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IP Gaming Using Hand Gesture Recognition and Virtual Gaming Control

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Abstract- Image Processing Gaming is the latest trend in the Gaming market. Costly Systems like Kinect of Xbox360, PS3 are very good examples of such system. In this project we are going to achieve same functionality of such gaming systems using only our webcam. We will be able to play games using our hands. Hand and body detection is a part of OpenCV project which was used to bring object detection on Play Consoles. It will be a challenge to understand the functionality of OpenCV and simulation of playing games to our live gestures.

Keywords- OpenCV- Open Source Computer Vision, Kinect- Motion Sensing Input Device for Xbox360,HCI- Human Computer Interaction, Hand Gesture Recognition, contour Processing.

1 INTRODUCTION-

Human Computer Interaction has becomevery important in today's world. Existing HCI techniques likekeyboard, mouse, joysticks etc. limit the speed and naturalnessof our interaction. Hand gestures provide a more natural wayof communicating with the computer.In this project we are going to achieve same functionality of gaming systemsSuch as Xbox360 using only our webcam. Hand and body detection is a part of OpenCV project which was used to bring object detection on Play Consoles. It will be a challenge to understand the functionality of OpenCV and simulation of playing games to our live gestures.In this project we will be playing game using hand gesture. There will be a web camera installed on the PC and it will be capturing your image continuously.Recognize hand in image for playing game. In experiment, set controls according to the game .draw the rectangle on the image for recognizing the hand. If a person keeps hand in the particular area and recognized it in that area press the key using robot API.

2 LITERATURE SURVEY

Motion capture and depth sensing are two emerging areas of research in recent years. With the launch of Kinect in 2010, Microsoft opened doors for researchers to develop, test and optimize the algorithms for these two areas. J Shotton proposed a method to quickly and accurately predict 3D positions of the body joints without using any temporal data.

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Key prospect of the method is they are considering a single depth image and are using a object recognition approach.From a single input depth image, they inferred a per pixel body part distribution.[1]Leyvand T discussed about the Kinect technology. His work throws light on how the Identity of a person is tracked by the Kinect for XBox 360 sensor. Also a bit of information about how the changes are happening in the technology over the time is presented.With the launch of Kinect, there is a sea change in the identification and tracking techniques. The authors discussed the possible challenges over the next few years in the domain of gaming and Kinect sensor identification and tracking. Kinect Internationalidentification is done by two ways: Biometric sign-in andSession tracking.[2]A method to track fingertips and the centres of palmsusing Kinect was presented by Raheja. It appliethresholdingon the depth of hand regions for segmentation. Then the palmwas filtered and subtracted from the hand, so that only thefingers were left in the image. Under most situations when thehand was in front of the user, the fingers should be closest to theKinect with the shallowest depth. Therefore, by determining theminimum depth, fingertips were found. The center of the palmwas determined by finding the maximum of distance within theimage of the hand. When fingers were extended, the accuracy of detecting fingertips was nearly 100% accuracy, and that of palm centers was around 90%. However this method did not attempt at gesture recognition. He proposed another approach using depth data provided by Kinect to detect fingertips. First, it found hand points by thresholding on depth data, and then generated the convex hull containing the hand by Graham Scan. Fingertips

were detected by calculating the angle between candidate points.After fingertips were found, the mouse clicking motion was recognized and tested on the popular game Angry Bird; that is, it recognized only one gesture.

3 PROBLEM STATEMENT AND PROPOSED SYSTEM

Aim of the project is to introduce aneasy solution for efficient finger movement by performing

1. Capturing video from camera
2.Trigger Image Capture.
3. Apply Processing on input IplImage (OpenCV image)

a. Edge Detection: Edges are the sharp black shadow surrounding the objects.
b. Threshold Control: for controlling sharpness of edges.
c. Finding Contours. Contours are nothing but shadow areas of hand.
d. Drawing Contours on IplImage.
e. Detect ConvexHull for edges. Set the proper beginning of the contours.
f. Detect ConvexityDefect in the picture. Defects are the points which are having thick edges.
g. Detect ConvexityDefect ending points for the tip of our hand detection or tip of body detection.
h. Draw Circles on the defects we obtained.
i. Save the Co ordinates of the Defects obtained in each areas.

