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Hand Gesture using Arduino

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ABSTRACT

The modern world is filled with new things and technology. As we can see in present time most of the things are becoming gesture control. Gesture based interaction is becoming a necessity at home, office, gardens etc. This build will detect hand gesture from the motion sensor connected to Arduino. The hand gesture will work as an input which will act with PC or laptop. One of the key areas of implementation of code using Python. We feel that we can help a little with our little contribution

Keywords— Hand Gesture, Arduino UNO, Hand Gesture, Sensors, Ultrasonic Sensor, Multimedia Player Control

1. INTRODUCTION

In this process we will be using HC-SR04 sensor (also known as ultra-sonic sensor) connected to Arduino UNO which will be attached to PC/Laptop such a way that all the connection stable and not pulling out from the circuit. We can also have a high configuration PC/laptop which includes such feature but there are extremely costly. In this work we will try to make one Gesture Controlled PC/Laptop with the help of Arduino and HC-SR04 (Ultra-Sonic Sensor). We will use two sensors which will be placed in such a way that it can detect movements the gestures made by our hands and read the distance. To execute these functions, we will use PyAutoGui library. The commands will be sent from Arduino to computers through serial port. This data will be read by python and action will be performed. The incoming signals are buffered, and Fourier transform is applied on them. The Arduino is connected to the PC/Laptop for powering the module and also for serial communication. The detected motions are then converted to pc commands.

2. DESCRIPTION

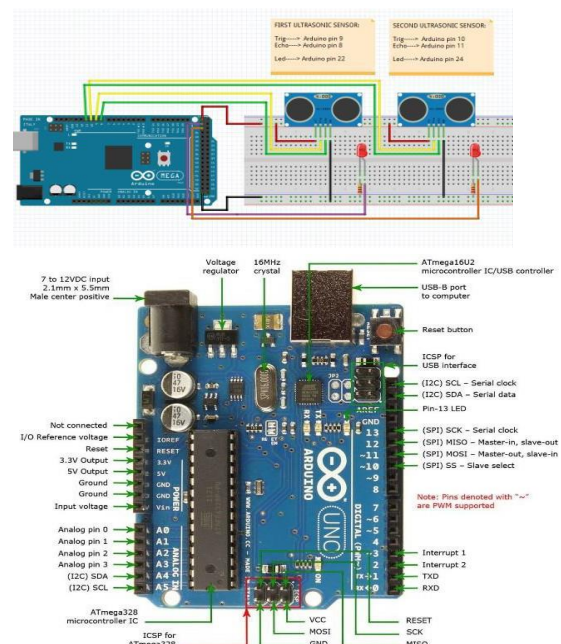
Design Creation & Integration

We've created a multi-media controller for users, with the assistance of the hand gestures they're going to be able to

management the functioning of the multi media player, this paper introduces a way supported determining distance by the sensing element and consequently a selected perform is performed. Some recognition strategies of the gestures are projected then actions are recognized in sensing element. we tend to originated few thought strategies supported the action recognition by the sensors. The sensing element device is hooked up on laptop at head of the screen, for fast operation

3. CIRCUIT DIAGRAM

The circuit diagram of Arduino part of the model is shown in the figure below. It consists of an Arduino UNO board and Two HC-SR04 Sensors. We can power up all these components from the laptop's USB Port.



4. IMPLEMENTATION

4.1 Component Require

- Arduino UNO x 1
- HC-SR04 Sensors x 2
- USB Cable (for Arduino)
- Few Connecting Wires
- A Laptop with internet connection

4.2 Circuit Modelling

The design of the circuit is simply too easy however, the setup of the elements is incredibly important. The Trigger and Echo Pins of the primary ultrasonic sensing element, that is placed on the left of the screen, square measure connected to Pins one and two of the Arduino.

For the second ultrasonic sensing element, the Trigger and Echo Pins are connected to Pins three and four of the Arduino. Now, for the position of the Sensors, place each the ultrasonic Sensors on prime of the laptop computer screen, one at the left finish and therefore the alternative at right. we will use double sided tape to carry the sensors onto the screen. Now, the Arduino is placed on the rear of the laptop computer screen. Then, connect the wires from Arduino to Trigger and Echo Pins of the individual sensors. Now, we have a tendency to are prepared for programming the Arduino. Figure a pair of shows the read of the model.

