Real Time Face selection with Camera Motion using Open CV

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Abstract- **Continuous monitoring and surveillance system is playing an important role in security whereby the recent demand for installation of security camera system had been increased dramatically. However, increasing of camera installation in both indoor and outdoor environment such as streets, parks, building, and stores arise problem of deciding position, direction, and visual angle of camera. In order to cover all the area by minimum of camera and at the same time used to track the activity done by am selected user, we propose real time face selection with camera motion control system used in continuous tracking of selected user by a single camera. The purpose of this device is to select a face and monitor it through a camera motion control system. This will help in monitoring a particular selected face. It is having capability to move around 360º. So that it will be possible to monitor the face in all directions.**

Keywords- **camera, security, face, real time.**

I. INTRODUCTION

A better activity recording based on target can be done throughout this system; this system also has advantage in making the low-cost smart doll become more user interactive as the doll will always face to the user.

This paper gives detail design and implementation of an architecture that can continuously observe and track selected face in real time by controlling camera motion around. Detection and tracking of face has been a significant and dynamic investigation domain because it provides many applications, primarily in video coding, video surveillance, biometry or Video Identity Resolution. But detection and tracking of face in real time is a composite issue with numerous feasible applications. The objective of this paper is to implement a real time camera motion control system to detect and track selected human face.

The detection of face includes cascade classifiers and haar features. One of the detected faces will be selected using mouse click option and matching is done in each frame by difference algorithm. The system is integrated with a frame-by-frame Kalman tracker in order to locate face region in each frame. Experimental result demonstrate that the system able to track selected face in real time with horizontal rotation angle -360 to +360 degree with maximum rotation speed 5 degree per second. Implementation was done in real time with minimum computational endeavor, thus suitable for low cost application.

The principle motivation for this paper is to develop a method of implementation of an architecture that can continuously monitor and track selected face in real time by controlling camera motion around. Detection and tracking of face has been a significant and dynamic investigation domain because it provides many applications, primarily in video coding, video surveillance, biometry or Video Identity Resolution. But detection and tracking of face in real time is a composite issue with numerous feasible applications. The objective of this paper is to implement a real time camera motion control system to detect and track selected human face. The detection of face includes cascade classifiers and harr features. One of the detected faces will be selected using mouse click option and matching is done in each frame by difference algorithm. The system is integrated with a frame-by-frame Kalman tracker in order to locate face region in each frame.

Development of facial tracking based head movement control system is begun by a simple real time selected face tracking in software further enhancement to wide tracking region by combination of hardware and software. Exploration of haar-like face detection algorithm,

Kalman filter for face tracking and control signals for camera control showed that this model is able to improve and enhance the overall monitoring system.

Microcontroller PIC16F877A is one of the PICMicro family microcontroller which is popular at this moment, start from beginner until all professionals. Because very easy using PIC16F877A and use FLASH memory technology so that can be write-erase until thousand times. The superiority this RISC Microcontroller compared to with other microcontroller 8-bit especially at a speed of and his code compression. PIC16F877A have 40 pin by 33 path of I/O.

The purpose of this device is to select a face and monitor it through a camera motion control system. This will help in monitoring a particular selected face. It has capability to move around 360º. So that it will be possible to monitor the face in all directions.

Moving camera will blur the captured image and further brings difficulties in image processing. Besides, the distance between face to camera will significantly affects the Performance of the system. Difference in distance between the camera and face will result in the difference in the change of error even with the same horizontal displacement speed. This makes the system even more difficult to be controlled.

Vigorous experiments and fine tuning shows that the system is able to work up to expectation when the distance between face and camera is more than 50 cm or the rotation speed of camera is more than 15 degree per second.

Hence, distance of 50 cm and 5 degree per second for maximum rotation speed are used as the testing threshold parameter for this system. Finally the response of the system in this Condition is optimized to roughly 1.5 seconds needed in completely moving the camera to move the tracked face into the centre of frame. From the above obtained result, the overall system is stable as the bounded input yields a bounded output.

II. Block Diagram

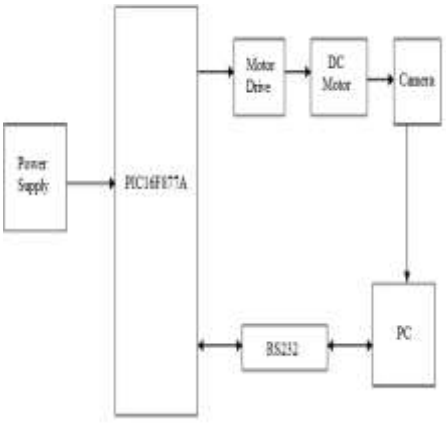


Fig. 1: Block diagram of proposed system

Fig. 1 shows the overview of the system and it is being initialized by input capture image from camera to the computer for further image processing. Face detection will be based on .NET and thus detect the face and calculate its position in capture frame. Through the combination of control theory to artificial intelligence, logic controller is applied into this system. RS232 is used as serial communication between the computer and microcontroller

Digital signal will send to microcontroller and it used as control signal for neck mechanism to make the proper

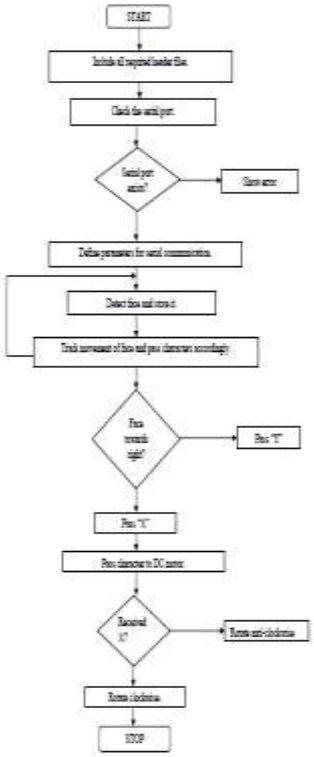
Adjustment using hardware actuator. Here, we are using OpenCV with .NET for the working of the camera motion control system. OpenCV stands for Open Source Computer vision, is a library of programming functions mainly aimed at real time computer vision, originally developed by Intel Research Center in Nizhny Novgorod (Russia). It is compatible with different platforms using languages like C/C++, Java, Python,etc.