3. BackgroundSubtractionfor clearing background

4. Multithreading for gesture detection using convexity points extraction.

4 ARCHITECTURE

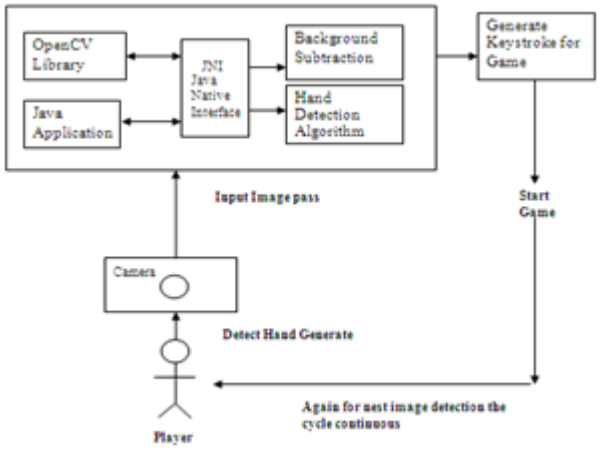

Fig1 Fig.1 System Architecture

The architecture diagram consists of:

- A player
- System OpenCV Library
- Java Native Interface
- Background Subtraction
- Hand Gesture Detection
- Key Stroke Generation

The given diagram has a single player playing a game through hand gestures using a web camera. The motions are detected using web camera and passed to the system for processing.

The system consists of OpenCV and Java Application, using these Hand Detection and Background subtraction is done. This processed image in the checked in which area it has occurred and its corresponding key event is called for action to be performed in the game. These steps are repeated till the player is playing the game.

5 METHOD

Contour Detection Algorithm*:*
Contours are sequences of points that represent a line/curve in an image. Every entry in the sequence encodes information about the location of the next point on the curve/line. Contour matching is most often used for recognizing and classifying image objects.

The contour model, containing pixels that are on the edge of (a part of) the object is placed on all possible positions in the search image (or another contour), computing a match value for every position. Search image (or another contour), computing a match value for every position. The match value is now based on the edge pixels in the contour model only. All the search image/contour pixels that correspond to an edge pixel in the contour model are added. The higher this value is, the better the resemblance between the contour model and search image/contour. Contour matching proves to be a more preferable choice over template matching as the matching algorithm is restricted to only the edge pixels rather than the whole image as in template matching. Hence it faster, yields sharp matches and invariant under imaging transformations like scaling, translation, rotation, intensity. However, the hindrance of this method is that since a smaller number of pixels is involved in recognition, the influence of each pixel is greater, i.e.a few deviating

pixels (due to noise, distortion) may hinder recognition.

6 BACKGROUND SUBSTRACTION

Background subtraction (BS) is a common and widely used technique for generating a foreground mask (namely, a binary image containing the pixels belonging to moving objects in the scene) by using static cameras.As the name suggests, BS calculates the foreground mask performing a subtraction between the current frame and a background model, containing the static part of the scene or, more in general, everything that can be considered as background given the characteristics of the observed scene.

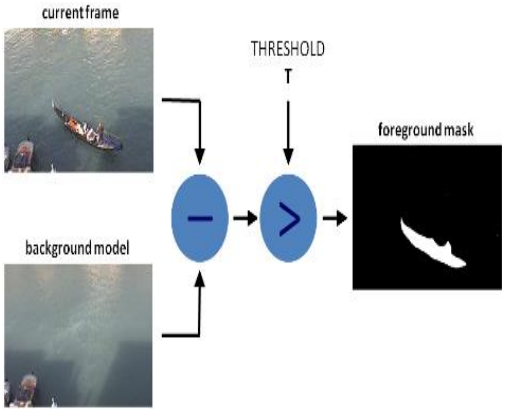

Fig. 2 Background Subtraction

7 CONCLUSION

Hand gesture recognition for real-life applications is very challenging because of its requirements on the robustness,accuracy and efficiency. In this paper, we presented how camera can be used for Detection hand gestures and can be applied to any game control. We are using camera as a detecting device as well as input device for Augmented Reality System.

8 REFERENCES

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