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SMART EYE TECHNOLOGY FOR CONTROLLING AND MONITORING THE BLIND PEOPLE

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ABSTRACT

This project is a smart eye tracking system which is intended for individuals with inabilities and old individuals. The idea of this exploration is to apply eye development to control apparatuses, wheelchair and speak with overseer. This framework involves four parts, imaging preparing module, wheelchair-controlled module, apparatuses controlled module and SMS administrator module. The picture preparing module comprises of webcam and C++ altered picture handling, the eye development picture is caught and transmitted to Raspberry Pi microcontroller for handling with Open CV to infer the facilitate of eye ball. The facilitate of eye ball is used for cursor control on the Raspberry Pi screen to control the framework. Other than the eye development, the eye flicker is applied right now entering an order as when you press Enter button on console. The wheelchair-controlled module is a support with two servos that can be moved to two measurements and furthermore versatile to other wheelchair joysticks. These frameworks additionally remotely control a few apparatuses and speak with overseer by means of send message to PDA.

Key words: smart eye, Blind People, caretaker, eye movement, wheelchair.

1. INTRODUCTION

The quantity of outwardly debilitated is enormous to such an extent that it hugy affects the economy of the nation. Actually right now, regular man doesn't have the opportunity to try and take a gander at these contrastingly capable ones. In this manner, the outwardly disabled individuals continually require the help of somebody in their day by day works, particularly while on streets. Frequently these individuals are viewed as a weight by others while some simply overlook their quality and leave them to think about themselves in solitude. This makes a vibe of dejection in them. This idea of being dependant on somebody makes a sentiment of demotivation and loss of self – trust now and again also. A portion of the significant difficulties remember trouble for moving starting with one spot then onto the next without the help of somebody. Different difficulties remember trouble for perceiving individuals, identifying snags on their way, etc. A few gadgets accessible in the market help them to defeat a couple of these difficulties. There is constantly countless looks into associated with the sole point of building gadgets to support these outwardly tested individuals.

It likewise gets hard for the oblivious in regards to perceive an individual. Typically, dazzle recognize individuals dependent on their voice. This is consistently not compelling as it may be hard for the oblivious in regards to perceive the voice of the individual who had not been in contact for quite a while. Consequently, a gadget to help recognize realized individuals gets essential. This issue can be settled by utilizing face discovery calculations. Face acknowledgment is one of the most important uses of picture investigation. The genuine test here is to construct a framework that could incorporate all these and fill in as an eye for the outwardly debilitated. Subsequently, the target of this work is to help the outwardly disabled in their everyday exercises like moving starting with one spot then onto the next and ID of people.

2. LITERATURE SURVEY

2.1. User-Centered Design (UCD)

A User-Centered Design (UCD) approach can be used in any type of product from the perspective of HCI design. UCD, also called Human-Centered Design (HCD), is a method that defines the needs, desires, limitations, services, or processes that serve the end-user of a product/system at all stages

of a project. In other words, UCD is a multistage troubleshooting process that follows all product development requirements. UCD tries to optimize how the user can use the product/system, what they want or what they need, instead of changing the user's behavior with the product/system. The approach of UCD is to put human needs, resources, and behavior first, and then design technology to accommodate those needs, resources, and behaviors. It is necessary to understand the psychology and technology to start the design, which requires good communication, mainly between human and machine, indicating available options, the actual status, and the next step [28]. The term "interaction" from human–computer interaction (HCI) is a basis for designing or developing a user interface and an interaction between humans and machines. Preece et al. define four basic activities of an interaction design: (i) identify needs and establish requirements; (ii) develop alternative projects; (iii) construct interactive versions of projects; and (iv) evaluate projects. They also describe three characteristics for interaction design: (i) focus on users; (ii) specific usability criteria; and (iii) iteration. Regarding the user experience, Goodman et al. claim that the process is not only to learn about the user experience with the technology, but also for designers to experience interacting in their own work. They report that user experience tests must be applied during the design, the approaches of which could be (i) reported approaches; (ii) anecdotal descriptions; and (iii) first-person research. In addition, Begum presents the user interface (UI), proposing an extended UCD process that adds the "Understand" phase to the methods. The conventional steps of a UCD approach are (i) study, (ii) design, (iii) build, and (iv) evaluate; however, Begum has extended it to (i) understand, (ii) study, (iii) design, (iv) construct, and (v) evaluate.

Usability The definition of usability is when a product is used by specific users to achieve specific goals with effectiveness, efficiency, and satisfaction in a specific context of use. Usability is more than just about whether users can perform tasks easily; it is also concerned with user satisfaction, where users will consider whether the product is engaging and aesthetically pleasing. Usability testing is a technique in UCD which is used to evaluate a product by testing it with actual users. It allows developers to obtain direct feedback on how users interact with a product. Thus,

through usability testing, it is possible to measure how well users perform against a reference and note if they meet predefined goals, also taking into account that users can do unexpected things during a test. Therefore, to create a design that works, it is helpful for developers to evaluate its Usability, i.e., to see what people do when they interact with a product. Usability is then the outcome of a UCD process, which is a process that examines how and why a user will adopt a product and seeks to evaluate that use. That process is an iterative one and seeks to improve the design following each evaluation cycle continuously.

System Usability Scale (SUS) The System Usability Scale (SUS) provides a reliable tool for measuring usability. It consists of a 10-item questionnaire with five response options which are scored by a 5-point Likert scale, ranging from "1—strongly disagree" to "5—strongly agree". Originally created by Brooke, it allows researchers, engineers, and designers to evaluate a wide variety of products and services, including hardware, software, mobile devices, websites, and applications.

The 10 statements on the SUS are as follows:

(1) I think that I would like to use this system frequently.