- OpenCV application areas that we are going to use, include:
- Facial recognition system
- Gesture recognition
- Human- computer interaction (HCI)
- Motion understanding
- Object identification
- Motion tracking

In this paper, the system used is camera motion control system, which uses haar cascade features with the help of openCV and .NET where we can access different files for tracking face and by that the camera is moved with the help of motor. For this movement X and Y characters are used which are transmitted from PIC and then the motor rotates according to that characters.

One of the detected faces will be selected using mouse click option and matching is done in each frame by difference algorithm. The system is integrated with a frame-by-frame Kalman tracker in order to locate face region in each frame. Experimental result demonstrate that the system able to track selected face in real time with horizontal rotation angle -360 to +360 degree with maximum rotation speed 5 degree per second. Implementation was done in real time with minimum computational endeavor, thus suitable for low cost application.

Flowchart:



III Circuit diagram

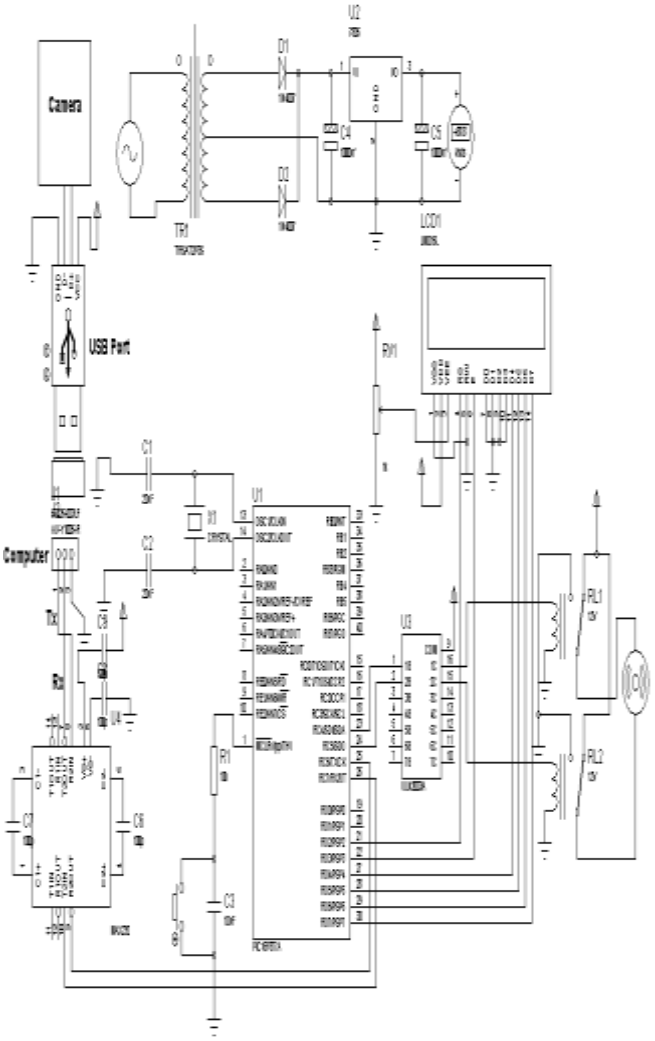


Fig.2 interfacing diagram of the proposed system.

IV Experimentation Result

Fig. 3: Final set up of proposed system

Testing & Troubleshooting

When the movement of the face is in left direction then character "X" is transmitted from the PIC and hence motor rotates in clockwise motion. During this, the text on LCD display is "MOTION CW."

Fig. 4: Testing for character "X"

When the movement of the face is in right direction then character "Y" is transmitted from the PIC and hence motor rotates in anti-clockwise motion. During this, the text on LCD display is "MOTION ACW."

Fig. 5: Testing for character "Y"

V CONCLUSION

Moving camera will blur the captured image and further brings difficulties in image processing. Besides, the distance between face to camera will significantly affects the performance of the system. Difference in distance between the camera and face will result in the difference in the change of error even with the same horizontal displacement speed. This makes the system even more difficult to be controlled. Vigorous experiments and fine tuning shows that the system is able to work up to expectation when the distance between face and camera is more than 50 cm or the rotation speed of camera is more than 15 degree per second. Hence, distance of 50 cm and 5 degree per second for maximum rotation speed are used as the testing threshold parameter for this system. Finally the response of the system in this condition is optimized to roughly 1.5 seconds needed in completely moving the camera to move the tracked face into the centre of frame. From the above obtained result, the overall system is stable as the bounded input yields a bounded output.

Development of facial tracking based head movement control system is begun by a simple real time selected face tracking in software further enhancement to wide tracking region by combination of hardware and software. Exploration of haar-like face detection algorithm, Kalman filter for face tracking and control signals for camera control showed that this model is able to improve and enhance the overall monitoring system.

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