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Real Time Face Detection System for Safe Television Viewing

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ABSTRACT: This system will come into picture when a human being approaches the television and stays at a particular distance for a specific time, as this is dangerous for our eye-sight, television will switch-off automatically. This system is based on the concept of face detection and further by using image processing. The television system control will be carried out by using microcontroller P89V51RD2.

KEYWORDS: Proximity, television screen, camera, face-detection, microcontroller.

I. INTRODUCTION

Television is one of the most popular entertaining systems now-a-days, but it also comes along with some drawbacks, continuous or frequent television viewing affects the natural sight of human beings. Watching television from a much closer distance affects eye-sight drastically; children do this frequently and they may have to wear spectacles with heavy numbers at an early age. This system will come into picture when a human being approaches the television and stays at a particular distance for a specific time, as this is dangerous for our eye-sight television will switch-off automatically. This system is based on the concept of face detection and further by using image processing. The television system control will be carried out by using microcontroller, and audio-video engineering.

To overcomethe harmfulness caused by television to human eyes, we have developed a system which is based on human face detection. As a human being goes nearer to the television set, his/her face will be captured by the camera. If he/she is close to the television then the captured image will be correlated with the given template. If the correlation is successful, a signal will be sent to the microcontroller for further processing. If the person stays there for a specified interval of time, then a buzzer will start ringing and warn the person to move back. If the person still stays at the same position, then after some time the television will switch-off automatically. However, television screen will not switch-off if a pet goes or comes around it, as this system works purely on human face detection only. Also the system will not switch-off if a human being simply passes through the periphery of the television screen[2].

II. EXISTING WORK

Smart Audio/Video Playback Control Based on Presence Detection and User Localization in Home Environment: This project presents the design and implementation of a simple software-based home control platform used for the automatic control of audio/video devices. The system facilitates integration of various residential sensors, with an accent on users' localization and presence detection. For the presence detection and localization we utilize three, the most frequently used technologies: visual (3D camera), audio (Microphone array) and passive infrared (PIR sensors). The home controller interprets information about user's position as a command issued to a list of UPnP/DLNA rendering devices (PC, TV or Audio system). Current distance and user's position can activate, abort or change video presentation, pause and continue playback, amplify sound or silence it automatically with regard to information retrieved from sensors and actions described in a so-called ambient behaviour patterns. The way the system automatically responds to detected positions is controllable and changeable, and it is defined by executing XML documents which represent the behaviour patterns - scripts. By using the easily accessible user interface, users are able

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to choose one of the available scripts or to prepare a new one, and to set up different audio/video modes in a room, similarly to switching profiles on mobile phones. The system is not limited to presence detection and audio/video control. Performing simple modifications of behaviour scripts, the controller can interpret data from different kinds of sensors in an unobtrusive way of controlling various home appliances[5][6][7][8].

III. METHODOLOGY

This article comprises of the following steps[1][4]:

STEP-1 Capture a live image through the web-camera by using a function as 'videoinput'. Store the image in a variable [4].

STEP-2 Then extract number of samples from the captured image, store them to another variable.

STEP-3 Display the captured image.

STEP-4 Enlarge the figure-window to full screen if needed.

STEP-5 Save this image to the disk i.e. computer memory by specifying a particular file name (in this case as 'my1image.jpg').

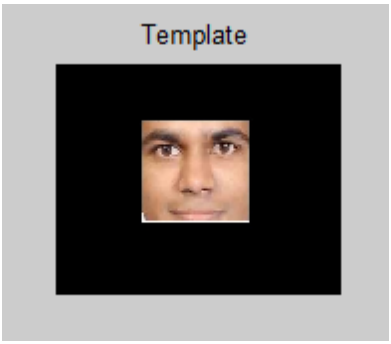
STEP-6 Then write the image to filename, inferring the format to use from the filename's extension.

STEP-7 Input the image back to MATLAB by recalling it.

STEP-8 Convert the recalled image into gray-scale i.e. RGB to Gray-scale conversion.

STEP-9 Then view the captured image in 'Image Tool 2' by using a command 'imview(K)' so that image properties (as pixel position, etc.) can be observed closely.

