

Survey on Sixth Sense Technology using real time hand gestures

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Abstract— Sixth sense technology is the technology which helps to bring digital world and real world together. Sixth sense is the wearable device which observes the real world scenarios and help to take right decision using the digital world's information. The technology helps to interact with digital world with the natural human hand gestures. The device components are mainly the camera, projector, mirror and computing device like mobile phone. Steve Mann designed the first model which is the root to the sixth sense technology. Later on, the MIT lab technician, Pranav Mistry builds the prototype of the Sixth sense technology which is portable and easy to use. This technology helps us to interact with digital world and real world with hand gestures.

Index Terms— Sixth sense Technology, Human Computer Interaction, OpenCV, Hand Gesture Recognition, Image Processing, Thresholding, Finger Tracking, Convex Hull.

1 INTRODUCTION

WE are known to only five senses: sight, hearing, touch, smell and taste. These are the senses which help us to take decisions in our daily life events. Sixth sense gives the extra perception to take the daily life decisions effectively. Using natural hand gestures Sixth sense gives a way to interact with the digital world and use that information in the real world. The technology uses the hand tracking, hand recognition, image segmentation and image preprocessing, etc. methods to recognize hand gesture and trigger the desired event. The camera catches the gesture and matches it with the pre-assigned gestures from the database. The Sixth sense technology has wide variety of applications and useful in many fields of work. The Sixth Sense technology helps to gain more information about the real world things with ease by using simple hand gestures. This makes the HCI very flexible. The gestures triggers the desired event assigned to it. The gestures are customizable and give full control to the users. The users can assign the gestures to the event or function according to their ease. With this technology, a new form of human-computer interaction is introduced. The role that image processing and computer-vision can play in our life is presented in such technology. The information collected by human after sensing from real world is insufficient to take right decision everytime. The most of useful information is available on the internet which can help the human to take the right decision. Sixth sense technology bridges the gap between digital world and physical world.

1.1 Overview

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Earlier Steve Mann introduced the first headworn system and later on the neckworn version. After the huge gap the MIT technician, Pranav Mistry introduced the advanced 6th Sense technology system which can change the way humans interact with the internet and get the knowledge.

The aim of this project is to interact with the world of internet using the real time hand gestures. We create the database to give the users freedom to use their own gestures and don't have to assign it again and again. The only input to the system is the gestures captured by camera. These gestures will be matched with the gestures from database and triggered the appropriate function. The users need to save the gestures before using the system. When the system will start the camera will track and recognize the hand gesture. As the tracking will be real time the system should be faster enough, so will be using the Viola and Jones object detection algorithm.

2 GENERAL SYSTEM DESCRIPTION

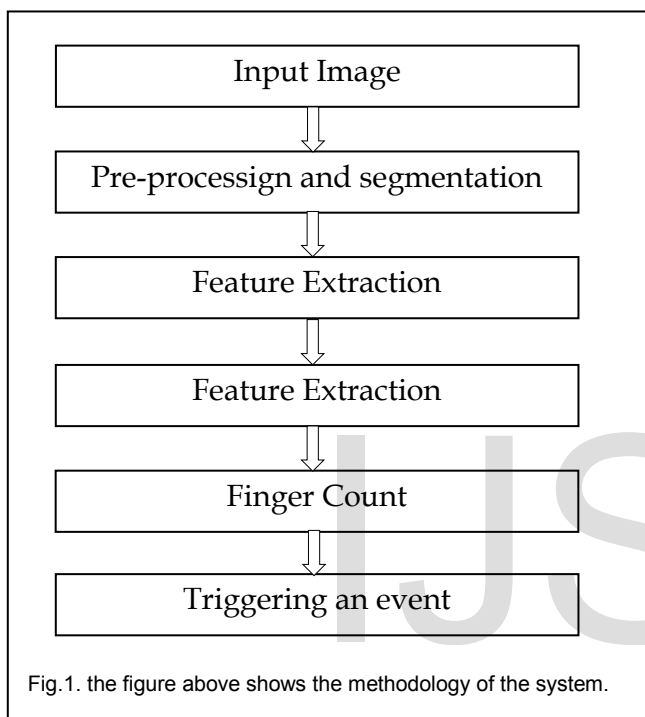
The system is comprised of different hardware parts: camera, projector and computing device. The camera will capture the gestures of the user and the physical world and send it to the computing device for pre-processing. The projector can project the images and other information to any plane surface, so that users can enjoy it with bigger screen. The computing device like mobile phone can process the gesture send by camera and trigger the event assigned to the gesture. The computing device is connected with the other components wirelessly.

In the existing system the users has to wear the color markers on the tip of fingerprints, but in our proposed system there is no need of color markers. We will use the real time hand tracking and gesture recognition system.

3 DATA COLLECTION AND METHODOLOGY

For this system, the data will be the gestures captured and assigned to the particular function. The gestures from the users are taken to do the pre-processing on the image.