(2) I found the system unnecessarily complex.

(3) I thought the system was easy to use.

(4) I think that I would need the support of a technical person to be able to use this system.

(5) I found the various functions in this system were well integrated.

(6) I thought there was too much inconsistency in this system.

(7) I would imagine that most people would learn to use this system very quickly.

(8) I found the system very cumbersome to use.

(9) I felt very confident using the system.

(10) I needed to learn a lot of things before I could get going with this system.

Although the scores are from 0 to 100, these are not percentages and should be considered only in terms of their percentile ranking. Based on the research of Brooke, an SUS score above 68 would be considered "above average", and anything below 68 is "below average". However, the best way to

interpret the results involves normalizing the scores to produce a percentile ranking. This process is similar to grading on a curve based on the distribution of all scores. To get an A (the top 10% of scores), a product needs to score above an 80.3. This is also the score in which users are more likely to be recommending the product to a friend. Scoring at the mean score of 68 gives the product a C, and anything below 51 is an F (putting the product in the bottom 15%).

PROPOSED SYSTEM

Route navigation

The GPS catches the present area of client and afterward checks if the goal is substantial or not. On the off chance that the goal is a legitimate one, at that point the way to arrive at that goal is really given in type of voice orders. The GPS consistently monitors the scope and longitude esteems while managing the client. The voice orders are basic and effectively justifiable. The earphones are utilized to provide all the orders, similar to the ideal route course and alarm the client if there is any deterrent in the manner.

Face detection and recognition

The face location and acknowledgment module utilizes the camera to catch the pictures of the substance of the individual before the client and store them in the SD card, the capacity card inside the microcontroller. The camera is fixed on the shirt neckline of the client. The web camera has three lights that naturally switch on in obscurity. It additionally has 16 embellishments and 10 foundations outlines. For proficiency reason, the camera catches 20 pictures of the face and these are put away alongside the individual name. This is physically done before the gadget can be placed into pragmatic use. On the off chance that a similar individual comes before the client once more, at that point the camera catches the picture and contrasts it and the recently put away pictures and if a match whenever found, the comparing name of the individual is perused out. No voice yield is presented in defense no match is found. The picture catch and handling is finished with the assistance of OpenCV programming.

Eye blink detection

The eye squint identification is utilized to reenact the enter console. To distinguish the eye flicker, the quantity of dark pixel in the student zone is estimated. The change from high to low of the dim pixel number is assigned for the eye-flicker identification; for example the enter key.

The webcam is associated with Raspberry Pi microchip that performs computerized picture preparing as well as interfaces with other module including apparatuses controlled, wheelchair-controlled and SMS mange module. Apparatuses controlled module, another Arduino is utilized to get order from Raspberry Pi by remote correspondence, the Arduino will turn hand-off on or off as indicated by the order of Raspberry Pi, this hand-off is utilized to turn Appliances on or off.

SYSTEM ARCHITECTURE

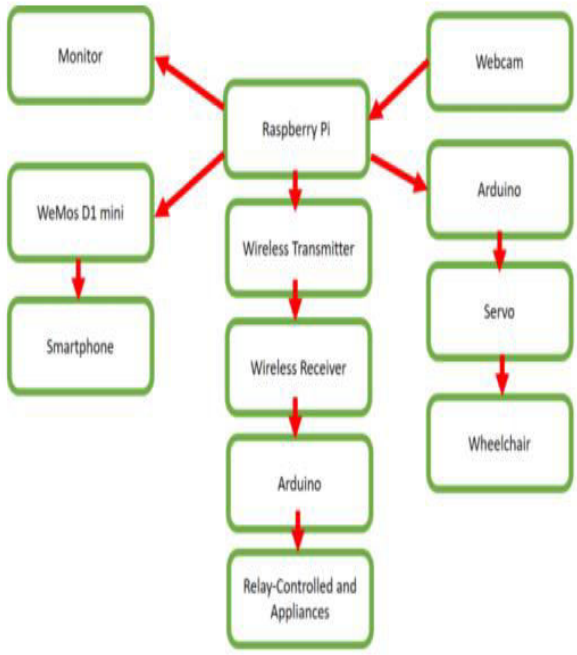

Figure 1 System Architecture

WORKING OF SMART EYE

The entire system can be divided into two simple subsystems namely route navigation and the other one is the face detection and recognition. The navigation module also includes the obstacle detection system. The device guides the person to the pre-stored destination whose path is stored. The user can choose the destination with the help of buttons. The system is provided with 4 buttons using which the user can select his/her desired location and then the navigation route for these locations are given as voice command using headphones.

CONCLUSION

The keen eye following framework is introduced right now. It not exclusively to control wheelchair development yet it likewise controls machines and speak with guardian. The eye development is utilized to control cursor that show up on screen and eye squint utilized for entering order yet the disservice of this framework is a webcam that appended on eyeglass is huge size, it will be trouble vision of client However, our framework is sufficient to be utilized for individuals with inability. Later on work we might want to improve execution of this framework based financially savvy condition. The proposed framework

coordinates the working of the different modules and in this manner gives a multipurpose gadget to the outwardly impeded. The gadget is planned so that it is convenient and compact. The gadget consistently screens the present area of the client with the assistance of the GPS. The gadget additionally gives cautioning when impediments are distinguished in transit. It likewise assists with distinguishing individuals dependent on the recently put away pictures. It can likewise be kept in pockets, in this way calms the client from the need to hang on the gadget for quite a while as if there should be an occurrence of sticks. The clearness of yield is high since the yield is provided as voice orders through earphones. Since all the information are taken care of to the framework before its utilization, it doesn't require Internet availability for its working. This is especially useful if Internet network isn't accessible all through the city.

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