STEP-10 Choose a suitable 'template', convert this template into gray-scale for proper normalized cross correlation as shown in the Fig. 1 & 2 below.



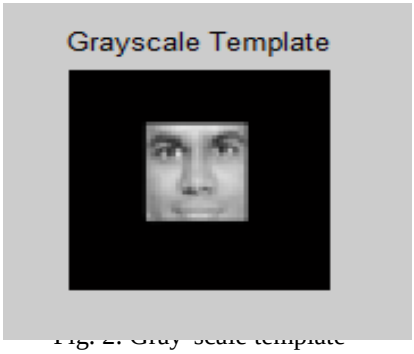


Fig. 2: Gray-scale template

STEP-11 Then carry out face detection by using Template matching method, by correlating chosen 'template' over the given image to detect a human face in it as shown in Fig. 3 & 4 below.

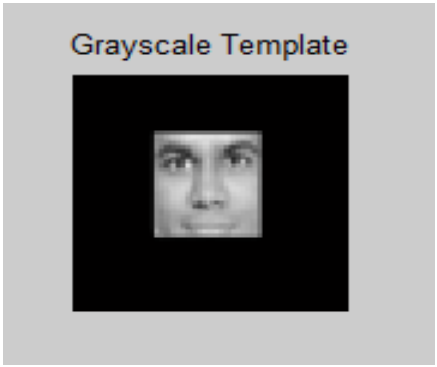


Fig. 3: Chosen template

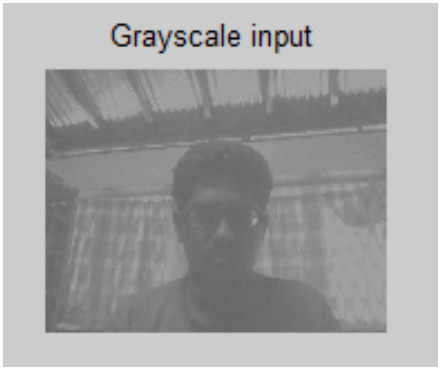


Fig. 4: Given image

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Fig. 5 below shows the final plot of normalized image and the white circle in it indicates the face detected.

