GESTURE CONTROLLED VIDEO PLAYBACK

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Abstract

Recently, Human-computer interaction (HCI) has become more and more influential among research and daily life. Human hand gesture recognition (HGR) is one of the main topics in the area of computer science as an effective approach for HCI. HGR can significantly facilitate a lot of applications in different fields such as automobiles for driving assistance and safety, smart house, wearable devices, virtual reality, etc. In these application scenarios, which based on haptic controls and touch screens may be physically or mentally limited, the touch less input modality of hand gestures is more convenient and attractive to a large extent.

This project describes about controlling video using gestures. It is based on using the combination of Arduino and Python. Instead of using a keyboard, mouse or joystick, we can use our hand gestures to control certain functions of a computer like to play/pause a video, increasing and decreasing of volume and forward and backward of video. The idea behind the project is quite easy by using two Ultrasonic Sensors (HC-SR04)[1] with Arduino. We will place the two sensors on the top of a laptop screen and calculate the distance between the hand and the sensor. Counting on the information from Arduino that is sent to Python through the serial port, this information will then be read by Python which is running on the computer in order to perform certain actions.

Key Words: Gestures, HCI, HGR, haptic, Ultrasonic

I.INTRODUCTION

Overview of the project:

Gesture recognition is effortless aspect of interaction among humans, but human-computer interaction remains based upon signals and behaviors which are not natural for us. Although keyboard and mouse are undeniable improvements over tabular switch and punch card, the development of more natural and intuitive interfaces that do not require humans to acquire specialized and esoteric training remains an elusive goal. To facilitate a more fluid interface, we would prefer to enable machines to acquire human-like skills, such as recognizing faces, gestures, and speech, rather than continuing to demand that humans acquire machine-like skills

So this kind of Gesture based video playback can avoid the problems caused by key boards and mouse. On the premise that it's very easy to use, it's another feature is it uses simple gestures to control the video. So people don't have to learn the machine like skills which is burden most of the time, but by contrast people need only to remember a set of gestures to control the video playback.

Objectives:

1. To minimize the use of keyboard and mouse in computer.
2. To use ultrasonic sensors to recognize gestures.
3. To integrate gesture recognition features to any computer at low cost.
4. To help in the development of touch less displays.

Background:

Massive improvement in computer development can be clearly seen involving both interaction between human and computer itself.

Human computer interaction (HCI) is defined as the relation between the human and computer (machine), represented with the emerging of computer itself. Vital endeavor of hand gesture recognition system is to create a natural interaction between human and computer when controlling and conveying meaningful information.

Connectivity & input:

For giving the gestures to the computer we are using two ultrasonic sensors. The ultrasonic sensors are attached to the arduino board to receive the gestures. Different types of gestures are characterized based on the distance between the hand and sensors. This calculated distance is sent to computer to control the video. It is designed for low power consumption as it is uses power from laptop itself. This module can be easily fitted with any computer and for any module for extension.

Purpose:

The purpose of our research is to provide simple gesture recognition system but with various features so that the user can easily use this for controlling the video and audio purposes. This simple architecture is also useful for interfacing with other features added to it. Students can build their own gesture recognition system with low cost and use them as platform for experiments in several projects. The main purpose of this project is to provide a better gesture control system using ultrasonic sensors and a efficient system using digital technology. There is a need to eliminate the traditional Human Computer Interaction(HCI) which uses keyboards and mouse as they are not suitable in real life situations. Using the gesture control technology our interaction with computer can be more improvised and simple.
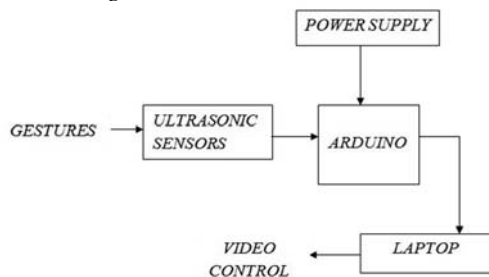
II.PROPOSED METHOD

Blockdiagram:

Fig. 1. Block Diagram Of The Project

Working:

First the arduino will be energized using 5v power supply which is taken from the laptop using serial port. Whenever anyone puts their hands in front of the ultrasonic sensor, the arduino calculates the distance between the hand and the sensor. The calculation of the distance is carried out by echo and trigger pin. First the trigger pin sends a burst of 8 ultrasonic signals. Whenever an obstacle occur in front of the sensor, the signal reflects back. This reflected signal is taken by the echo pin. Then the time for the signal to get reflected is calculated by the sensor. Then this time is converted into distance. Based on the distance the arduino processes which controlling action to be performed. This controlling action is sent to the computer using serial port. That action is performed by python in laptop.
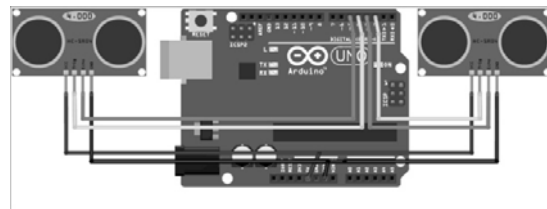
Circuit diagram:

Fig. 2. Circuit diagram

Circuit description:

In this circuit we have used two ultrasonic sensors (HC-SR 04) to recognize the gestures. Gestures using ultrasonic sensors using **Doppler shift.**[2] In this arduino based project we have used distance based gestures[3] so we do not need any cameras to recognize the gestures.

