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Smart Wheelchair Based on IOT

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***Abstract*—There are a lot of disabled people in the world today who have trouble moving around or going about their daily lives. These people are primarily reliant on other people for support. With the use of assistive technology, however, people are capable of becoming independent and carrying out some tasks of daily living on their own. Wheelchairs are the assistive technology that is most commonly utilized. A wheelchair is essentially a chair with wheels that can assist those who are unable to walk due to disease, a disability, or an injury in getting around. However, many people with disabilities who have weakened joints and limbs are unable to man oeuvre the wheelchair. Therefore, everyone in society, including them, may profit greatly from smart wheelchairs. Electric wheelchairs with several additional components are known as smart wheelchairs. The primary goal is development of a wheelchair having numerous handling mechanisms, including a joystick, an obstacle detection system, a safety switch, and others. An ultrasonic sensor is used to record the obstructions in the path in order to make it easier for disabled individuals to ride safely. The wheelchair's motors can travel in any of the four directions that the joystick is moved in, and the speed of each direction increases the more the joystick is used. The system stops moving in all three directions except for backwards when an impediment is detected by an ultrasonic sensor, and the system stops moving if it is already moving. For emergencies, we employ a GSM-GPS module, which is built right inside this wheelchair.**

I INTRODUCTION

Advanced Wheelchair for Disabled Person is a fully automated wheelchair specially created for people suffering from paralysis or for physically challenged souls. Paralysis can affect people in many different aspects and one of the most dangerous types is Quadriplegia. Quadriplegia is a condition of the body where the person cannot move any of his body parts.

Thus numbness of all four limbs is known as Quadriplegia. Thus Physically it is impossible for people with this problem to control the typical wheelchair available in the market to operate these wheelchairs accessible in the market, the person has to utilize a great amount of physical strength to move the wheels of the wheelchair. The lives of such people have become really tough and hence as a small attempt to make their life easier, this system is introduced where the person can use his eyes to control the wheelchair. The motivation of this project is to develop a wheelchair that will be controlled by the eyes of the person seated in the wheelchair. Eye action-controlled wheelchair is to enable completely paralyzed patients as well as the elderly to make their life more accessible People who are unable to walk and are using wheelchairs, use a great amount of energy using physical strength to move the wheels. With the use of this wheelchair, the disabled would save energy and could use their hand and arm for other activities. Right now,

there are different eye-based methods used for controlling wheelchairs, such as EOG, ECG, EEG based eyeball sensing method, Face detection and eye detection. Several algorithms are used to find the exact pupil location direction. Haar cascade like feature detection algorithms can also be utilized.

The main components used in this system are a web camera, Mat lab and Arduino. The structure captures the images using a webcam that will be attached to the laptop placed on the wheelchair of the user [1]. These apprehend images will be sent to Mat lab where it will compare the images with the pre input images and give the required output to the Arduino. Arduino is further connected to the motor of the wheelchair. Thus these serial commands given to the motor by the Arduino through Mat lab will choose the direction of the wheelchair. The instructions given to Mat lab can include commands like Left, Right, Stop, Forward, Reverse etc.

To make this system more advanced and more accessible, an ultrasonic sensor is attached to 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 safe and valuable to life. The existing system includes a voice-based method and an Infrared reflection-based method [2]. The voice-based method works properly when the user speaks the command clearly. But due to background noise and the anatomy of the vocal tract, a voice-based system is not effective.

Infrared reflection-based eye pupil detection system provides explicit detection of eye pupil centre location. But the infrared radiation affects the eye of the disabled person and he/she may lose eye visibility. The uniqueness of this system is that no part of the system physically interacts with the user, making disabled persons feel comfortable [8]. The aim of this system is to improve society in a small way by setting out an idea for a system that could actually better the lives of millions of people across the globe [9]. This system is cost-effective and can be used globally and easily by every disabled.

II PROBLEM STATEMENT

Clinical studies show that 9-10% of severely disabled patients with difficulty find it impossible to use a wheelchair despite having some training to manage and use a wheelchair. This shows that they do not have the ability to move and power and it is difficult to use the functions of a wheelchair [4]. The project aims for an easy-to-use product that does not require solid training.

