Design of Arduino Based Door Bell for Physically Challenged People

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Abstract:
Now a day, doorbells are often seen in every house. Also it is one of the most common devices used in house to alert the person inside home is doorbell. It is used to open the door if someone has arrived. In this work is developing a special type of doorbell for physically challenged a person who has hearing loss. An ultrasonic and PIR sensor is used to detect the person standing in the door. Through Arduino interface LCD, ZigBee transceiver signal will be transmitted and received. Once ZigBee is receiving the signal, vibration motor will be vibrated. So, the vibration signal will get alert, which a person is standing in the door.

Keywords: ultrasonic and PIR sensor, Arduino interface module, ZigBee transceiver, motor.

1. INTRODUCTION

Nowadays, television and other electronic systems are operated by remote, which makes life less difficult. An ultrasonic sensors and PIR sensors are used for distance measurement without physical contact. The measurement signals are receive and transmit using Zigbee transceiver. This system is interfacing with IP webcam and it is used to identify the person who's standing outside. An IP web camera is kept on the door in order that user can see who's is waiting outside, so as to increases the security. It helps physically challenged persons and our project makes it easy for them to acknowledge that an individual is standing ahead of the door. The major advantages are easy to use and power consumption is low.

The main contribution of this work is developing an Arduino based doorbell for physically challenged people. It is used to detect person at the doorstep effortlessly. This work mainly supports the deaf people that can't afford a hearing aid.

2. LITERATURE SURVEY

Arduino is also majorly used in health care like hand gloves, breath analyser microphone, pulse monitoring system etc. Arduino can also detect a person's heart condition by counting the person's pulse and can give alert. In this way, Arduino is not only used in the electronic field but also in medical field and our day-to-day life [1]. The system transmits ultrasonic waves and receives the echo. The time difference distance measurement principle states that the known air spreading velocity, that is, measurement of time for the waves from transmitting to receiving after the contact with the target and the space is calculated by using time and velocity of the waves [2, 3, 4]. Mostly all experiments show that using Passive Infrared (PIR) sensors for human motion detection in an area are often successful [5, 6, 7]. The most commonly used methods for monitoring the activities using CCTV cameras or wireless sensor network (WSN) [8, 9]. In particular work, both the simple and state of the art techniques that is used in selecting transceiver architecture for a specific design is presented [10, 11].

3. EXISTING SYSTEM

The existing technologies, in these regards are far outdated than what we have proposed. Most of the people who are affected with hearing impairments only knows to use a hearing aid that helps then to hear. But due to sound created by the device, it causes ear pain in many.

That existing way of using hearing aid is difficult as it makes some sounds louder so that a person with hearing loss can listen, communicate, and participate more fully in daily activities. A hearing aid can help people hear more in both quiet

and noisy situations. However, only about one out of five people who would benefit from a hearing aid actually uses one. The disadvantages of the existing method are high cost, low reliability, complex technology, and system compatibility

4. PROPOSED SYSTEM

This work aims to provide the most easy and efficient way of detecting the doorbell by those who have got hearing impairment. This project can be really beneficial because it's not always the case that a person can reach the doorbell or the person inside can hear it, so it would be nice if it not only ring but give them some more way to make them realize the bell. Also, there is a flexibility that you can adjust the distance according to you by doing some changes in the code you are using to drive the doorbell.

We will be using ultrasonic sensor and a PIR sensor to detect the presence of the human and then give the alert using an LED and a vibration sensor using transceivers. The ultrasonic sensors are used for measuring the distance without physical contact. So it's the best thing to use ultrasonic sensor for detecting object. In today's scenario of COVID-19, using of ultrasonic and PIR sensors is very useful as it is touchless. Fig. 1 and Fig. 2 show that the Block diagram and real time setup for Arduino based door bell system respectively.