Circuit of this project is very simple which contains Arduino, and two ultrasonic sensors. Arduino controls the complete processes like converting the time into distance, what action to be done based on the distance and sends it to the serial monitor. Ultrasonic sensors are connected to the digital pins 2, 3,4, 5 and the GND pins of two sensors are connected to two ground pins on the arduino uno board. One VCC pin of sensor is connected to 5v pin on arduino board and another VCC pin of the sensor is connected to IORESET pin. This pin is used because extra 5v pin is not there in arduino. The IORESET pin gives the

supply voltage based on the difference voltage between 5v pin and 3.3v pin.

Working:

      In this project, a 5V supply to the Ultrasonic sensors and arduino. When the circuit is energized, the ultrasonic sensors continuously calculates the distance between the sensor and the hand[4]. Initially, we have given five gestures to control the video.

First hand gesture: It allows us to 'Play/Pause' VLC by placing the two hands in front of the right and left Ultrasonic Sensor at a particular far distance.

Second gesture: It allows us to 'Rewind' the video by placing a hand in front of the right sensor at a particular far distance and get near to the sensor.

Third gesture: It allows us to 'Forward' the video by placing a hand in front of the right sensor at a particular far distance. And get far way from the sensor

Forth gesture: It allows us to 'Increase Volume' of the video by placing a hand in front of the left sensor at a particular far distance and moving away from the Sensor.

Fifth gesture: It allows us to 'Decrease Volume' of the video by placing a hand in front of the left sensor at a particular far distance and get near to the sensor.

III. RESULTS & DISCUSSIONS

A. Result and simulation :

      The project is being tested and is working properly. It is tested on two different laptops and of different brands and is properly working. It has lots of application like we can use this project for video controlling not only in laptops but also we can integrate it to many displays. Here we can easily control the playback of the video without using keyboard and mouse. In this project we have used very less component so it is cost effective and it is less complicated than a simple micro controller based project.

B. Prototype of the project:

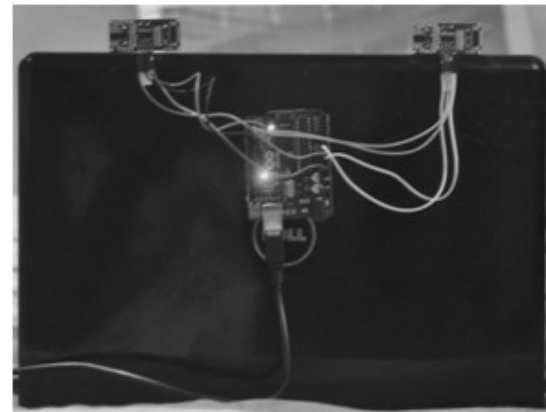Fig. 3. Prototype Of The Project (Front View)

Fig. 4. Prototype Of The Project (Rear View)

C. Advantages:
1. Low cost.
2. The given system is handy and portable, and thus can be easily carried from one place to another.
3. The circuitry is not that complicated and thus can be easily troubleshooted.
4. There are no moving parts, so device wear is not an issue.
5. There is no direct contact between the user and the device, so there is no hygiene problem.
6. Less cost for making a gesture control computer.
7. This system would be designed to be those that seem natural to users, thereby decreasing the learning time required.
8. They will reduce our need for devices like mouse, keys, remote control or keys for interaction with the electronic devices.

D. Disadvantages:
1. The distance between ultrasonic sensors and user is limited.
2. The distance between sensor and user must be accurate.

E. Applications:
1. This project can be used in gesture control gaming in gaming industry.
2. This system can be used for making touch less displays at low cost.
3. This project can be implemented in medical area for making gesture control displays.

IV.CONCLUSION & FUTURE SCOPE

A. Conclusion:

The presented approach proves that it is possible to use inexpensive ultrasonic range-finders for gesture recognition to control the video. This fact seems to be important because these sensors are easily available and no additional ultrasonic system is needed to be constructed. Unfortunately, a set of gestures which can be recognize in this way is very limited. Nevertheless they are useful for extension of communication channel between a human and a machine. In this context the obtained results are preliminary and show that recognition of some class of gestures is possible by using very simple range-finders.

B. Future development:
1. This project can be further implemented on platform like AVR, ARM microcontroller etc.
2. We can add many video controlling features just by modifying the python code.
3. We can integrate this type of module for many applications like browsers, designing and editing applications.

The knowledge is ever expanding and so are the problems which the mankind strive to solve.

REFERENCES:
1. Sidhant Gupta, Dan Morris, Shwetak N Patel, Desney Tan, SoundWave: Using the Doppler Effect to Sense Gestures, ACM, 2012

2. Kaustubh Kalgaonkar, Bhiksha Raj, One-handed gesture recognition using ultrasonic sonar, IEEE, 2009.

3. S. P. Tarzia, R. P. Dick, P. A. Dinda, and G. Memik, "Sonar-based measurement of user presence and attention," in Proceedings of the 11th international conference on Ubiquitous computing. ACM, 2009.

4. H. Watanabe, T. Terada, and M. Tsukamoto, "Ultrasound-based movement sensing, gesture-, and context-recognition," in Proceedings of the 2013 International Symposium on Wearable Computers. ACM, 2013.