Software Requirements Specification

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1. INTRODUCTION

Human motion recognition has gained enough attention in the field of human computer interaction, HCI. Human gesture recognition consists of identifying and interpreting automatically human gestures using set of sensors. HOVER games is a web-application, based on capturing the hand gestures of users through the webcam using Computer Vision and analyzing them to perform events and interact with the website which was earlier done with the help of Keyboard and Mouse.

1.1 PURPOSE

The purpose of this project is to present a website platform for gamers which provides a newer platform where users can interact with the website and certain indie games with the help of motion of their hands using human computer interaction, HCI, instead of traditional keyboard, mouse and joystick gaming.

1.2 SCOPE

The scopes of this project are:

- Enabling Facial Recognition to identify different unique users during login
- Integrating Speech Modules to lower the keyboard-mouse interaction
- Embedding more gestures for better user experience
- Smartphone View of the website which uses touch controls to access the website

1.3 REFERENCES

References for the information gathered are hereby followed:

[1] V. Pavlovic, R. Sharma, and T. S. Huang, Visual interpretation of hand gestures for human-computer interaction: A review, IEEE Trans. Pattern Anal. Mach. Intell. 19, 1997, 677-695.
[2] W. Freeman. Computer vision for television and games. In Recognition, Analysis, and Tracking of Faces and Gestures in Real-Time Systems, page 118,1999
[3] D.Heckenberg and B. C. Lovell, “MIME: A Gesture-Driven Computer Interface", Proceedings of Visual Communications and Image Processing, SPIE, V 4067, pp 261-268, Perth 20-23 June, 2000
[4] M-H. Yang, N. Ahuja, Recognizing hand gesture using motion trajectories. Proc. of IEEE CS Conference on Computer Vision and Pattern Recognition. 1999, pp. 468-472.
[5] J. Davis and M. Shah. Gesture recognition. Technical Report CS-TR-93-11, University of Central Florida, Orlando, FL 32816, 1993.

1.4 OVERVIEW

With the massive influx of computers in our society, human computer interaction, or HCI has become an increasingly important part of our daily lives. Hand gesture recognition systems for virtual reality applications provides the users an enhanced interaction experience as it integrates the virtual and real world object. Virtual world object such as game objects can be easily integrated with the human hand gestures and the actual game can be played with just gesture recognition. Games have always played an important part in the entertainment field from the early phases. Developments in the gaming sector has always been exponentially. Enabling user to play and experience the website without the use of keyboard and mouse, which are used for interaction over any normal website, but with the help of common up, down, left right gestures of their hands. Human Computer Interaction occurs due to computer vision and it helps in interacting with the website.

2. GENERAL DESCRIPTION

HOVER Games is a website which will have none or minimal dependency on the keyboard or mouse of the user. The whole website can be interacted easily with the gestures of the user's hands such as moving the hands up, down, left, right and several other gestures for various different actions and events on the website. The major feature of the website is to provide a game dashboard which features unique indie games which were earlier played the traditional way of clicking keys, but can now be played with just hovering the hand in the air.

2.1 PRODUCT FUNCTION

- The user interacts with the website navigation using gestures of hands and not using either keyboard or mouse.
- This product works on the Human Computer Interaction, using Computer Vision and processing real time video provided by the webcam to obtain appropriate gestures.

2.2 USER CHARACTERISTICS

- Gain a new experience of interacting with a website like never before
- Play exciting games without the use of keyboard and mouse
- Check themselves up in the leaderboard and see where they rank for a particular game among other users

2.3 GENERAL CONSTRAINTS

- The website will be deployed on a server, so the system needs to be connected to a proper internet connection to use this website.
- The website uses the Human Computer Interaction based on Computer Vision to record different motions and thus a webcam is used for the purpose.
- A keyboard or a mouse device to authenticate or navigate to the website and allow required permissions to run the website
- A centralized database management system needs to be implemented which can be used from anywhere.

3. SPECIFIC REQURIMENTS

The Specific Requirements of the project HOVER Games are:

From user point of view -

1. Internet Connection
2. A suitable Web Browser, latest version of Google Chrome recommended
3. A webcam to enable Computer Vision and Human Computer Interaction
4. A keyboard or mouse device to give permissions to certain prompts before the website responses

From Developer end –

1. Use of Computer Vision and Neural Networks to understand gesture recognition
2. Advanced knowledge of programming languages HTML5, CSS3, JavaScript(ES8), Python(3.7.2)
3. Implementation of Front-End Library ReactJS(16.8)
4. Basic knowledge of Back-End Framework Flask(1.0.2)
5. Ability to connect MongoDB(4.0) to the project

3.1 FUNCTIONAL REQURIMENTS

HOVER Games majorly works on Human Computer Interaction and Computer Vision with the help of which gestures can be recorded. Gestures are processed using Neural Networks and to record the gesture, a webcam is required or any other camera device. Internet Connection is required to access the website.

