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Leap Opticals for Mapping

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Abstract: *In the era where crunch of time is the biggest problem, we all want things to be done within minutes. So, somewhere and somehow to curb this down, e-commerce sites have evolved. Whenever you want to buy yourself an optical, there are always two options for you: Shop or E-commerce. In the former, as already said, the problem is we want things to be done in minutes, but that's impossible. And in the latter, the uncertainty of choosing the best frame and limited number of options make it difficult. Here, we come, the LEAP OPTICALS to solve this problem of folks by giving them a virtual platform to choose their own optical. The application is a great combination of three technologies including Space Mapping which helps to match your eyes with right frame, they just need to upload and picture of them and check the options available there, the next is leap motion technology making it easy to use for the customers by introducing Swiping methodology and an open-source e-commerce platform called Magento, all of the three make it a junction for the frame-lovers. We aim to solve the problems of the customers with time crunch or others with problem in choosing their Opticals in e-commerce sites.*

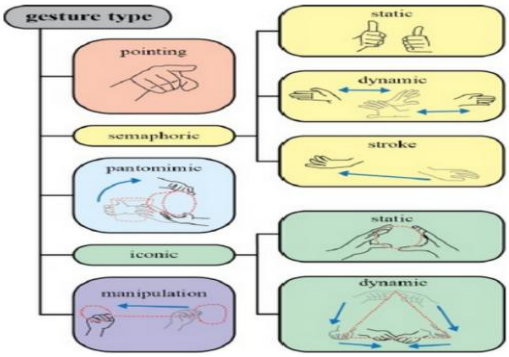
Keywords: *Leap Motion technology, Face Mapping, E-commerce*

I. Introduction

This paper studies the new possibilities to gesture interfaces that emerged with a Leap Motion sensor. The Leap Motion is an innovative, 3D motion capturing device designed especially for hands and fingers tracking with precision up to 0.01mm. The outcome of the thesis is the LeapGesture library dedicated to the developers for Leap Motion Controller that contains algorithms allowing learning and recognizing gestures. The authors examined the data provided by the sensor in context of recognition of hand poses (static gestures), hand movements (dynamic gestures) and in task of a finger recognition. The static gestures are recognized using the Support Vector Machine (SVM) with median filtering an input data and using the correspondences between consecutive recognitions. The thesis contains evaluation of different feature sets, which have a significant impact on the recognition rate. The chosen feature set allowed to recognize a set of five gestures with 99% accuracy and a set of ten gestures with 85%. The dynamic gestures (movements of a hand and fingers) are recognized with the Hidden Markov Models (HMM). Recognition with HMMs allowed to achieve accuracy of 80% for a set containing six classes of dynamic gestures. Finger recognition algorithms proposed in this thesis works with 93% accuracy on a recorded dataset. The LeapGesture library contains presented approaches using a C++ interface, which can be easily used in any application for many purposes.

Introduction to gesture recognition:

The vast multiplicity of gestures that human can perform makes the number of classes to which we can divide these gestures substantial. Therefore the classification can be performed in different ways, taking into account different characteristics of gestures. The majority of presented theories include the knowledge that originates from a variety of science such as anthropology, linguistics, cognitive science and other. In this Section, review of the most common gesture classifications in Human Computer Interaction (HCI) context is provided. It is focused mainly on gestures that relate to hand and arm movements. The basic classification of gestures is the division into static and dynamic gestures. Group of static gesture includes fixed gestures which are not take into account the changes in time. Dynamic gestures is group of time varying gestures



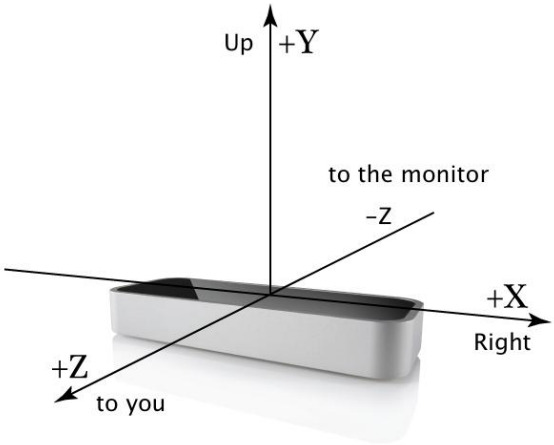
II. Swipe Gesture

In our concept we are using Swipe Gesture Swipe Gesture objects are generated for each visible finger or tool. Swipe gestures are continuous; a gesture object with the same ID value will appear in each frame while the gesture continues.

```
controller.enableGesture(Leap::Gesture::TYPE_SWIPE);
```