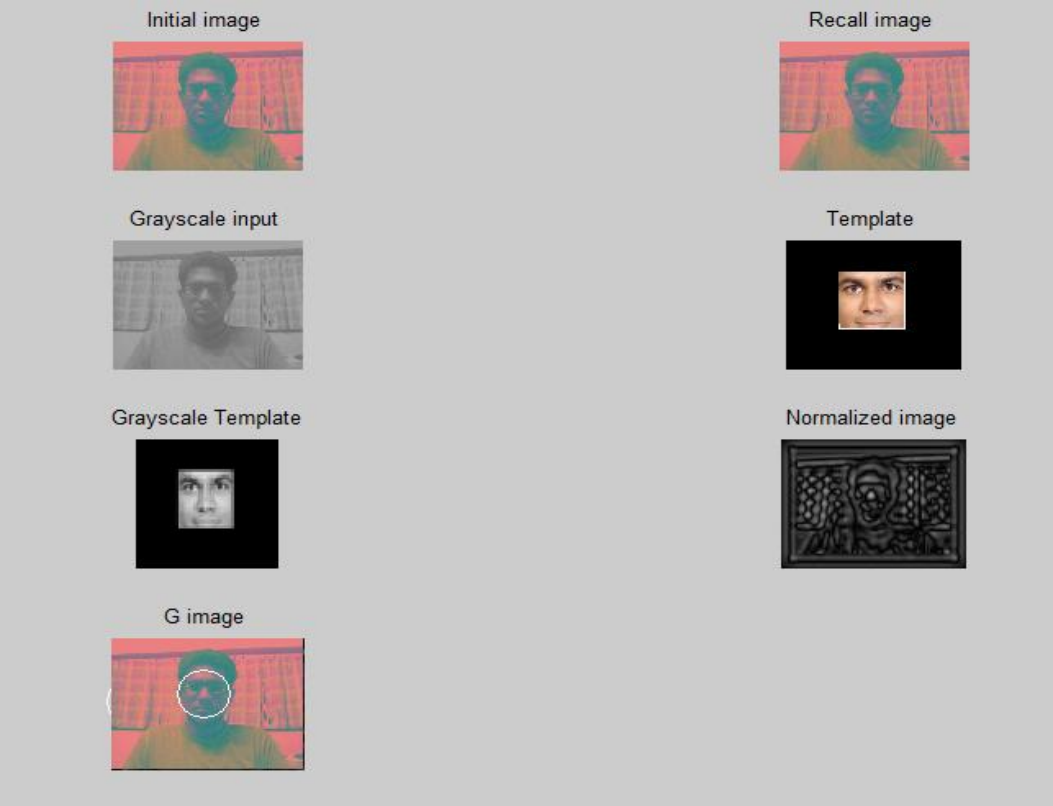

Fig. 5: Final output plot of the project

STEP-12 Each image capturing process is delayed by 'n' seconds by using a command 'pause(n)' which pauses execution for 'n' seconds before continuing, where 'n' can be any non-negative real number (in the program given n=5).
STEP-13 Whenever face is detected, alarm goes on (as shown in the RESULT ahead), next television is switched off, if face is not detected television stays on without alarm going on. Alarm ON leaves a warning to the viewer to move away from the television to a certain distance.

IV. PROPOSED METHOD

Template Matching Method used for Face Detection:

A basic method of template matching uses a convolution mask (template), tailored to a specific feature of the search image, which we want to detect. This technique can be easily performed on grey images or edge images. The convolution output will be highest at places where the image structure matches the mask structure, where large image values get multiplied by large mask values.

This method is normally implemented by first picking out a part of the search image to use as a template: We will call the search image S(x, y), where (x, y) represent the coordinates of each pixel in the search image. We will call the template T(x t, y t), where (xt, yt) represent the coordinates of each pixel in the template. We then simply move the center (or the origin) of the template T(x t, y t) over each (x, y) point in the search image and calculate the sum of products between the coefficients in S(x, y) and T(xt, yt) over the whole area spanned by the template. As all possible

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positions of the template with respect to the search image are considered, the position with the highest score is the best position. This method is sometimes referred to as 'Linear Spatial Filtering' and the template is called a filter mask.

Design Flow:

The design flow of this project paper is as shown below.

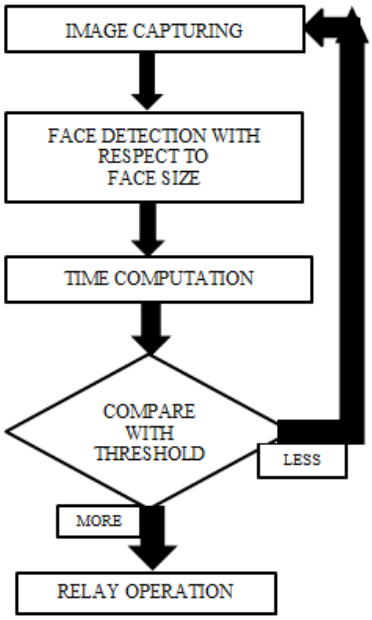

Fig. 6: Design flow of the project

Construction:

An embedded camera will be mounted over the television set, and a microcontroller will be used to control the switch on/off of television set and that of the alarm, via their respective relay switches. A serial port RS232 will be used so that the camera captured data can be sent to the microcontroller serially.

When a human face appears much near to the television set, his/her facial image will be captured automatically. If that person stays at the same position for a much longer time above the threshold, then the microcontroller will raise the alarm initially to warn that person to move away, if he/she still stays near the television set, then microcontroller will switch off the television via a relay-switch.

V. EXPERIMENTAL RESULTS

The output involves a series of steps to be followed as explained in the methodology section. Fig. 7 illustrates the original experimental setup of this project, consisting of a laptop having built-in camera and a microcontroller (P89V51RD2) kit. Fig. 8 & 9 illustrates Keil µvision4 simulator results based on the face detection results[3].

