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# Software Requirements Specification

for

## <Games Using Hand Gestures>

Version 1.0 approved

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## Revision History

Name	Date	Reason For Changes	Version
Syed Muhammad Ali	20-May-20	None	1.0

# 1. Introduction

## 1.1 Purpose

The product we have use is Hand gestures devise using Arduino Uno.

### 1.1.1 Vision Statement

Vision based Gesture recognition has the potential to be a natural and powerful tool supporting efficient and intuitive interaction between the human and the computer. Visual interpretation of hand gestures can help in achieving the ease and naturalness desired for Human Computer Interaction (HCI).

## 1.2 Document Conventions

This document follows MLA Format. Bold-faced text has been used to emphasize section And sub-section headings. Highlighting is to point out words in the glossary and italicized text is Used to label and recognize diagrams.

## 1.3 Intended Audience and Reading Suggestions

This document is to be read by the development team, the project managers, marketing Staff, testers, hardware specialist. The SRS has been organized approximately in order of increasing specificity. The developers and project managers need to become intimately familiar with the SRS.

## 1.4 Product Scope

This study deals with the problem of developing a vision-based static hand gesture recognition algorithm to recognize the following six static hand gestures: Open, Close, Cut, Paste, Maximize, Minimize. Refer to the project scope document for further information.

## 1.5 References

- [1] G. Murthy, R. Jadon, International Journal of Information Technology and Knowledge Management, 2009, 2, 405–410.
- [2] D.-H. Lee, K.-S. Hong in 5th International Conference on Computer Sciences and Convergence Information Technology, IEEE, pp. 1092–1097.
- [3] X. Zhang, X. Chen, W.-h. Wang, J.-h. Yang, V. Lantz, K.-q. Wang in Proceedings of the 14th international conference on Intelligent user interfaces, ACM, pp. 401–406.
- [4] M. P. GOSLIN, J. L. OLSON, Combination gesture game mechanics using multiple devices, 2019, US Patent App. 10/317,988.

## 2. Overall Description

### 2.1 Product Perspective

The software product being developed is for a new portable stand-alone device which functions as a hand gestures device for video/audio and pages input and common signs. The product works with software products like an Embedded Operating System. The product uses hardware specially designed for this purpose which is called Arduino Uno. The Arduino Uno is an open-source microcontroller board based on the Microchip atmega328P microcontroller and developed by Arduino. The board is equipped with sets of digital and analog input/output pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable. It can be powered by the USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts. It is also similar to the Arduino Nano and Leonardo. The hardware reference design is distributed under a Creative Commons Attribution Share-Alike 2.5 license and is available on the Arduino website. Layout and production files for some versions of the hardware are also available.

### 2.2 Product Functions

1. Read the gesture through ultra sonic sensor, recognize it and takes as an input
2. Accept movement of hand in different ways through which it can do the final work
3. The backend programming provide the sign the work through which the following actions take place  
i.e., page changing, changing the volume of audio and video, changing the Google chrome tabs etc

### 2.3 User Classes and Characteristics

#### 2.3.1 Customer:

Remote customers most frequently use the device for ease and replacement of mouse. Some of the functions of this device will replace mouse and make it easy for every kind of person and for different age's numbers also. It will make the easy to play games and other task such as rewinding and audio or video and changing pages and also in the work of MS office by swapping pages through up and down.

### 2.4 Operating Environment

The software will operate with the following software components and applications:  
The software being developed will be running under Python programming language. The hardware that will be running these programs is being developed for many project that appear in this document in section 3. The synchronization procedures will be written to interface with Windows XP, Windows Vista, Windows 8/8.1 and Windows 10.

## 2.5 Design and Implementation Constraints

1. Synchronization: uses USB 2.0, connects only to Windows XP, Windows Vista, Windows 8/8.1 and Windows 10.
2. Ports: In the arduino, pins 0-7 are controlled by port D and pins 8-13 are by port B. Advantages of using ports: Faster than going per pin, takes up less code for a smaller program.
3. Ultrasonic Sensor: The HC-SR04 ultrasonic sensor uses SONAR to determine the distance of an object just like the bats do. It offers excellent non-contact range detection with high accuracy and stable readings in an easy-to-use package from 2 cm to 400 cm or 1” to 13 feet.

## 2.6 User Documentation

For user documentation and information, please consult section 4: External Interface Requirements and attached user manual.

## 2.7 Assumptions and Dependencies

It is assumed that the hardware designed will work correctly with the third-party Python Programming language editor or coding software and the developed software. Because the device acquires backend updates through USB2.0 the customer must have a computer with a USB2.0 port, and have a USB2.0 connector of arduino.

# 3. External Interface Requirements

## 3.1 User Interfaces

The Games using hand gestures through arduino user interface has been specifically designed with their customers in mind, giving them convenience while they use other programs and games. This device makes sure at every point, that the customer or users spends most of the time using the device rather than using mouse and in some point also keyboard.