4.3 Uploading Program to Arduino to Detect Gesture

The following are the 5 different hand gestures or actions that we have programmed for demonstration purpose.

Gesture 1: Place both hand in front of the Both Ultrasonic Sensor at a distance (between 15CM to 35CM). This gesture will play/pause the file.

Gesture 2: Place the hand in front of the Right Sensor at a distance (between 15CM to 35CM) for a small duration and move our hand towards the sensor. This gesture will help you to use volume down function.

Gesture 3: Place the hand in front of the Right Sensor at a distance (between 15CM to 35CM) for a small duration and move our hand far from sensor. This gesture will help you to use volume up function.

Gesture 4: Place the hand in front of the Left Sensor at a distance (between 15CM to 35CM) for a small duration and move our hand towards the sensor. This gesture will help you to rewind the file.

Gesture 5: Place the hand in front of the Left Sensor at a distance (between 15CM to 35CM) for a small duration and move our hand far from the sensor. This gesture will help you to forward the file.

Gesture 6: Swipe the hand across both Left Sensor This action will switch to next file

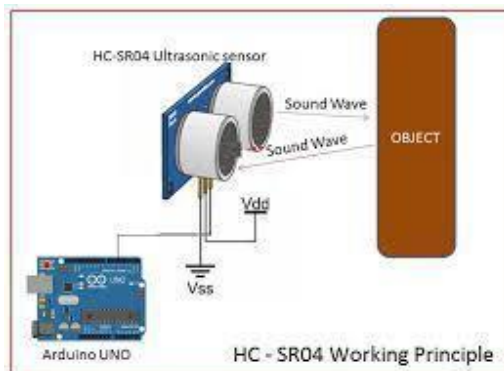


Fig (i)

4.4 Working

Gesture controlling relies on specifying hand position from the processing ultrasonic. For process the information, a micro-controller is essential; for that we tend to use Arduino UNO board.

Via USB connection the micro-controller transfers the processed and calculated distance worth that is provided by the sensing element. The information that is send by the sensor is processed within the computer code in laptop wherever all the calculations are performed and therefore the data is matched with the predefined conditions (gesture resolution). during this model 2 ultrasonic sensors are accustomed to find hand position and are connected to the Arduino board. As we all know Ultrasonic sensing element endlessly emits sound and it gets mirrored back from user's hand. (As shown in Fig (i)) The gap between the sounds is send and detection of replicate back wave is calculated by the micro- controller.

This model has following hardware components; these are two ultrasonic sensors (HCSR-04) fig(ii) and (iii) and Arduino UNO board fig (iv).

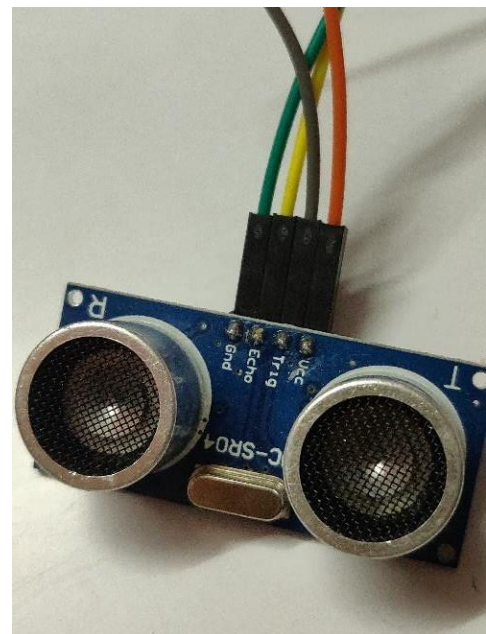


Fig (ii)