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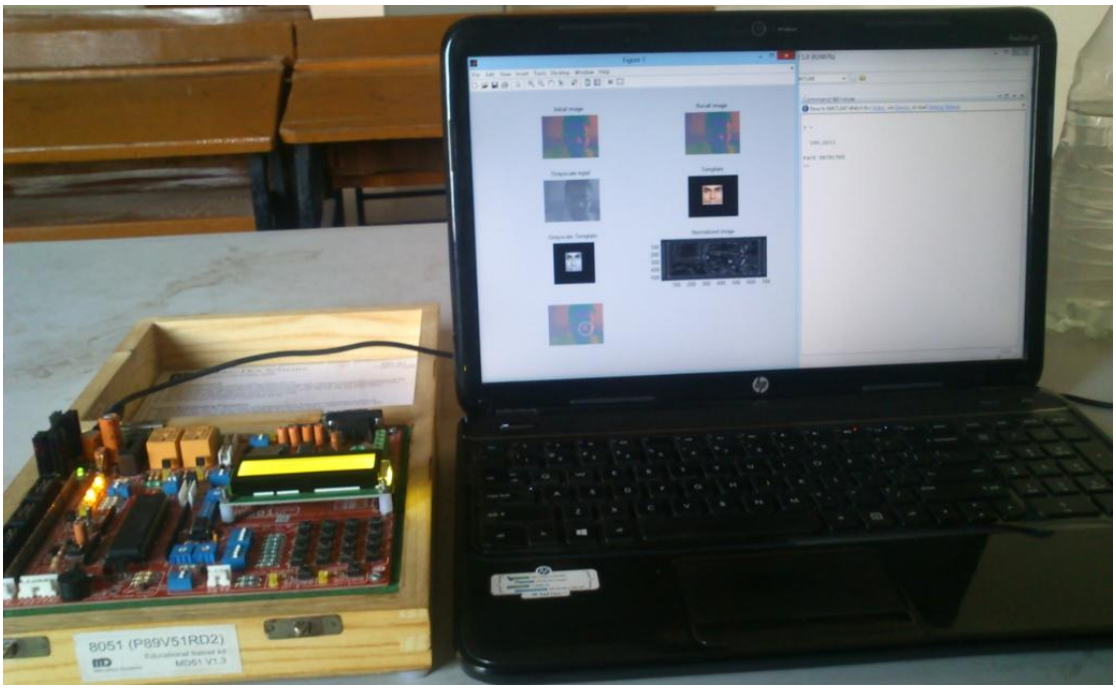

Fig. 7: Experimental setup used for the project.

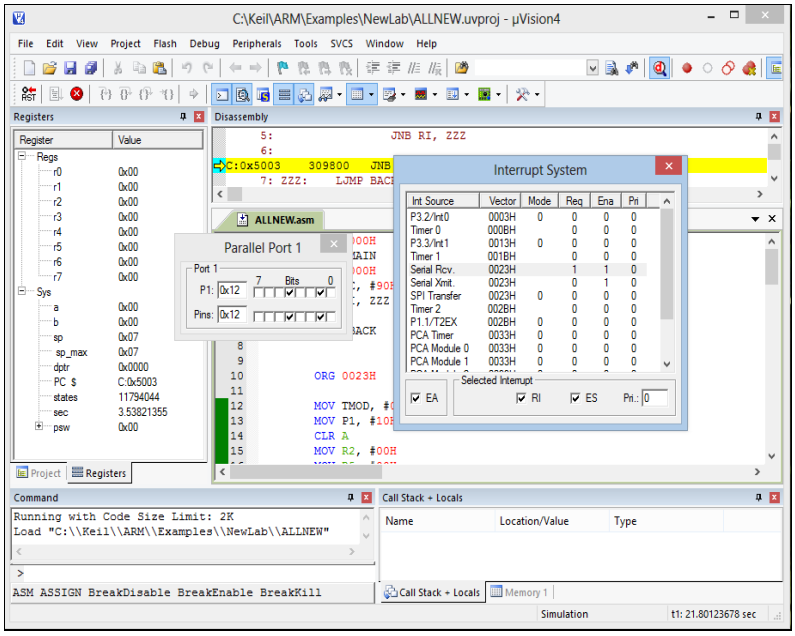

Fig. 8: Output of Keil simulator shown above indicates that now viewer is much closer to the television and so a warning alarm is switched on after approximately 30 seconds (Pin 4=TV, Pin 1=Alarm).