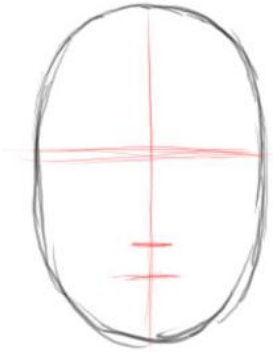
III. Controller

Leap Motion is an USB sensor device released in July 2013 by Leap Motion Inc., designed to provide real-time tracking of hands and fingers in three-dimensional space with 0.01 millimeter accuracy. It allows a user to get information about objects located in device's field of view (about 150 degree with distance not exceeding 1 meter). Details of how Leap Motion performs 3D scene capturing have not been revealed by Leap Motion, Inc. However, it is known that hardware consists of three infrared LEDs which are used for scene illumination, while two cameras spaced 4 centimeters apart capture images with 50– 200 fps framerate, dependent whether USB 2.0 or 3.0 is used.



IV. Face Mapping

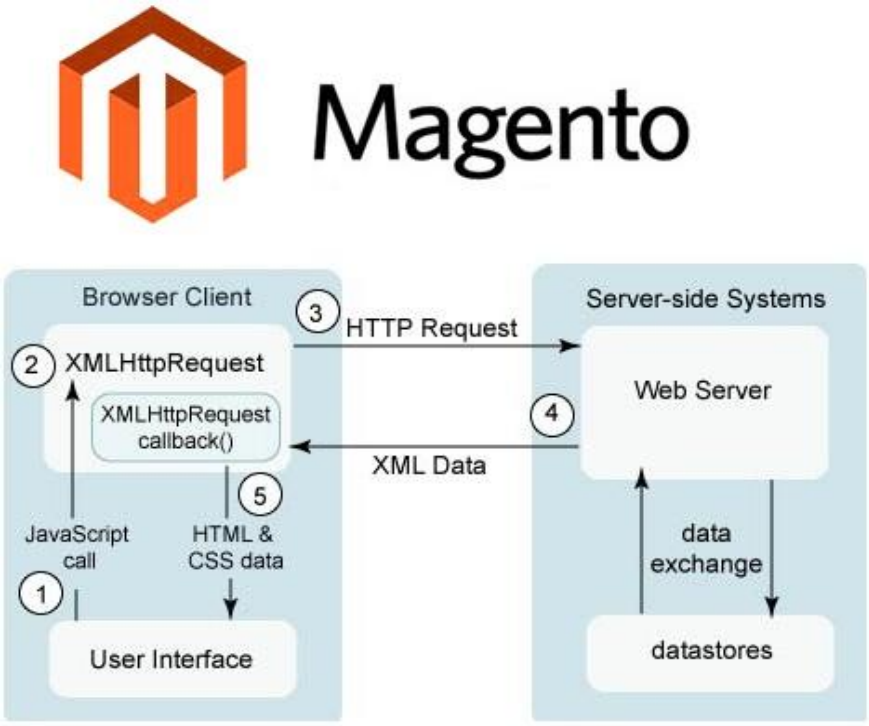
Face mapping is the ability to see the reflection of the body's organs on each part of the face by observing the face's complexion, such as Eyes, Nose, here we are using Face Mapping for Detection of Eyes.



Though humans generally have a tendency to look at a region just below the eyes and above the nose toward the midline when first identifying another person, here we are using eyes to match the Opticals.

V. Magento

Magento is an e-commerce platform built on open source technology which provides online merchants with a flexible shopping cart system, as well as control over the look, content and functionality of their online store. Magento offers powerful marketing, search engine optimization, and catalog-management tools.



AJAX (aka asynchronous JavaScript and XML) driven websites especially Magento powered E-commerce stores often loads much faster in comparison to those which are solely dependent on Magento's default libraries. Using AJAX in Magento offers great advantage in terms of speed and user experience.

VI. Conclusions

This Paper describes the use of LeapGesture to ease the customers' choices for optical, which is the hand gesture recognition library dedicated for Leap Motion Controller. This library includes modules for static and dynamic gesture recognition and also fingers recognition. Developed library provides recognition of all types of action gestures. Static action gestures are supported by static gesture processing module, while the dynamic gesture processing module provides recognition of dynamic action gestures. Additionally, comparison of existing gesture recognition methods, implementation of additional modules enabling the recording and reviewing of gestures, creation of sample gestures database and performance of tests has been conducted.

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