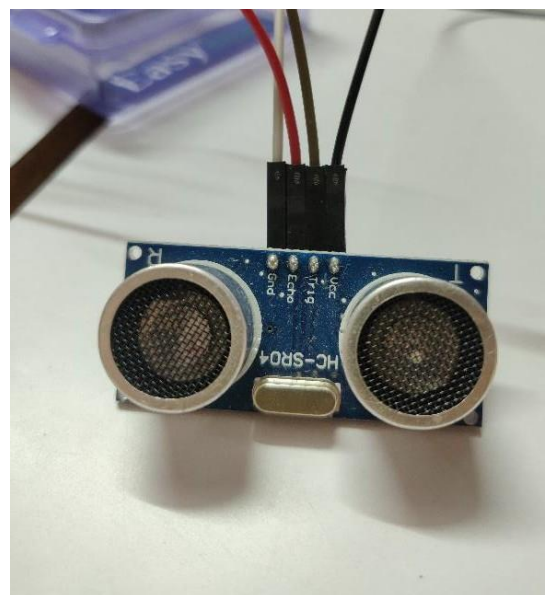


Fig (iii)

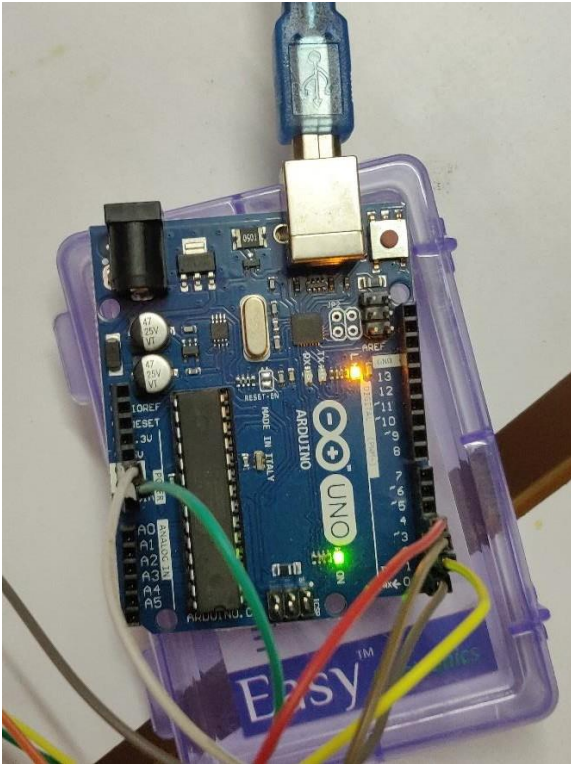


Fig (iv)

System software includes Arduino IDE and python GUI. To run this model, the python code will be executed on python GUI first. It matches gestures with predefined conditions and prints on python output shell.

5. RESULT

The gesture recognition using ultrasonic waves is found to be correct and reliable. The methodology for testing comprised of movement of single hand or multiple hands. Single hand movement was detected accurately. once there are multiple hands, the movement isn't detected accurately. The detection failed to take that under consideration the background space. The noise in human sonic range failed to have an effect on the detection. In our work, we've got enforced Arduino based mostly hand gesture management of our laptop, wherever few hand gestures created in front of the laptop/pc can perform outlined tasks within the computer while not using mouse or keyboard.

6. APPLICATION

Gesture recognition is helpful in process data from human beings that's not sent through speech or alternative ways. This technology is helpful in following areas:

- Immersive gaming technology: Gestures may be control management interactions with the gaming console and provides an additional interactive and immersive expertise.
- Control through facial gestures: This technology may be used for applications with even additional preciseness like recognizing face gestures. this can be useful in things once users cannot use alternative input interfaces like mouse or keyboard or perhaps hand gestures. this could be additionally useful in applications like mood sensing.
- Alternative computer interfaces: sturdy gesture recognition may be used to accomplish common tasks performed historically with this input devices like mouse or keyboard. Gestures, in conjunction with alternative methodologies like speech recognition may be created to manage the electronic appliances and gadgets fully or with no need to sort or bit.
- Remote control: By using gesture recognition, it's doable to use hand alone as a far-off management for varied devices. The signal should not solely indicate the required response, however conjointly that device to be controlled.
- Home Appliances control: it's doable to increase the gesture recognition technology to manage the home appliances.

7. CONCLUSION

this article presents one among the solutions among numerous others, for operating a pc with help of hand gestures. it's one in every of the simplest ways in which of interaction between human and pc. it's a value effective model that is only supported Arduino UNO and ultrasonic sensor. The python IDE permits a seamless integration with Arduino UNO so as to attain completely different process and dominant technique for making new gesture management answer.

8. REFERENCES

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