III LITERATURE REVIEW

There were preceding works carried out on electric wheelchairs. A few of them assist us to get ideas for our project. Dulari Sahu proposed an eye control wheelchair for disabled people. This abolishes the personal assistance required for those persons. The whole structure is controlled by Raspberry PI [3]. Reona Cere issued a proposal on the Arduino circuit. The whole structure is controlled by the Arduino [4]. Arduino is a simple microcontroller board and open source development environment that allows making functional and creative projects by using Arduino microcontroller and software. And make the system affordable. And this paper also concentrates on finding the direction in which the eye looks using a MATLAB frame. Depending upon the location of the pupil in these blocks, action is carried out. Gunda Gautam suggests an image capturing module and image analysis module.

Image Capture Module:- Image Capturing is to capture a chain of iris images from the subject using a camera.

In iris recognition image capturing is a mandatory step. Since the iris is small in size and dark in colour, it is challenging to achieve a good image. The image is then changed from RGB level for further processing. It is to

capture a chain of iris images from the subject using a camera.

Image Analysis Module:- Image analysis is achieved by segmentation. Segmentation is to eliminate houseful information namely the pupil segment and part outside the iris. Segmentation is done by the Baughman algorithm [5]. Daug man's algorithm presents an integrodifferential operator to find both the pupil and iris contour. This operation works even if the image is taken in a little dark environment.

Ankur Thakur proposed a Mat lab component and script. Mat lab constituent includes the topics are as follows [6]

1.Initialization of variables and setting communication.

2. Image capture and eye detection.

3. Image processing.

4. Movement detection.

Using the idea listed in the survey we developed a wheelchair for paralysed persons.

IV PROPOSED METHODOLOGY

The issue of the utmost importance in a proposed system is the robustness against different user types, illumination changes, user movement, vibration, and accuracy. With respect to considering these as vehicle systems, if the user changes, the system should work without any input parameter changes. In accordance with EWC movement, illumination conditions may vary. Also, disturbances due to EWC vibration are a major problem.

The conventional WC control system uses human eyes only, the camera is placed on the WC. This may cause a vulnerability when WC is vibrated. Also, when the user moves their head, gaze estimation is hard. Furthermore, illumination conditions may vary during EWC movement. The proposed WC system utilizes an IR camera placed on the user's glass. This way will eliminate problems of illumination changes. Furthermore, pupil detection and recognition based on pupil knowledge will improve the robustness against different users.

A. Hardware Configuration

The Hardware configuration of the proposed structure is shown in Figure 1.

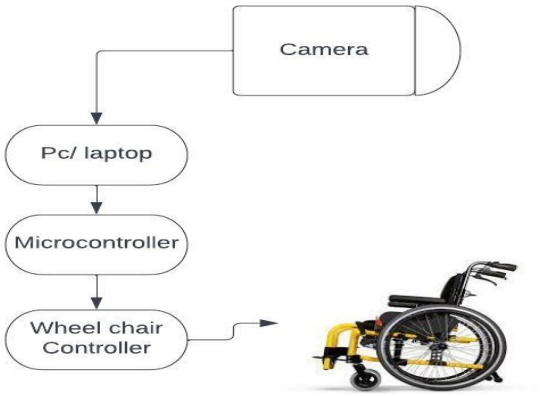

Figure 1: Hardware Configuration

V EXPERIMENTAL RESULTS

(1) The system UI is designed in such a way that it is easy for users to use. It also has a threshold adjustment area to capture the user's movement.

(2) Input and related images shown below are generated after using the Daugh man algorithm in the input image that is processed in MATLAB. The shape of the iris and the user will be determined. Also, the image location is detected and the inserted image resolution given below will be generated as LEFT or RIGHT respectively.

(3) The input and related images shown below are generated after using the Daugh man algorithm in the input image to be processed in

MATLAB. The shape of the iris and the student will be determined.

Also, the image location is detected and the input image resolution given below will be reproduced as a centre in Figure 8.

VI CONCLUSION

In conclusion, the development of a smart wheelchair using Joystick and Bluetooth with emergency Switch can greatly benefit individuals with physical disabilities. The joystick allows for easy and intuitive control of the wheelchair, while the Bluetooth technology enables wireless communication with other devices such as smartphones, for added convince and accessibility. In other word we can operate the wheelchair in two modes such as Joystick mode and Bluetooth mode as per convince. The emergency switch serves as a crucial safety feature, in the case of any accident it send the message and location of the wheelchair to the authenticated number through GSM/GPRS module. Overall, the smart wheelchair represents a significant step Forword in improving the mobility and independence of any disable, old or injured people.

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