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EYE THE SCREEN

SARAVANA KRISHNA S[1] **SURYAH A[2]** **SARATH KUMAR R[3]**

Department of ECE, Sri Krishna College of Engineering and Technology,
Coimbatore, Tamil Nadu, India

ABSTRACT:

The aim of the paper is to control the screen of smart phones using eye ball movement. As touch screen becomes costly implementing the control using eye ball would reduce the cost. To control the touch screen we record the eye ball using front camera and we select images at every certain interval. These images will be processed to a grey scale image and depending on the pixel range the image is processed and the centroid of the eye is calculated and the coordinates are sent to the control of the smart phone and thus the touch screen is controlled. We use image processing techniques to achieve the monitoring function towards the eye ball. By this technique the smart phone screen can be controlled using eye. This feature will enhance the comfort zone of the user and makes smart phones more smatter.

INTRODUCTION:

As the smart phone technology has been growing the importance of human and phone interaction is increasing rapidly. Most of the latest electronic devices use the touch screen technology. This technology does not have a concern towards cost. Even hand gestures are irrelevant at times and are not accurate all the times in order to overcome this 'Eye the Screen technology' is used. Creating an interactive module which supports the control of the mobile phone display through human eye. This can be an alternative to touch screen. The motivation is to create an object tracking application to interact with the smart phone and develop a virtual human mobile interaction device. In our work we use JAVA C to call the front camera which is set to take images continuously from the eye focussing pupil. With the help of different image processing techniques the eye recognition and tracking is achieved. The processing technique involves a subtraction algorithm to detect colours. The colour is detected from the image pixel and the position of the pixel is found and fed to the control of the display.

OBJECTIVE:

The biggest obstacle lies in developing a cost efficient hardware system in which a human can communicate with a mobile without any physical connection. The main objective is to develop an object tracking application to interact with the system and human.

NEED OF EYE THE SCREEN:

While manufacturing touch screen and its supporting components it costs nearly 40$to 150$. And in hand gestures the following disadvantages are faced.

- Performance recognition algorithm decreases when the distance is greater than 1.5 meters between the user and the camera
- System limitation restrictions restrict the application such as the arm must be vertical, the palm is facing the

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camera and the finger colour must be basic colour such as either red or blue or green.

- Irrelevant object might overlap with the hand. Wrong object extraction appeared if the object is larger than the hand
- Ambient light affects the colour detection threshold

To over come all the above disadvantages we need EYE THE SCREEN

Which records your eye ball movement in real time and controls the screen of the smart phones

SYSTEM APPROACH:

- Capturing real time video using front camera of the phone focussing the pupil of the eye.
- Processing each and every frame.
- Flipping of each image frame.
- Conversion of each frame into gray scale.
- Conversion of the detected image into binary image.
- Finding the region of the image and calculating its centroid.
- Controlling the display

ACQUISITION:

Obtaining a clear image of the pupil in the eye is crucial for the tracking process. So the front camera of the device is used to take a close-up picture of the pupil. JAVA C is used to call the front camera for capturing the real time video input data.

IMAGE PROCSSING

In Image processing the input is in the form of frames of the video. The output is an image. Here the image processed by splitting each pixel of the image into RGB components. This is done by traversing the image. Retrieving each pixel, extracting RGB values and then comparing the colour values to the RGB values.

IMAGE ANALYSIS:

Image analysis is the extraction of meaningful information from images; mainly from digital images by means of digital image processing techniques. Image analysis tasks can be as simple as reading bar coded tags or as sophisticated as identifying as person from their face. In this project we do various image analyzing techniques. The main thing done is the colour detection. At first we receive an image from the web cam. Then each pixel is retrieved from the image and extracts the red, green and blue values(RGB) from each pixel. Now we can easily detect a particular since all the colours are combination of RGB values. Digital image processing is the use of computer algorithms to perform image processing on digital images. As a subcategory or field of digital signal processing, digital image processing has many advantages over analog image processing. It allows a much wider range of algorithms to be applied to the

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input data and can avoid problems such as build-up of noise and signal distortion during processing. Since images are defined over two dimensions digital image processing may be modelled in the form of multi-dimensional system.

Original image captured from camera

WHY 2000 FRAMES?

In order to capture the fast movement of eyeball with its exact and points we go for 2000 frames. The count 2000 frames was decided on an approximation with an example which is stated below

A bullet shattering a light bulb may take only a fraction of second, seeming almost instantaneous anyone watching. If a camera records the light bulb at **1000 times per second** and then a projector plays the frames back at 24fps,the movie on screen will take almost **40** times as long **(1000fps/24fps=41.6sec).** So in order to capture a bullet striking we take 1000 frames so to capture a eye ball movement which is little bit faster than that we go for **2000 f**rames so that the **user will feel more comfortable while handling the device**

FLIPING OF IMAGES:

When the camera captures the image, it is inverted. It's similar to an image obtained when we stand in front of a mirror (left is detected as right and right is detected as left). To avoid this problem we need to vertically flip the image. The image captured is an RGB image and flipping actions cannot be directly performed on it. So the individual colour channels of the image are separated and then they are flipped individually, after flipping the red, blue and green coloured channels individually, they are concatenated and a flipped RGB image is obtained.

