International Journal of Scientific Research & Engineering Trends
Volume 5, Issue 2, Mar-Apr-2019, ISSN (Online): 2395-566X

Controlling Set Top Box using Hand Gestures

Deepti Gupta **Yash Goel** **Neeraj Sharma**
Deeptigupta@mait.ac.in Yashgoel.1222@gmail.com Neeraj.sharma1093@gmail.com
Department of Computer Science and Engineering,
Maharaja Agrasen Institute of Technology
Rohini, Delhi, India

Abstract- **- Controlling the T.V set top box has been done through an infrared remote control since its inception but with the growth in smart technology all around us our control can be more interactive and easy by the use of hand gestures. Main motive behind this gesture based remote control is to remove the constraint of a handheld device. This hand gesture based remote control will also be useful for people with disabilities as compared to traditional handheld remote in which a key has to be pressed to control the STB which can cause muscle strain to people with physical disability whereas a simple gesture will not cause such strain and will also make it easier for them to control their T.V effortlessly. This system will be built on Arduino microcontroller board and use Ultrasonic sensor to detect hand gesture and an infrared LED to transmit the decoded signal to the Set Top Box.**

Keywords **– Arduino, Hand Gesture, IR Led , Ultrasonic Sensor, Remote Control, STB, TV**

I. INTRODUCTION

Human interact with electronic devices like TV, AC, CD Player using their remote control but the communication with such devices can be made easy by a unique system of hand gesture recognition. Today with smart technology the new generation TV set comes with different ways of control like voice or gesture but that control works only with the T.V functionality whereas most of TV viewers watch satellite channels for which a Set Top Box is must which comes with their own handheld remote control which puts a constraint of looking for a remote control on viewer. Also not all people can afford to change their existing TV set with new age smart TV.

So this proposed system aims at providing the traditional TV set with new age smart technology like gesture control. The new gesture remote control will also benefit people with physical disability as handheld device can cause muscle strain which is not the case in this proposed system. There are several ways to build a system to detect a human gesture that a match would be able to recognize. The gesture can be captured using distance measurement, camera, or a data glove.

The embedded systems can be designed for specific tasks and can be further optimized to reduce the size and cost of device and increase reliability and performance. This system uses an ultrasonic sensor to detect different hand gestures by measuring distance between hand and the sensor. Arduino recognize those gestures and assign the required IR code to perform some basic functions to control Set Top Box like Power On/Off, Channel Up/Down and Volume Up/Down. Then those signal is sent to STB which is done using Infrared Led.

II. LITERATURE REVIEW

1. Gesture Detection

Gesture detection has been an area of research and study for quite long. Gesture detection can be done in multiple ways, each having its own merits and demerits fitting in varied use cases ranging from motion sensors to cameras etc. Earlier for detecting gesture different technologies were used which are mainly wired connection in which user need to be connected to computer using wired mechanism for example Data glove or Instrumental glove.

These glove uses sensors to detect each hand movement using finger orientation, transmitting them as electronic signals through wire connected to gloves. This kind of gesture detection has its limitations as it restricts the user's mobility defeating the entire purpose of the need of gesture based system. And also the cost of this kind of system run high therefore its commercial success is limited. With the advancement in the technology gradually more accurate accelerometers, infrared cameras came into existence that provided more accurate gesture detection.

2. Remote Control

A remote control is an electronics device component used to control most electronic devices like television set, DVD player etc. Originally, is used for operating another device wirelessly from a short line-of-sight

© 2019 IJSRET

distance. Nowadays, Remote control has continually evolved and advanced to include motion sensor, Wi-Fi, Bluetooth connectivity, GPS to enable capabilities and voice control.

Usually, remote controls operate through two ways: IR and radio signals. The remote controls are used to issue commands from a distance to any other consumer electronics device. Remote controls are usually small wireless handheld model. The user just press an array of buttons for adjusting different settings ex. change channel, increase volume. Most of the electrical device has its own control bottom but the remote is used for easier usage and more convenience. At the same time most of the remote controls communicate with their electronic device through an infrared signal while a few via radio signals. However, the first remote controls were using ultrasonic tones in 1973.

III. PROPOSED SYSTEM

All paragraphs must be indented. All paragraphs must be justified, i.e. both left-justified and right-justified

1. **Block Diagram**

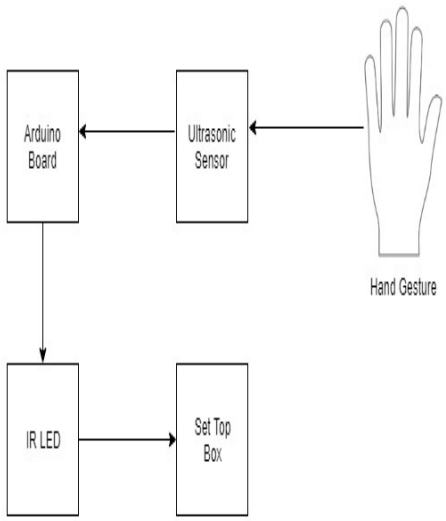

Fig. 1 Block diagram of proposed model.

