

Iris Detection for Automation of Wheelchair

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Abstract: The wheelchair have become increasingly important when physically handicapped people want the movability. In early days it is operated by joystick, but it's not suitable for few disable people i.e. who don't have hand. This paper present the wheelchair who have not hand or paralyzed and operates by means of the movement of the iris. The detection or the location of iris gives the direction to the wheelchair and also the obstacles and detected and stops the chair which gives the high sensitivity to the movability for handicapped people.

Keywords: Disable people, Electronic wheelchair, Electronic wheelchair using image analysis technique, Eye movement, Finding pupil location, PSoCmodul.

I. INTRODUCTION

Human Machine Interface (HMI) goes considered in the field of wheelchair for movement handicapped people. The techniques include joysticks controller, finger movement, voice recognition, electro-myography etc. These techniques are already included for giving movement to handicapped people. But newly invented technology named as Automatic Innovative wheelchair operated on the movement of iris. As people who are paralyzed and who don't have hand and leg then this technique is more useful because wheelchair is operated on the iris movement. Joystick wheelchair is not operated when people who don't have hand; whereas the head tracking wheelchair limits to visualize to the adjacent surrounding also voice recognition cannot operated in the noisy environment.

The proposed system is designed to eliminate the high cost and for few people who don't have hand or leg. This system is operated in all kinds of environment as it is very much less sensitive to the environment. The motion of the iris gives the command to the PSoC for the moving of chair; as per iris chair will move to right, left, forward and stop. The obstacle detection sensor detect the obstacle and stop the chair irrespective of the iris.

Aim & Objective

To give the mobility to the physically challenged people particularly who don't have leg or hand or simply used by any physically challenged person

Objective

To give mobility to physically challenged people; the chair will particularly move to particular direction as per eye direction.

By detecting iris chair move in that direction

To give smooth mobility without any physical energy

Background and Motivation

Since hundreds of years the wheelchair have been invented but in early days chain are movable from point A to point B by moving wheel through hand. As technology is progressed by detecting the finger location, head location, voice encoded, joysticks movement etc. but each is having its own advantage as well as the disadvantage. As voice encoded can't use in noisy environment, head detection is most sensitive as the handicapped person cannot look surroundings. Similarly finger location & joystick movement technique can be used by people who have hand and so many techniques for handicapped people but they need hand for use the technique.

By keeping this background as the motivation the more challenged people have big challenge in their life to move from one place to another. They cannot live as like normal human, so the iris movement technology is invented. By detecting the position of the iris the chair will move in the respective direction. This paper will remove the current disadvantage & gives the smooth life for the challenged people through iris detection technique.

II. METHODOLOGY

The wheelchair is implemented on the PSoC Kit. PSoC act as the main processing block called the heart of the system. As shown in fig.1 the webcam continuously detects the images of eyes, when webcam is on then it detects 20 frames per second and few second later it will get off after that all the images are given to the image processing unit for further actions.

In the image processing unit firstly the colored image is converted in to gray scaled image. For 20 frames if more than 15 frames are same then it is clearly find the location of the iris. The iris can be detected from the following formulas.

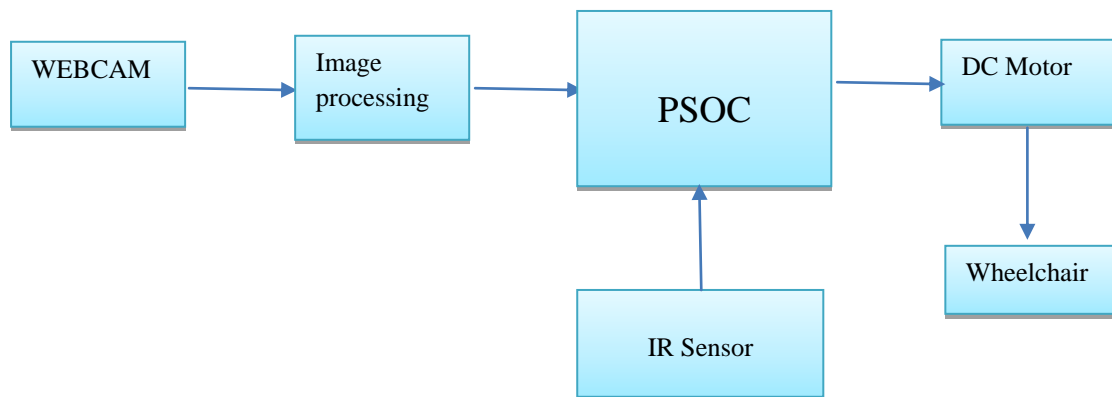


Figure 1 Block Diagram of Proposed System

$$I <= (C/2-10) \quad (a)$$

Whereas, I = Detected location

C = Current location of iris

The above equation indicates that iris is towards the left and chair will move towards the left

$$I <= (C/2+10) \quad (b)$$

The above equation indicates that iris is towards the right and chair will move towards the right

$$(C/2-10) <= I <= (C/2+5) \quad (c)$$

The above equation indicates that iris is towards the middle and chair will move towards the front

The detected iris is given to the PSoC for further actions. PSoC gives the input to the DC motor for wheelchair movement as per the iris location.