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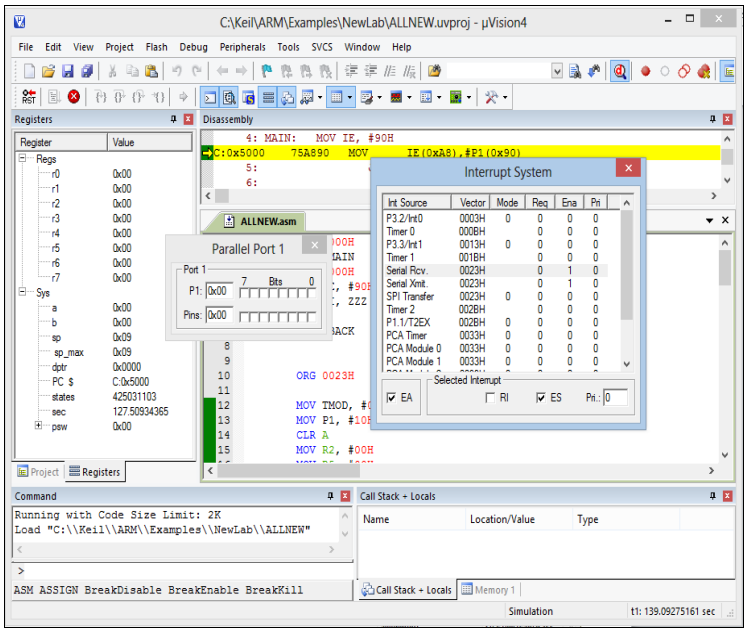

Fig. 9: Output of Keil simulator shown above indicates that though the warning is given to the viewer, instead of moving away he/she is still standing near the television, then first alarm goes off, and finally the television is switched off after approximately 2 minutes i.e. 120 seconds (Pin 4=TV, Pin 1=Alarm).

VI. CONCLUSION AND FUTURE SCOPE

Conclusion:

This paper proves that the system is more generalized as well as multi-purpose and which can be implemented with several other applications as specified in the future scope. Also that it is effective human-face detection based controlling project.

Future scope:

Internal Message Displaying: Instead of shutting off T.V., messages can be displayed through T.V. like 'KEEP SAFE DISTANCE', etc. so it will not disturb the T.V. viewer and will just act like a warning. Renown T.V. production companies or DTH service providers who can implement this technology to portray their T.V.'s image as eye caring T.V. which will indulge senses of a T.V. viewer.

Security purpose in Museums and Historical heritages: The places like museum where there is a collection of many precious as well as ancient things that are supposed to be preserved for a long time. These objects have some historical importance. The system is face detection based so it prevents the human entrance within a restricted area. Many times it's a general observation that some visitors try to damage or touch the things which are kept in museum. The system will immediately alarm the security guards who are on duty to take necessary remedial action against such people.

For Industry Safety: Heavy or large scale industries involve many chemical tankers, gas chambers which are threatening for human life. Many severe accidents may take place, as a remedy safe distance must be maintained. This system will be applicable in high voltage power areas and also in a server room security of a big multinational software company.

REFERENCES

1. A Guide To MATLAB by Brian R, Hunt, Ronald L.Lipsman, Jonathan M. Rosenberg.
2. Basic Television & Video Systems by B. Grob, C. E. Herndon.
3. 8051 Microcontroller and Peripherals by Muhammad Ali Mazidi.

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4. Digital Image Processing using MATLAB by Rafael C. Gonzalez and Richard E. Woods.
5. M. Weiser, "The Computer for the 21st Century," ACM SIGMOBILE Mobile Computing and Communications Rev., vol. 3, no. 3, 1999, pp. 3-11.
6. UPnP Forum, UPnP Device Architecture Version 1.1, 2008.
7. Digital Livig Network Alliance, www.dlna.org.
8. M. Z. Bjelica, I. Papp, N. Teslic, JM. Coulon "Set-top box-based home controller", Proc. of 14th Inter. Symposium on Consumer Electronics 2010, Braunschweig, Germany.

BIOGRAPHY

SurajMulla, Vishal Dubal, and KedarVazeare students of the Electronics and Telecommunication Department, PadmabhooshanVasantraodadaPatil Institute of Technology, Shivaji University. They are final year students and will receive their Bachelor of Engineering degree by June 2015.