Eye Controlled Wheelchair for Disabled Person

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Abstract : Statistics suggests that there are around 40 cases per million of Quadriplegia(Paralysis of four limbs) every year.Person suffering from quadriplegia cannot operate the typical wheelchair available for disable person.As an attempt to make lives of the people suffering from this phenomenon simple.The aims of the project at using eye pupil movement to control wheelchair and also used temperature sensor to sense the boby temperature.This project hence makes the life of the disabled person simpler and eliminates the need of assistance required for them.

Key words : Paralysis, Wheelchair, Webcam, Microcontroller, Quadriplegia, Matlab

1. INTRODUCTION

Statistics suggests that there are 11,000 new cases of quadriplegia every year in United States of America. Great people like Stephen Hawking and Max Brito have been suffering from this crippling phenomenon. Our project is an attempt to make lives of the people suffering from this phenomenon simple and by simpler we mean self-reliant, which will thereby reinstate their confidence and their happiness. The idea is to create an Eye Monitored System which allows movement of the patient's wheelchair depending on the eye movements. We know that a person suffering from quadriplegia can partially move his eyes and tilt his head, thus presenting an opportunity for detecting those movements. We have created a device where a patient sitting on the Wheel Chair assembly looking directly at the camera, is able to move in a direction just by looking in that direction. The camera signals are monitored by a MATLAB script, which will then guide the motors wired to the ATMEL 8051 Microcontroller over the Serial Interface to move in a particular direction. The system is cost effective and thus can be used by patients spread over a large economy range.The main components used in this system are web camera, Matlab, Temperature Sensor DHT11 and Microcontroller . The system captures the images using a webcam that will be attached to the laptop placed on the wheelchair of the user. These captured images will be sent to the Matlab where it will compare the images with the pre input images and give the required output to the Microcontroller. Microcontroller is then connected to the motor of the wheelchair. Thus with these serial commands given to the motor by the Microcontroller through Matlab will decide direction of the wheelchair. The commands given to the Matlab can include commands like Left, Right, Stop, Forward, Reverse etc.To make this system more advanced and more accessible, a ultrasonic sensor is attached on the front side of the wheelchair. With the help of this sensor, the wheelchair will stop automatically whenever any obstacle is placed in front of the wheelchair, thus making this system more safe and valuable to life.

2. LITERATURE SURVEY

we wanted to utilize the opportunity to design something which could be a contribution in our own small way to the society. Quadriplegia is paralysis caused by illness or injury to the humans that results in partial or complete loss of limbs and torso. It's a phenomenon which confines the ability of a person to move by himself, and he has to rely on someone to carry him around.Researchers suggest that this leads to a drop in the self-reliance of these people. We realized that technology can intervene and help reinstate confidence of people suffering from Quadriplegia, by creating a medium, through which they can move at will. The complexity lies in the fact that they may be able to move only their eyes and partially their head.

We precisely aim at targeting the movements of the eye and the head. The idea is to create a eye monitored wheelchair system where a camera constantly stares at the person's eyes and based on the combined movement of eye and head, decide to move the wheelchair in the direction the person desires to move in.The camera is wired to the person's laptop which has a MATLAB script running which constantly captures snapshots and processes them. The script based on the processing determines whether the person wants to move in a particular direction, and communicates this information using serial communication to a microcontroller which drives motors of the wheelchair is the desired direction. The existing systems in the market use a cheek or tongue monitored systems, where some body part of the person is wired to some electrical circuitry. But, it is very annoying for a person to have something wired to his body all the time. The novelty of our system lies in the fact that no part of the system physically interacts with the user, making him feel comfortable.

3. BLOCK DIAGRAM
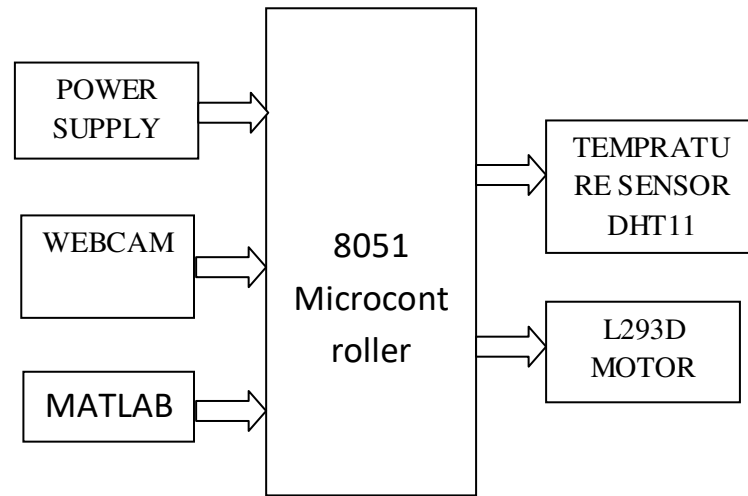
This system is designed using WebCamera , Microcontroller and Motor driver IC. Eye pupil of patient is detected by Webcam and then processed using MATLAB software. Image acquisition toolbox is used for eye pupil detection. As per the movement of eye pupil, command to the Motor driver IC L293D is given through Microcontroller using serial interface. Wheelchair is moved forward, backward, left or right according to the signal given by Microcontoller to the motor. Temprature and humidity sensor DHT11 use to sense the body temperature.

