Click me to handle my projector using a webcam

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Abstract: Touch screens have become increasingly popular and widely used in most human-computer interfaces. We present a new low-cost touch display method based on handling projectors using image processing, in which we use object detection instance segmentation and key points detection to improve the efficiency of touch detection and reduce the probability of misrecognition. We are using a high-definition camera and Torch with red beam light that provides more touch accuracy which converts the camera coordinates to space coordinates. The main idea is to make it easy to handle a projector using fingertip processing using the OpenCV library. Here we handle some projector functionality like swipe left and right and virtual typing using Fingertip. We can easily convert a simple projector into an interactive projector using just a webcam through image processing.

Keywords: Image Processing, OpenCV, Camera coordinates -to- Space coordinates, Touch Detection, Infrared Touch Model.

I.   INTRODUCTION

There are many projectors that provide on-screen projector handling but they are very costly and also It is difficult to deploy on multiple platforms and if the requirement of a projector increases cost will also get an increase

The main target is to reduce the cost of projectors which required more deployment cost and purchase cost. We can easily convert a simple projector into an interactive projector using just a webcam through image processing.

The challenge is, from a single image alone there is generally difficulty in even distinguishing whether there is physical contact between the finger and the surface. The facility of acquiring certain 3D information about the illuminated workspace would be of much aid. A desirable way of making that possible is to use no additional sensor or instrument beyond what is already there - the projector and camera - by embedding structured codes into the projection. This way, the projector serves two purposes: the display device, as well as the 3D acquisition channel.

An algorithm of detecting multiple touchpoints on an imaging surface was implemented using the Python programming language and achieved detection of multiple fingertips. A webcam-based touch screen was proposed in which the main tools are image processing techniques. A projector and a camera were used to let any tabletop surface to which the projection is illuminated become a touch-sensitive computer screen. To capture only the selected area, we have used a region-growing algorithm that is then applied to the region to extract the whole finger.

The aim of the project is that at the time of using a projector it is very difficult to manage slides and projector screen as we need 2nd person to handle it either on laptop or desktop. And also, it is very difficult to manage things while the screen is projected. The main objective of this project is to handle most of the functionalities using just a fingertip. Our system provides features like virtual typing, slide handling features, zoom-in, zoom-out, and also mouse click features through which users can directly perform actions on projector curtain.

In brief, our system turns any normal screen to have touch features, and it has the advantages of low price, simple installation, and ease of use.

II.   LITERATURE SURVEY

●   Turn any display into a touch screen using an infrared optical technique. In this, the original RGB image captured from the webcam is first converted to the images represented in YCbCr and HSV color formats. Because of the need to control the effects of environmental light

●   Touch sensing for a projected screen using slope disparity gating. In this, the slope disparity is done because the system is that there won't be any interaction with the human face and other identifying

●   Implementation of a webcam-based touchscreen. Two webcams are needed. One webcam is placed in front of the screen to determine the relative location of touching the object, and of the screen to detect whether the object touches the plane of the screen.

● Make any surface as a touch screen where a touch pen is needed for the process. The four coordinates of the screen are assigned at the space these coordinates. When the user does touch on the projector screen, a map that touches coordinates with the actual laptop screen and takes appropriate actions

● a virtual keyboard is implemented by the homomorphism feature of OpenCV.

III. PROPOSED SYSTEM

3.1 Algorithm

1) Capture the video continuously from the web camera.
2) Extract the frames from the video and send them to the program.
3) With the help of a web camera detect the finger.
4) If a finger is detected then go to step 5 else go to step 3
5) Track the finger
6) Did finger touch the screen then go to step 7 else go to step 5.
7) Calculate the touch position on the screen i.e. X and Y coordinates on the screen
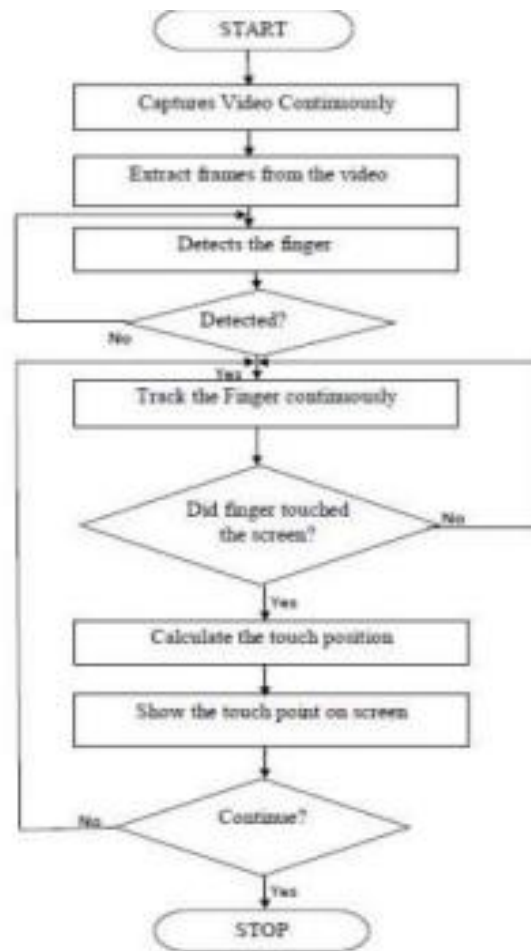8) Then show the touchpoint on the screen.
9) Stop

fig 1 Algorithm

3.2 SYSTEM ARCHITECTURE :

The user interacts with the system by touching his finger on the screen, webcam records the video continuously and this video is given as input to the program, and the program per_forms the extraction of frames from the video and scans the frame to detect the finger. Once the finger is detected the program performs a function i.e.tracking the finger continuously, during the tracking process the program checks if the finger is touching the screen or not if yes then it generates an output on the screen.
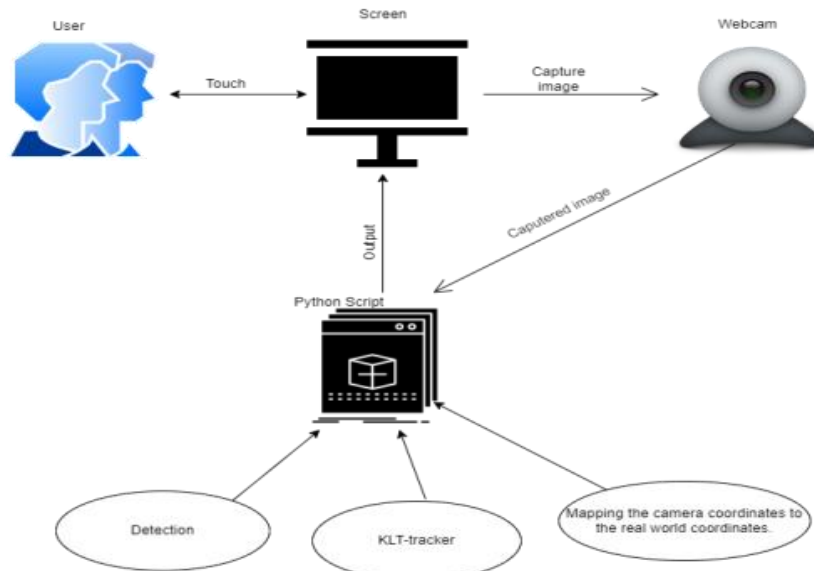
fig 2 System Architecture

IV.   CONCLUSION

We can conclude that our proposed system can convert the normal screen into a touchscreen using image processing. The system has the benefits of low cost and innovation. We realized a touch sensing algorithm that can both touch detection and fingertip localization from a single camera image.

V.   REFERENCES

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