System consists of:

- Hand Gesture
- Ultrasonic Sensor
- Arduino Board
- IR Led
- Set Top Box

2. Circuit Diagram

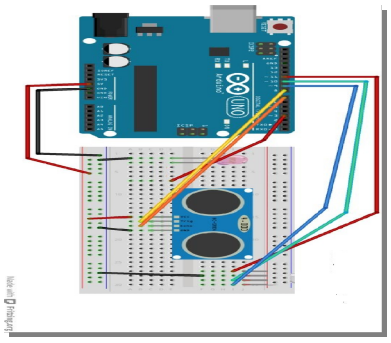

Fig. 2 Circuit diagram of proposed work.

3. Working

No more than 3 levels of headings should be used. Every word in a heading must be capitalized except for short minor words as listed in Section III-2.

3.1 Ultrasonic Sensor- Ultrasonic sensors measure distance by using ultrasonic waves. The sensor head emits an ultrasonic wave and receives the wave reflected back from the target. Ultrasonic Sensors measure the distance to the target by measuring the time between the emission and reception. In this project a ultrasonic sensor will be used to detect hand gestures. It has 4 pins Vcc, Gnd, Trig, Echo. Trigger pin send the sound signal and when it gets reflected back echo pin receives it. Distance between send and receive time is calculated which is converted to distance in inches.

3.2 Arduino Uno Board-Arduino is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board. In this project it will programmed to control the sensor and IR led.

3.3 IR Led- IR LED is a special type of LED that emits Infrared rays of the Electromagnetic Spectrum. In this project this IR LED will be used to transmit decode IR signal to communicate with the STB.A appropriate Led is to be used that operate on frequency of the receiver.IR led used in this system operates on frequency 38Khz and transmits NEC coded IR signal.

IV. Conclusion

This project has its applications in solving real life problems in the field of electronics. The typical STB remote consists of various buttons namely the power button, numbers (for channels), and volume controls etc. This has been the case all these years, though there

© 2019 IJSRET

has been a lot of change in the technology used in the actual T.V the remote has been the same. The basic purpose of this project is to provide a means to control a set top box using hand gestures. This project has successfully achieved its main goals:

•To Provide an alternative method of input to the remote.
• Replace buttons.
• To implement all the basic controls with gestures

ACKNOWLEDGMENT

It gives us immense pleasure to express my deepest sense of gratitude and sincere thanks to our highly respected and esteemed guide Ms. Deepti Gupta, Asst. Prof., CSE, MAIT Delhi, for her valuable guidance, encouragement and help for completing this work. Her useful suggestions for this whole work and co-operative behaviour are sincerely acknowledged. We also wish to express our indebtedness to our parents as well as our family member whose blessings and support always helped us to face the challenges ahead.

REFERENCES

[1] Freeman, William T., and Craig Weissman. "Television control by hand gestures." Proc. of Intl. Workshop on Automatic Face and Gesture Recognition. 1995.
[2] Forrest M. Mims III, Engineer's Mini Notebook, Volume I. Timer, Op Amp & Optoelectronic Circuits & Projects, 1st Ed., Master Publishing, 1986.
[3] Theraja B.L., Theraja A.K., A text book of electrical technology, Ed. 21st, Publisher; publication of division of Nirja construction and Development co., Ltd. Ram Nagar., 1994.
[4] Horowitz P., Hill W., The art of Electronics, 2nd Ed., Cambridge University Press, U.S.A., 1995.
[5] HowStuffWorks, 1998-2006, Available at: http://www.howstuffworks.com/.[12/ 12 /2014]
[6] SB-Projects, Infra-Red Remote Control Theory, Available at: http://www.sbprojects.com, 2004.
[7] Shiguo Lian, Wei Hu, Kai Wang, "Automatic User State Recognition for Hand Gesture Based Low-Cost Television Control System", IEEE 2014.
[8] Ahmad Akl. Chen Feng and Shahrokh Valaee, "A Novel Accelerometer-Based Gesture Recognition System", IEEE Transactions On Signal Processing, Vol. 55, 13 March 2004.
[9] M. Ebrahim Al-Ahdal & Nooritawati Md Tahir, "Review in Sign Language Recognition Systems'' Symposium on Computer & Informatics(ISCI),pp:52-57, IEEE ,2012.
[10] D. Marioli, C. Narduzzi, C. Offelli, D. Petri, E. Sardini and A. Taroni,"Digital time-of-flight measurement for ultrasonic sensors," IEEE Transaction on Instrumentation and Measurement, vol. 41, pp. 93–97, 1992
[11] G. Gparesc and A. Gontean, "Performance evaluation of ultrasonic sensors accuracy in distance measurement," 2014 11th International Symposium on Electronics and Telecommunications (ISETC), Timisoara, 2014, pp. 1-4. doi: 10.1109/ISETC.2014.7010761
[12] What is an Arduino? - learn.sparkfun.com
[13] Overview of Ardunio Microcontroller with Working Principle and Design - https://www.elprocus.com/arduino-basics-and-design/
[14] IR Sensors | Types of IR Sensors & Working - Engineers Garage- https://www.engineersgarage.com/articles/infrared-sensors.
[15] Introduction to HC-SR04 (Ultrasonic Sensor) - The Engineering Projects - https://www.theengineeringprojects.com/Electronic Components.

© 2019 IJSRET