Obstacles are detected through the IR sensor after the movement of the chair if obstacles are coming and it gives command to PSoC to stop the DC motor.

III. Results and Discussion

The flowchart shows the processing of the image detected through the webcam. The iris location is detected in MATLAB.

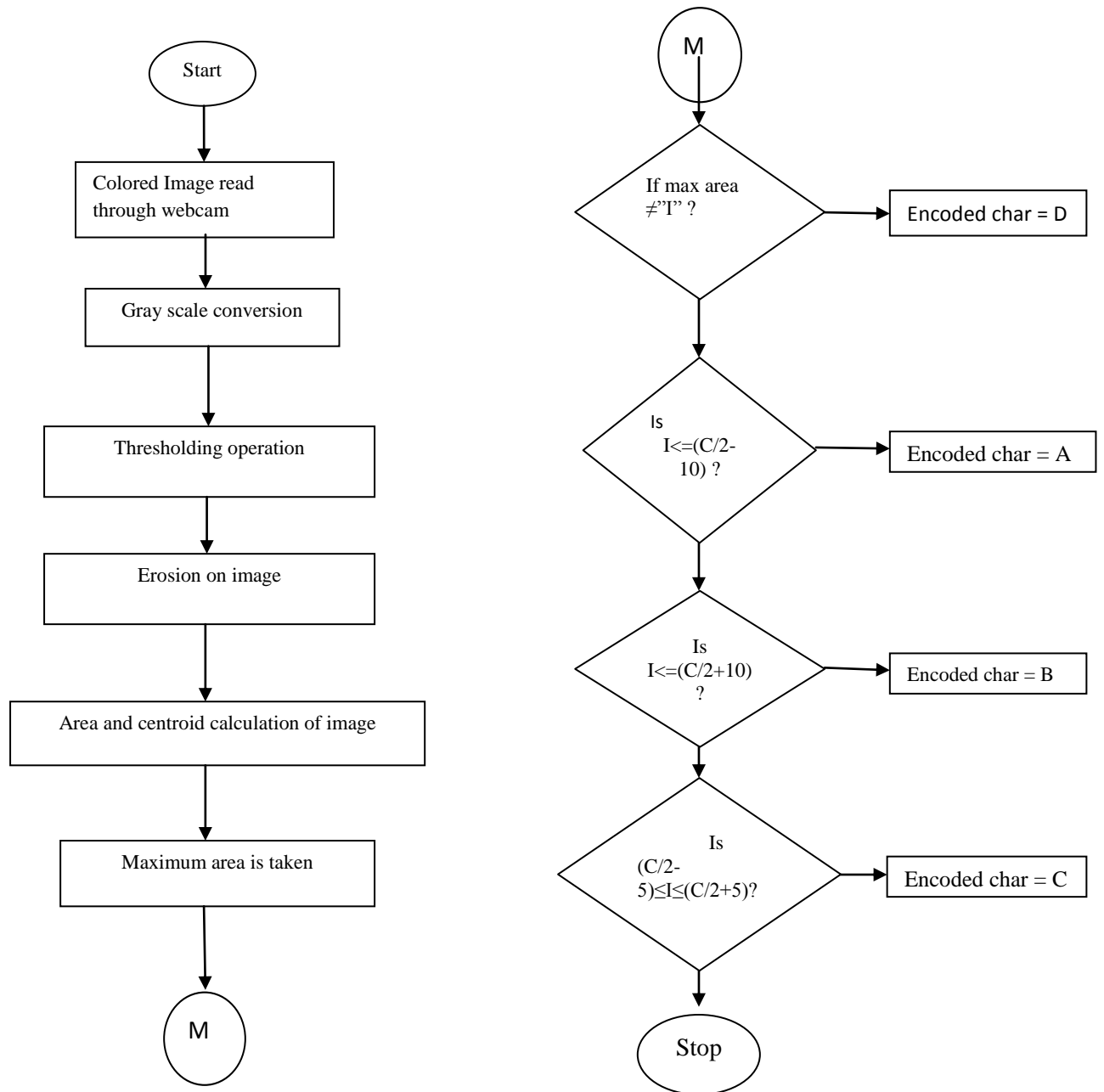


Figure 2 Flowchart of Image Processing Unit

As shown in fig. 2 firstly the colored image is converted in to the then gray scale image is given for thresholding. After that erosion process on the image and finally the centroid and area is calculated. According to the location of centroid the above formulae find the iris position. Each iris detected image is encoded and as shown in fig.3 given to the PSoC for further processing.

