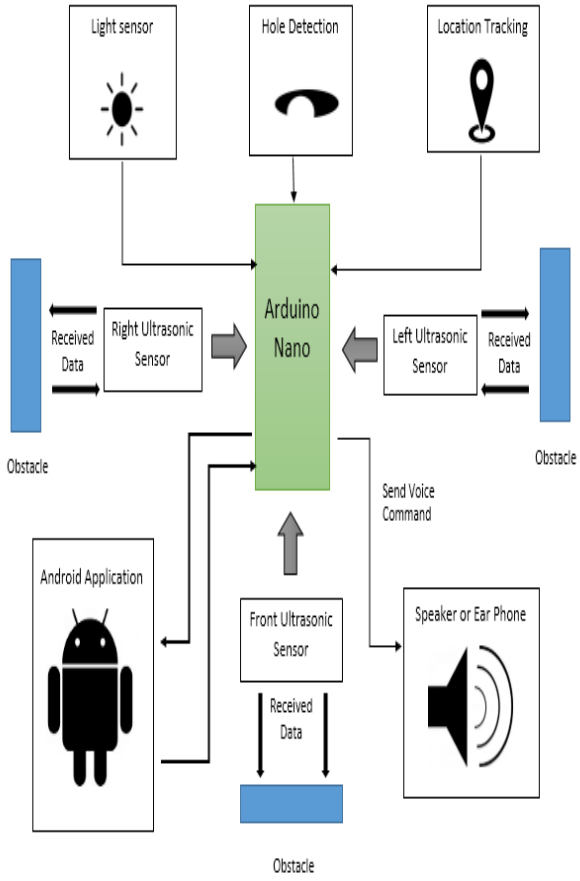

Fig 3: Architecture of IoT based blind's person stick

4. SENSOR DATA IN GRAPH

Ultrasonic sensor provides 2cm-4m non traffic measurement criteria. This module has four part VCC, GND, Trig and Echo. This module measures distance by performing math operation based on Sound echo. Measuring distance equation is given below:

Test distance = (T× V) / 2

Where,
T = High level time

V = Velocity of the sound

Using this mathematical equation we present the graphical representation of data. Fig 4. Shows the graphical data of ultrasonic sensor.

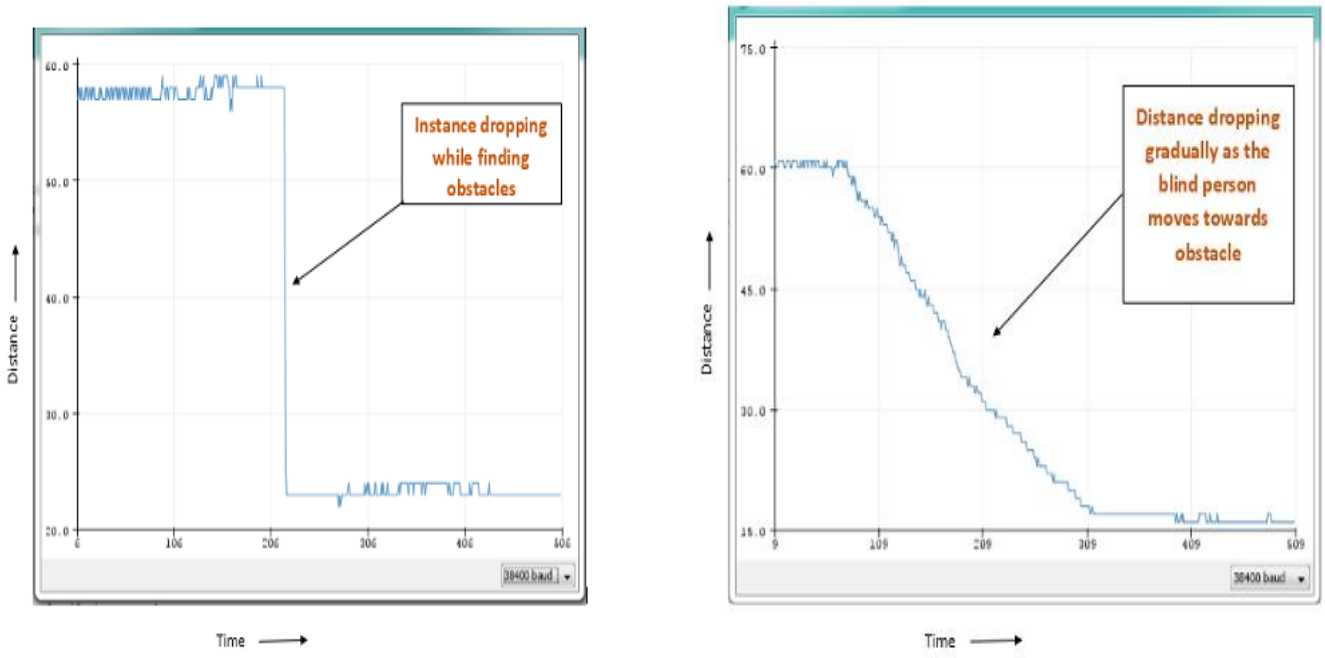

Fig 4: Ultra sonic sensor data in serial monitor or graphical representation

5. ADVANTAGES

- This stick is eligible for both inside and outside of the house.
- This project is very cost effective. Thus, every people can afford it.
- This project can also controlled via Android application
- Obstacle detection is very effective
- As we use the mother tongue, so every user can identify the messages.
- We can easily track the blind person.

6. FUTURE SCOPE

All about our research we take care about one problem that is visual disability. To make a solution we did this low cost project. We believe that this project will spread all around society and convert disable to able. This is our hope, to consider this stick as smart eye for the visual impairments.

7. CONCLUSION

All about our research we take care about one problem that is visual disability. To make a solution we did this low cost project. We believe that this project will spread all around society and convert disable to able. This is our hope, to consider this stick as smart eye for the visual impairments.

8. REFERENCES

[1] Shinohara, K. ―Designing assistive technology for blind users‖ In Proceedings of the 8th International ACM SIGACCESS conference on Computers and accessibility, ACM, 293–294, 2006.

[2] Benjamin J. M., Ali N. A., Schepis A. F., ―A Laser Cane for the Blind‖ Proceedings of the San Diego Biomedical Symposium, Vol. 12, 53-57.

[3] Johann B., Iwan U., ―The Guide Cane — A Computerized Travel Aid for the Active Guidance of Blind Pedestrians‖ Proceedings of the IEEE International Conference on Roboticsand Automation, Albuquerque, NM, 1283-1288, 1997.

[4] Madad A. Shah, Sayed H. Abbas, Shahzad A. Malik , ―Blind Navigation via a DGPSbasedHand-held Unit‖ Australian Journal of Basic and Applied Sciences, 4(6): 1449-1458, 2010.

[5] Kulyukin V., Gharpure C., and Nicholson J., ―Robo-Cart: Toward Robot-Assisted Navigationof Grocery Stores by the Visually Impaired,‖ IEEE/RSJ International Conference onIntelligent Robots and Systems, Edmonton, CA.

[6] Mohammad Hazzaz Mahmud, ―Smart walking stick - an electronic approach to assist visually disabled persons.

[7] Singh Vaibhav, ― 'Smart' Cane for the Visually Impaired: Design and Controlled Field Testing of an Affordable Obstacle Detection System‖ http://assistech.iitd.ernet.in/doc/Transed2010_Sm art t_Cane.pdf.