The pre-processing is requiring tracking the human hand and capturing the right gesture. The input image is fetched from the camera at the faster rate. With the use of Viola and Jones object tracking, the hand is detected and tracked. The feature extraction is done to identify the gesture. The features are mainly centroid, thumb detection and the distance of tip of finger and centroid. The finger count and the distance can differentiate between the different gestures for different functions.



4 TOOLS TO USE

The main tools required for the project are “Visual Studio”, “Xampp”.

4.1 Visual Studio:

Microsoft Visual studio is the IDE used to develop computer programs. Visual studio supports 36 different programming languages and allows the code editor and debugger to support nearly any programming language whose services exists. In our project we will be using the C++ language along with the OPENCV technology which is mainly used for computer vision and Image processing work. It provides wrapper classed to use in C++ language.

4.2 Xampp:

Xampp is a free and open source cross platform web server solution stack package. The software can create the server on your local machine. It can also create the MYSQL database locally on the system. We will need the database to store and distinguish the gestures of different users. As Xampp is easy to install and use, we will use it to store our gestures in the database.

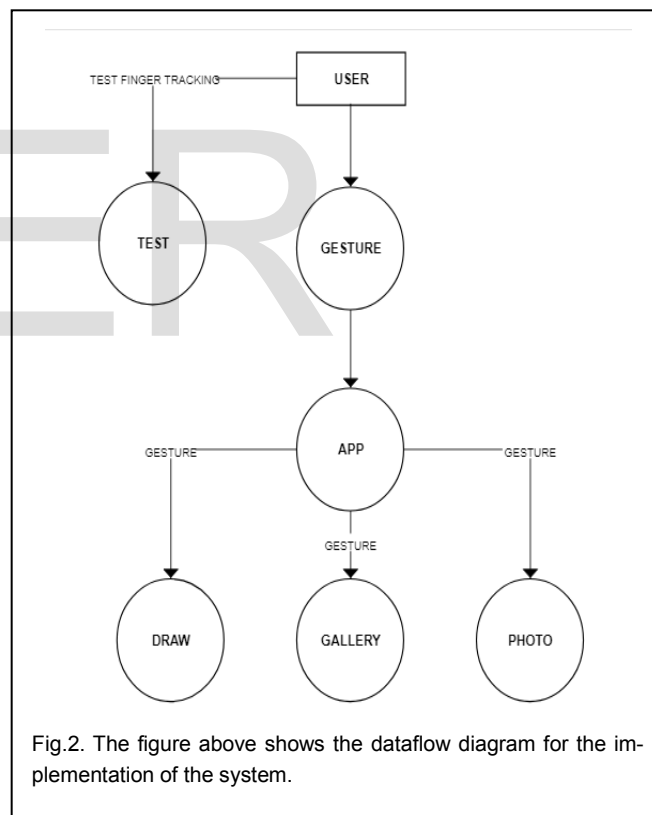
5 FLOW OF WORKING

The system will function in the following manner:

As the user login to the system the new database is created for every new user. User can test if camera is working or not and the gesture sample of the user is taken to identify the hand from the background. The more number of samples are taken in different light condition to make the system error free.

Users will have the freedom to assign customized gesture to each and every pre-defined function. With the start of the system the users hand is tracked and it will capture the frames at a faster rate. As the user makes any gesture the system will compare it with the gestures stored in database. If the gesture matches with any of the gesture, the particular event is triggered.

5.1 Dataflow Diagram



The main objects of our system would be User, Gestures and the Application. The Gestures are mainly the real-time gesture and the gestures stored in database. User will first test the finger tracking and gesture recognition and store the gestures in the database. When the system starts the

camera will capture the gesture and open the appropriate application or function according to it. On further users can control the functions within the application by hand gestures.

6 CONCLUSION

Though it is necessary to implement the proper working system, but we can conclude that with the help of the real time finger tracking and gesture recognition system it is possible to build the 6th sense technology. The new system will be markerless finger tracking system and will be more easy to use and will give more freedom to the human computer interaction.

REFERENCES

- [1] Vishmita Y. Shetty, Vinayak B. Rai, "Sixth Sense Technology," *International Journal of Science and Research*, pp. 2319-7064, 2012.
- [2] Dr. Ashwani Kush, "Sixth Sense Technology, A ner Paradigm", (unpublished).
- [3] Rhitvij Parashar, Preksha Pareek, "Event Triggering using hand gestures using OpenCV", *International Journal of Enginnering and Computer Science*, ISSN:2319-7242,2016.
- [4] Meenakshi Panwar, "Hand Gesture Recognition based on shape parameters", *Institutes of Electical and Electronics Enginnering*, 2325-6001, 2012.
- [5] Amiraj Dhawan, Vipul Honrao, " Implementation of Hand detection based Technique for Human Computer Interaction", *International Journal of computer Applications*,0975-8887,2013.