4. WORKING

For eye pupil detection, MATLAB program is designed such that, it monitors and reacts to eye movements.Based on a series of snapshots taken and thereafter processed, the motion of the patient's eyes are detected and decision to move the wheelchair in a particular direction is taken and communicated serially to Microcontroller. Microcontroller receives the data, analyse it and send the control signal to motor driving circuit, based on the location of eye pupil. This will decide motor to move either in forward, backward, left or right. Approximately one snapshot is taken every second and processed and based on the position of the feature points in previous snapshot and current

snapshot, a movement is detected and this is communicated to the wheelchair assembly via the serial port.

5. FLOW CHART
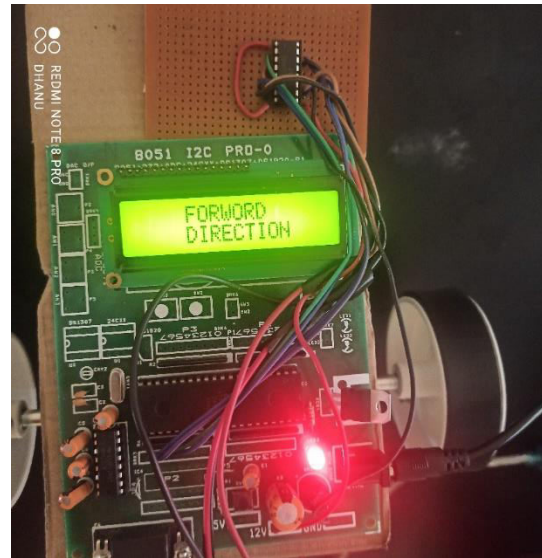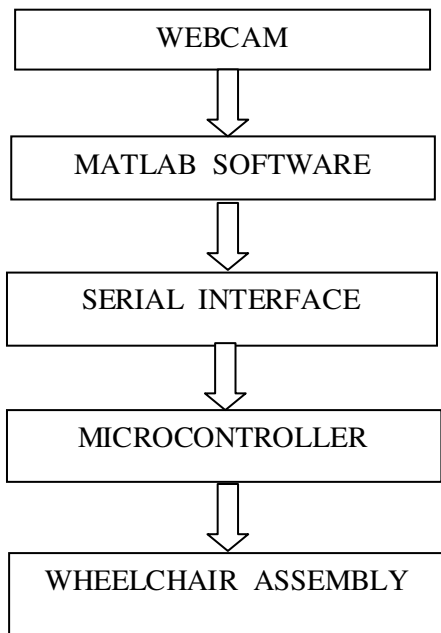
Expected Result : The Position of iris and pupil will be detected and and produced using Viola Jone Algorithm.After that they are processed using MATLAB. Then decision will be taken by Microcontroller for the given input image. as per the pupil movement motor will be moved either in left,right,forward and backward direction.

6. Result
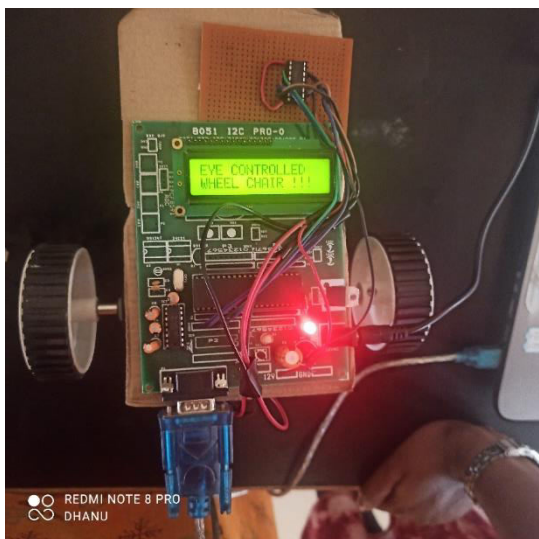
7. APPLICATION

- In Hospitals for Handicapped Patients
- It can be used by an elderly or physically challenged persons to move inside the home without any difficulty

8. CONCLUSION

This hardware along with the software can prove to be an effective system to make the life of the paralytic patients independent. The critical part of the system is image processing at real time which can be addressed byusing better high end image processing software. The most effective thing about project is, it eliminates the need of assistant for the patient. The aim of this system is to contribute to the society in a small way by setting out an idea for a system which could actually

better the lives of millions of people across the globe.

9. REFERENCES

[1] S. Tameemsultana and N. Kali Saranya, "Implementation of Head and Finger Movement Based Automatic Wheel Chair", Bonfring International Journal of Power Systems and Integrated Circuits, vol. 1, Special Issue, pp 48-51, December 2011.

[2] Manuel Mazo, Francisco J. Rodriguez, Jose L, Lazaro, Jesus Urena, Juan C. Garcia, Enrique Santiso, Pedro Revenga and J. Jesus Garcia, "Wheelchair for Physically Disabled People with Voice, Ultrasonic and Infrared Sensor Control ", Autonomous Robots, vol.2, no. 3, pp. 203-224 ,Sep 1995.

[3] Tabasum Shaikh, Naseem Farheen Sayyed, Shaheen Pathan, "Review of Multilevel Controlled Wheelchair", 4th National Conference On Electronic Technologies, pp. 275-279, April 2013.

[4] Motor Controller circuitry from ECE 4760 web page for lab 4 http://people.ece.cornell.edu/land/courses/ece4760/labs/f2013/lab4.html

[5] Voila Jones Algorithm - http://en.wikipedia.org/wiki/Viola%E2%80%93Jones_object_detection_framework

[6] Cascade Object Detector – http://www.mathworks.com/help/vision/ref/vision.cascadeobjectdetector-class.html