The user can select multiple programs to deal with this device including some kind of games for example pinball etc and some computer programs such as in MS word, infotainment programs and internet browser.

This device offers easy scroll options to navigate the screens efficiently and managing the programs.

## 3.2 Hardware Interfaces

This device contains a USB cable which one side is Type B which connect the arduino and other side is a simple USB 2.0 which connects with the computer.

This device also contains 2 Ultrasonic Sensor through which the gestures expression is done with. Pins cable also be needed to connect the Ultrasonic Sensor with the arduino.

### 3.3 Software Interfaces

The Games using Hand gesture is run with Python programming language. This device uses synchronization software that is compatible with Windows operating systems

### 3.4 Communications Interfaces

Users can connect their device to their computers using a Type B USB cable. Users can easily update their device software when connected to the computer. Whenever the user connects the device to the computer, the device updates itself. The update should not take any longer than 10 minutes.

## 4. System Features

*<This template illustrates organizing the functional requirements for the product by system features, the major services provided by the product. You may prefer to organize this section by use case, mode of operation, user class, object class, functional hierarchy, or combinations of these, whatever makes the most logical sense for your product.>*

### 4.1 System Feature 1

#### 4.1.1 Objective

To reduce the use of mouse and of keyboard too on some point.

#### 4.1.2 Priority

This requirement is medium priority.

#### 4.1.3 Source

The source of this use case is the customer.

#### 4.1.4 Actors

An end user of the device (a customer) would be the relevant actor for this use case

#### 4.1.5 Flow of Events

##### 4.1.5.1 Basic Flow

4.1.5.1.2 User connect wires

4.1.5.1.3 Device displays and run the program

4.1.5.1.4 User uses hand gestures

4.1.5.1.5 The computer programs are run through this

### 4.1.6 Requirements

4.1.6.1 System should have python programming language editor

4.1.6.2 System should have USB 2.0 port

### 4.1.7 Gestures

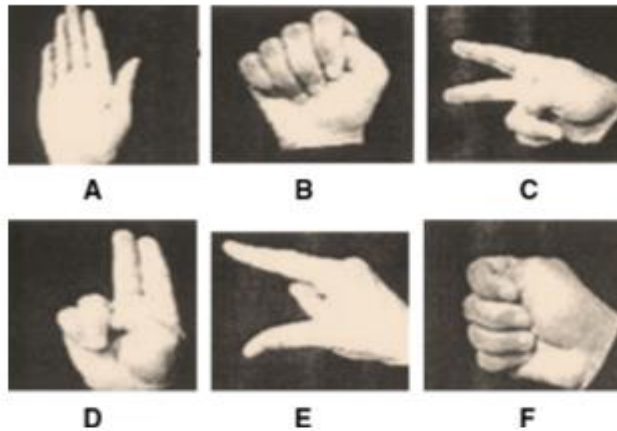


Fig. 2 Six static hand gestures: Open, Close, Cut, Paste, Maximize and Minimize

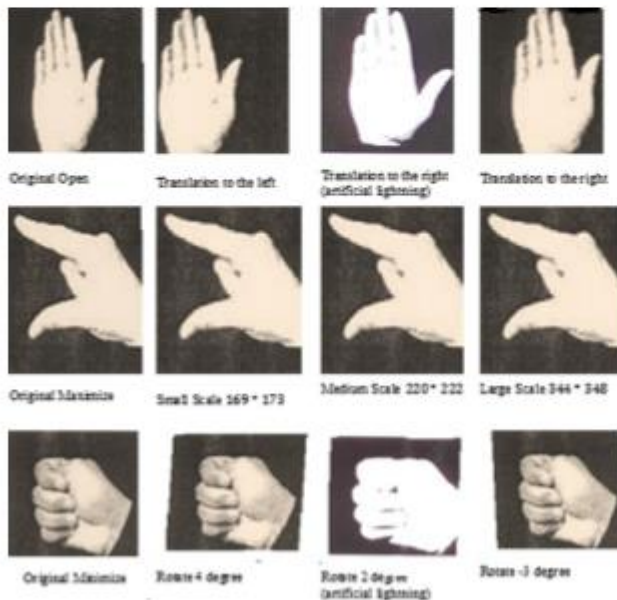


Fig. 3 Hand gestures images under different conditions

## 5. Other Nonfunctional Requirements

For information regarding nonfunctional requirements, refer to section 3: System Features. Each feature has its requirements listed alongside the feature information. There are no additional Non Functional Requirements.

## **6. Other Requirements**

For information regarding functional requirements, refer to section 3: System Features. Each feature has its requirements listed alongside the feature information. Special requirements for each system feature are also mention in section 3. There are no additional Functional requirements.

## **7. Appendix A- Glossary**

SD – Secure Digital. A widely available format for flash memory cards.

USB – Universal Serial Bus. A serial bus standard that is used in many computer peripherals and other electronic devices