3.2 NON-FUNCTIONAL REQURIMENTS

3.2.1 PERFOMANCE

The web application processes major of its tasks on client side thus have enhanced performance as it does not need to handle the server load.

3.2.2 RELIABILITY

The website does not store any user information except a unique id and a generated password.

3.2.3 AVAILABILITY

The website is deployed on the server and can be accessed remotely through any computer device which has proper internet connection.

3.2.4 SECURITY

The website does not deal with huge security issues as it does not store vulnerable user data except a unique id and password.

3.2.5 MAINTAINABILITY

The main maintainability required is to develop newer games and use better hand gesture recognition algorithms.

3.2.6 PORTABILITY

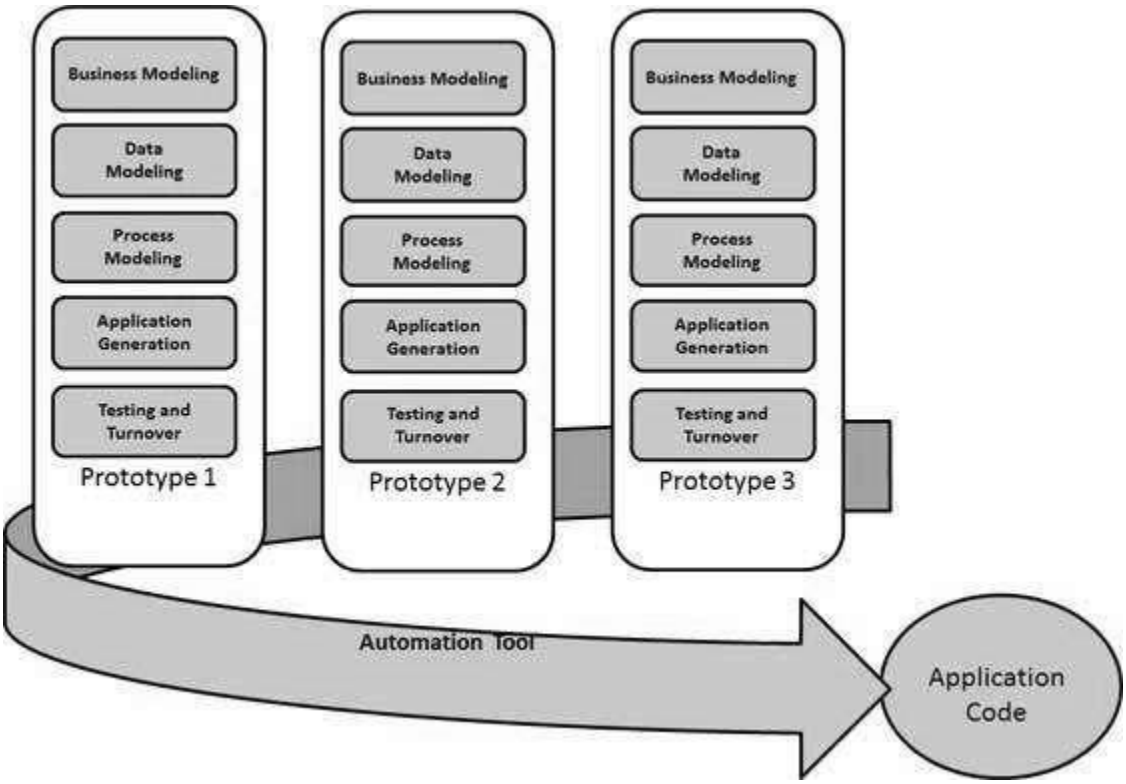
The website is deployed on the server and thus it can be accessed from any computer device which has suitable internet connection and any latest web browser.

4. SDLC MODEL

4.1 MODEL USED

RAD Model

RAD Model is a Rapid Action Development Model. It is a type of incremental model. In the RAD Model the components or functions are developed in the parallel for rapid and fast development. The developed modules are time boxed, delivered and then assembled into a working prototype, Thus it is easy to implement when a product can be divided into several modules and when working in a team to get faster delivery.



Reason for use

Our aim was to develop a web application that can be controlled using hand gestures which uses ReactJS on the frontend and through Computer Vision and Image Processing in browser we tend to make Human Computer Interaction more comprehensive and enjoyable user experience. Thus we worked on various modules which were to be developed sepearately such as front end which was made using ReactJS(HTML, CSS, JavaScript), Human Computer Interaction using Image processing with Tensorflow.js and HandTracking.js, Back-end which was made using Flask, a micro framework on python and MongoDB for user base login system and player rankings.

4.2 TIMELINE CHART

Task	Jan	Feb	Mar
Front End			
Human Computer Interaction			
Back End			
Database			