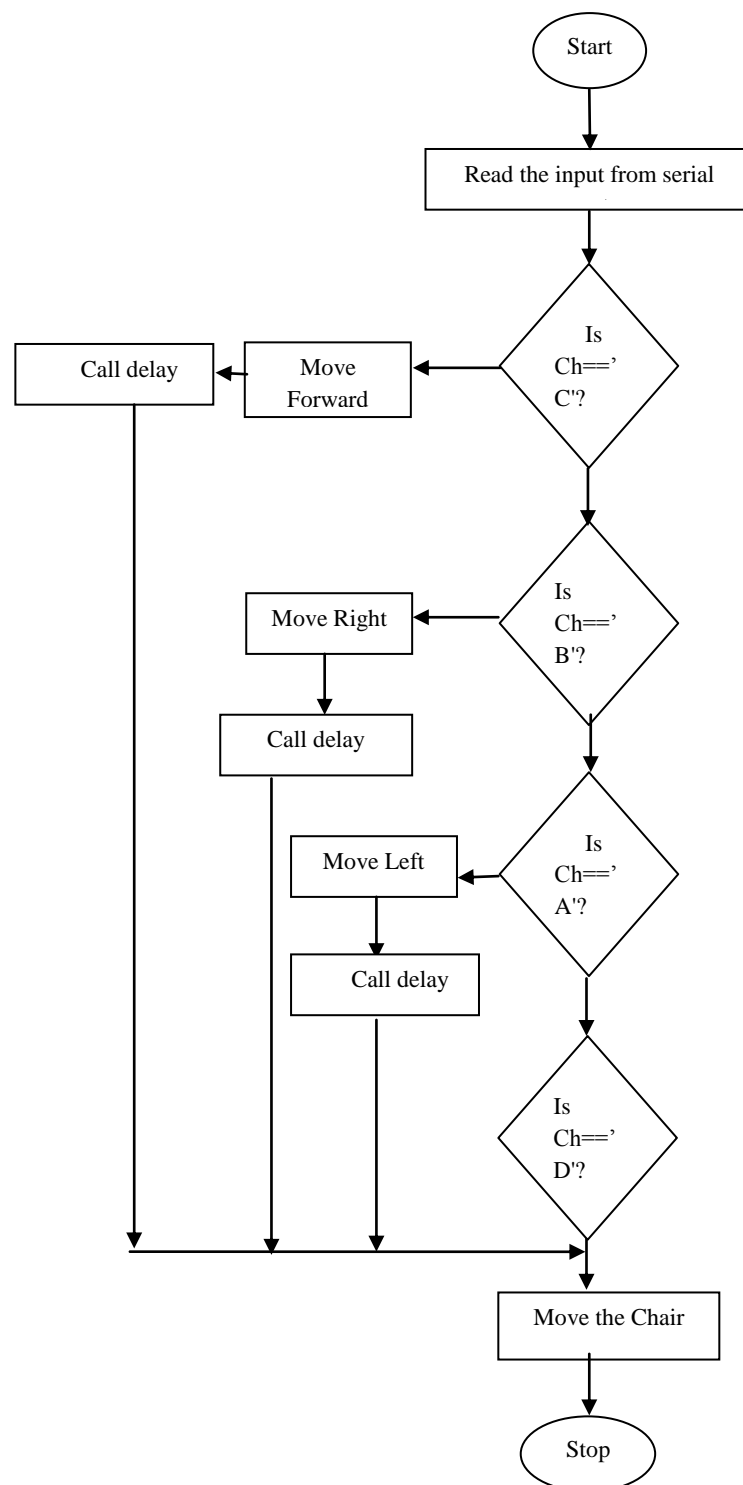


Figure 3 Flowchart of PSoC Environment

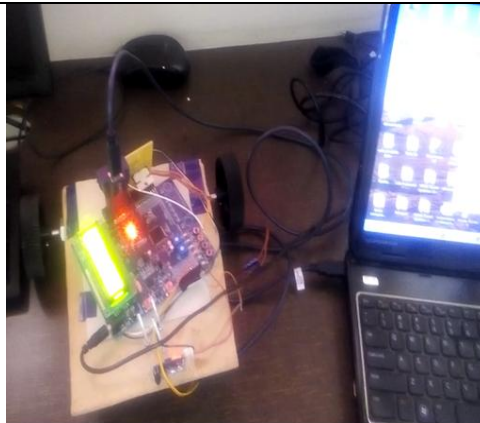


Figure 4 Hardware of Proposed System

IV. CONCLUSIONS

Wheelchair provides the mobility to the special handicapped people by detecting the location of the iris. The images are continuously taken from the webcam then after image processing operation the detected iris gives the direction to the chair. The system also provides the obstacles proof travelling as IR sensor detects the obstacles irrespective of the direction of chair. Using image processing iris detection gives the easy of roaming and better performance as compared with existing techniques. As the use of PSoC the number of external components are very much less for interfacing the external peripheral. Using image processing it can be achieved the better performance compare to all the other existing techniques. Because of the use of PSoC it reduces the no of external peripherals to be interfaced with the system.

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