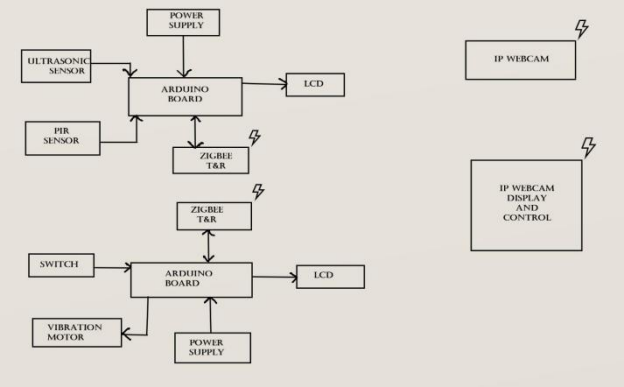

Fig. 1 Block diagram of Arduino based door bell system.

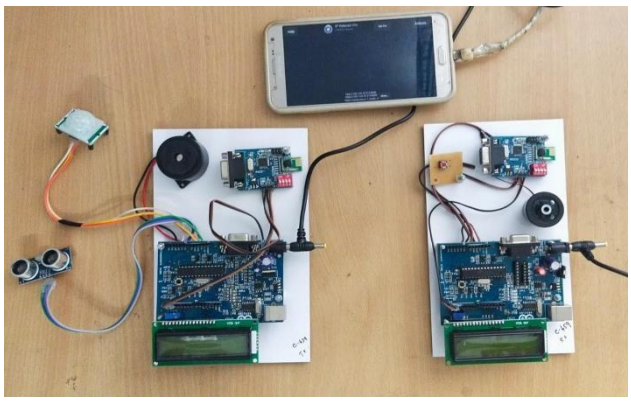

Fig. 2 Real time setup for Arduino based door bell system.

An Ultrasonic and a PIR sensor is interconnected with Arduino board and Zigbee transmitter and receiver with the connection and the sensor is placed in the doorstep. When a person is detected by the sensors, the output of the sensor is received by the Arduino controller, signal gets transmitted via the transmitter. Then the transmitter transmits the signal, then it gets passed to another transmitter module and from here the signal transfers to a controller from which vibration motor gets activated. This makes the person aware that someone is waiting at the doorstep. An IP webcam is also available which displays the image of the person waiting. LCD display provides messages displayed between the two persons. A switch provided to the person inside the house, when they press the switch the alert message like 'person entering' was sent to the person who was waiting at the outside of the door.

5. RESULTS AND DISCUSSION

The picture shows the reading of ultrasonic sensor and PIR sensor in the LCD display, when the person arrives at the door.

Fig. 4.3 Result of Ultrasonic and PIR sensor

The picture shows the alert message to the persons inside the house to know someone is waiting by the door.

Fig. 4.4 Alert message of Human detection

The picture shows the reading of ultrasonic and PIR sensor, that something was detected instead of people. PIR sensor shows high only when the human arrives.

Fig. 4.5 LCD display of object finding

The picture shows the alert message after detection of only ultrasonic sensor to the person inside the house that something is detected outside the door.

Fig. 4.6 Alert message of object detection

The picture shows the display of IP webcam which is controlled over the IP address provided by the IP webcam

placed outside the door, to ensure that who is waiting outside.

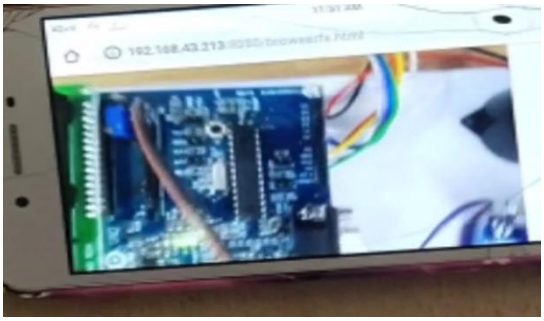

Fig. 4.7 Display of IP web cam

The picture shows the alert message created after pressing the switch which is alongside the person inside the house, to ask the person to wait who is waiting by the door.

Fig. 4.8 Alert message of person entering

The proposed project undertakes a solution to help the physically challenged people. Though, we have so many technologies to help the normal people to lead their life easily. This project helps the physically challenged people to lead their life normally. The components used in the project is low cost and thus, affordable to all scale people. The program used in the modules are easy and can be easily modified depending upon the need. The components used are easily available and can be replaced easily, if needed.