Grey Scale conversion

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STEPS INVOLVED IN IMAGE PROCESSING:

STEP 1: Capture the eye ball using front camera in video format

STEP 2: Set the properties of the video object.

STEP 3: Start the video recording.

STEP 4: A loop should be defined that ends after 1000 frames of recording. It contains the following steps:

- Get the snapshot of the current frame.
- A grey scale image can be obtained by converting the R G B points of the image.
- Now to track the black objects in real time we have to complement the gray scale.
- Change the complemented result into the desired format
- Gray scale image into a binary image.
- Remove the lower ranged pixels
- Display the image.

STEP 5: Stop the video recording.

STEP 6: Reset the memory.

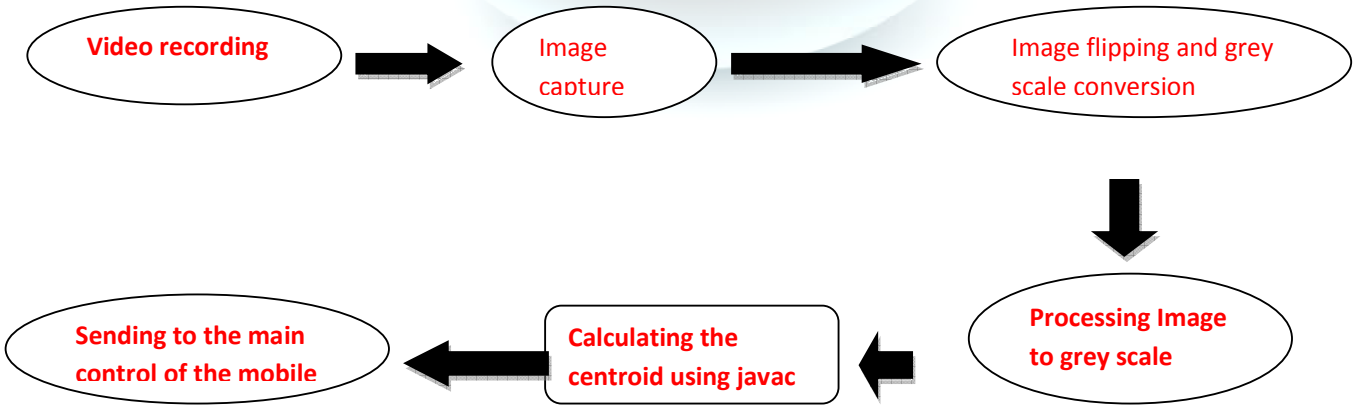
STEP 7: Clear all the values.

STEP8: Stop.

PROCESSING:

After recording there should be a loop that takes particular images of a frame at predefined intervals. Main step in processing is to convert the coloured image into a grey scale because processing of grey image is easy rather than handling with three colours RGB.

STRUCTURE:



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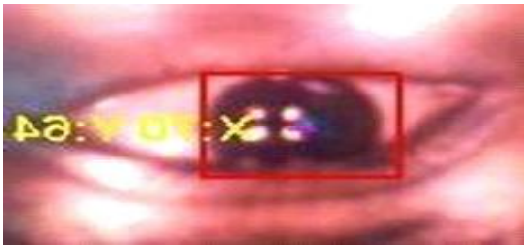
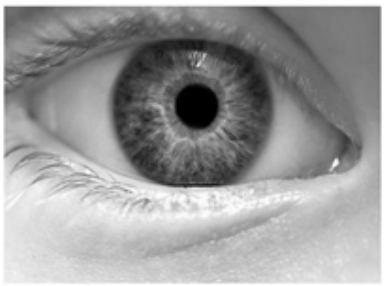
Processing of Image

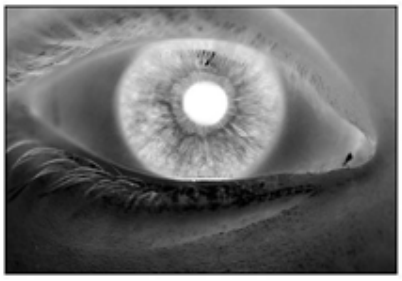
Original image captured from mobile



Calculating the centroid orf eye

Converted grey scale image





Depending on the pixel value the image is converted to black or white

PROGRAM ANALYSIS:

The obtained grey region is used to detect the pupil. The grey scale image consists of value of each pixel. There will be a predefined threshold value, all the pixels whose value is below the threshold level the image will be converted into a black image. If above the image will be converted into a white image. These images are used to calculate the centroid of the eye in JAVA C program. With the help of centroid coordinates the position of the eye is detected and the screen of the smart phone will be operated in accordance to that.

CONCLUSION:

In this paper an idea to control the touch screen of the smart phones using eyeball movement is proposed with all predefined supporting factors.

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