​***LEAP MOTION***

**STATEMENT ABOUT THE PROBLEM :-**Gesture control is a technology in computer science with the goal of interpreting human gestures​. One such way is using a motion sensor device,the technology popularly known as “LEAP MOTION”​. This enables humans to interact with the computer without physically touching it. It enables us to control certain functions on our computer/Laptop by simply waving our hand in front of it.

**WHY IS THIS TOPIC CHOSEN ​:-​**This project is chosen because we

know that laptops with functionalities like gesture control are really expensive. They probably cost us about a lakh, but our general purchase lies between 45000-60000.So to extend this functionality to cheaper laptops, we are using a combination of arduino toolkit and a couple of ultrasonic sensors to implement gesture control.

**OBJECTIVE AND SCOPE OF THE PROJECT​:-​**The main objective of the project is to control various operations in an application. This project is set to enhance the ease of use. The world has moved from keypads to touch screens and then to gesture controls and voice commands. The end user likes to have everything at the tip of their fingers and to provide this functionality we are using this project for incorporating hand gestures in a budget oriented laptop/computer.

The scope of the project is to control applications using simple hand gestures. The basic requirement is an arduino toolkit and ultrasonic sensors and language used will be python. We aim to cover gestures like moving hand towards the sensors for fast forward in VLC application and also scroll up a web page depending on the application running at that time.

The reverse will happen when we move our hands away from the sensor. Also swiping the hand across the sensors will perform “quick switch” between two applications. These are some basic operations that we have aimed along with traditional controls like volume adjustment and play/pause. This project is aimed to be completed by april, 2018.Also future aspects of the project can be to move from traditional technology to touchless technology at a bare minimum cost.

**METHODOLOGY: -​**The concept behind the project is very simple. We will place two Ultrasonic (US) sensors on top of our monitor which will read the distance between the monitor and our hand using Arduino, based on this value of distance we will perform certain actions. To perform actions on our computer we use Python **pyautogui library. The** commands from Arduino are sent to the computer through serial port (USB). This data will be then read by python which is running on the computer and based on the read data an action will be performed.

The important part of this project is to write a program for​ Arduino such that it converts the distances measured by both the sensors into the appropriate commands for controlling certain actions.

We use python programming language to implement our next part of the code. We use python for establishing a serial communication with​ Arduino through the correct baud rate and then perform some basic keyboard actions.

The first step with python would be to install the p​*yautogui ​* module.

Now we will map buttons to various gestures that are detected by the ultrasonic sensors. This mapping of buttons will help us to control various actions to be performed in the computer.

The various actions performed by us are as follows:

**· Switch to Next Tab in a Web Browser**

**· Scroll Down in a Web Page**

**· Scroll Up in a Web Page**

**· Quick switch between two Tasks (Chrome and VLC Player)**

**· Play/Pause Video in VLC Player**

**· Increase Volume**

**· Decrease Volume**

**PROCESS DESCRIPTION:-**

* When we swipe your hand in front of the Right Ultrasonic Sensor. This will move to the Next Tab.
* When we place our hand in front of the right ultrasonic sensor and slowly move towards the sensor it should scroll up the page in a web browser and similarly when moved away it should scroll down a web page.
* Also when VLC media player is running placing our right hand in front of the ultrasonic sensor for a small duration and then moving towards the sensor the video should fast forward or if moved away it should rewind.
* When both the hands are placed up before the sensor at a particular far distance then the video in VLC player should Play/Pause.
* When left hand is placed up before the sensor at a particular near distance and then if moved towards the sensor the volume of video should increase and if moved away the volume should Decrease.
* Swipe your hand across both the sensors (Left Sensor first). This action will switch between Tasks.

**HARDWARE & SOFTWARE USED:**

* Windows 7 or above
* Intel core i3 or above
* RAM-2GB or more
* Arduino Toolkit(UNO)
* Couple of Ultrasonic sensors.
* Connecting wires.

**TESTING TECHNOLOGIES USED:**

**Alpha testing**

Alpha Testing is one of the most common software testing methods. Here the tests occur at the developers’ site. They observe the users/clients and jot down the problems. This kind of testing is done when the project is about to reach its completion and upon the result of the test, changes can be made.

**Beta Testing:**

Beta Testing is also known as field testing. It is performed at the customers’ site. It is the second phase of software testing in which some selected users are given the software to try out. It can be considered “pre-release testing”. In case of any imperfections, changes could be made before final release of the product.

**Black box Testing:**

Black Box Testing is also known as Behavioral Testing. It is a software testing scheme in which the internal structure of the article being tested is not known to the tester. These tests can be both functional and non-functional.

**White box Testing:**

White box testing is also known as open box testing/transparent box testing, whereby the internal structure of the article being tested is known to the tester. Here, the tester chooses inputs to exercise paths through the code and determines the fitting outputs. This kind of testing can be started at earlier stage, and the testing is more thorough with the possibility of covering most paths.

**LIMITATIONS:**

The main limitation of the project is the accuracy with which it detects the gestures. Since the project does not guarantee 100% accuracy special care has to be taken about distance from the sensors,movements,placement of the sensors etc.

**What contribution will the project make?**

With the advent of technology the world is moving at a faster rate. People want to accomplish a task with minimal effort. This is a project which would require a minimal effort to accomplish some of the above mentioned tasks. Also the cost for the required hardware used for achieving our task is very less compared to a high end laptop.

**CONCLUSION:-**

Controlling applications using gesture or motion has been the trend with the transition from touch interface to touchless technology. But this requires implementation of various algorithms and incorporation of Artificial Intelligence.

But we are trying to achieve this using simple hardware and few lines of code, so that even budget conscious people will be able to experience this technology with little programming knowledge and an arduino UNO toolkit and ultrasonic sensor.