The system is further simplified and can be worn like a watch, thus can carried with the person. The project aims on physically challenged people(deaf) to let them know, person standing in the front of their door. Calling bell are used in our home to let us know that someone has come/standing in front of the door, where it is difficult for physically challenged people with hearing loss.

In this project, the user has to do nothing but to wear/carry the system, if the person is standing in front of the door, the ultrasonic sensors sense and transmit the signal. The last component vibration motor will vibrate if it receives the signal from sensor. The vibration is the signal to be aware that a person is standing in front of the door.

6. CONCLUSIONS

Arduino is very user friendly and allowing user to understand its functionality in very less time. This technologies use the internet but elderly people with less knowledge of internet can also use the system, thus, the user need not have to train themselves for using this. The system is user friendly and needs very less maintenance. Hence, the use of Arduino application in this system allows a user to easily learn the process and get accustomed to the functions. Moreover, the entire work is very flexible and scalable. Any number of appliances can be added as when required. Hence, the systems are used not only in houses but it also extended in many places.

REFERENCES

1. Geeroms, D., Bertho, S., De Roeve, M., Lempens, R., Ordies, M. and Prooth, J., 2015, September. ARDUSAT, an Arduino-based Cubesat providing students with the opportunity to create their own satellite experiment and collect real-world space data. In 22nd ESA Symposium on European Rocket and Balloon Programmes and Related

Research (Vol. 730, p. 643).
2. Carullo, A. and Parvis, M., 2001. An ultrasonic sensor for distance measurement in automotive applications. IEEE Sensors journal, 1(2), p.143.

3. Mak, P.I., U, S.P. and Martins, R.P., 2007. Transceiver architecture selection– review, state-of-the-art survey and case study. Analog-Baseband Architectures and Circuits for Multi standard and Low voltage Wireless Transceivers, pp.9-40.
4. Martins, H.F., Martín-López, S., Corredera, P., Filograno, M.L., Frazão, O. and Gonzalez-Herráez, M., 2014. Phase-sensitive optical time domain reflectometer assisted by first-order Raman amplification for distributed vibration sensing over> 100 km. Journal of Lightwave Technology, 32(8), pp.1510-1518.
5. Urfaliglu, O., Soyer, E.B., Toreyin, B.U. and Cetin, A.E., 2008, April. PIR-sensor based human motion event classification. In 2008 IEEE 16th Signal Processing, Communication and Applications Conference (pp. 1-4). IEEE.
6. Saha, S. and Neogy, S., 2014, February. A case study on smart surveillance application system using WSN and IP webcam. In 2014 Applications and Innovations in Mobile Computing (AIMoC) (pp. 36-41). IEEE.
7. Frankiewicz, A. and Cupek, R., 2013, November. Smart passive infrared sensor-Hardware platform. In IECON 2013-39th Annual Conference of the IEEE Industrial Electronics Society (pp. 7543-7547). IEEE.
8. Beula, G.S. and Rathika, P., 2020, February. ZigBee Transceiver Design for Smart Grid Home Area Network using MATLAB Simulink. In 2020 International Conference on Emerging Trends in Information Technology and Engineering (ic-ETITE) (pp. 1-5). IEEE.
9. Loukil, K., Khalfa, M., Jmal, M.W., Frikha, T. and Abid, M., 2017, March. Design and test of smart IP-camera within reconfigurable platform. In 2017 2nd International Conference on Anti-Cyber Crimes (ICACC) (pp. 25-29). IEEE.
10. Bai, P.F., Hayes, R.A., Jin, M., Shui, L., Yi, Z.C., Wang, L., Zhang, X. and Zhou, G., 2014. Review of paper-like display technologies (invited review). Progress in electromagnetics research, 147, pp.95-116.
11. Minglei, L., Guiying, C., Xiaodong, S. and Huabin, M., 2011, September. Design of LCD display system for handheld devices based on Linux. In 2011 International Conference on Electronics, Communications and Control (ICECC) (pp. 822-825). IEEE.