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Wheel Chair Control Based on Biometric with Automatic Obstacle Detection

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ABSTRACT

This paper basically provides a real time model of a low cost wheel chair based on the guiding movement of the tongue, for the persons disabled with quadriplegia. The model is realized through the data comparison in serial communication with the special purpose microcontroller IC. In this paper tongue is our object detected by using infrared signals to serially interact with the controller, which in turn, controls the wheel chair movements. This communicative act with as the wireless, be here we use RF transmitter and receiver after then controlled by the wheelchair. In this model Ultrasonic sensor used to detect obstacles and Image processing is done to recognize the obstacle and provides them information about the obstacle.

Keywords: RF Transmitter And Receiver, Raspberry Pi, Ultrasonic Sensor, Image Processing, Infrared Sensor, USB camera.

I. INTRODUCTION

In day to day life we are seeing quadriplegia affected people facing many problems in locomotion. They need additional support for moving from one place to another place for their safety, but all the time it's not possible to help them. The people who can't articulate can't access wheel chair with voice recognition. Moreover, In the existing system wheel chair control does not provide any information about the obstacle during locomotion. Wheelchair is managed via tongue movement as its call implies. We are able to use the tongue for controlling wheelchair. There are two segments transmitter segment and receiver segment. Infrared sensor is positioned outside the user's cheek that is related to RF transmitters and the RF receiver segment is located behind the chair. Whilethe tongue is moved closer to leaving facet inside the mouth, the sensor will take input and the chair is moved to the left facet. Whenthe tongue is moved closer to right facet in the mouth, the sensor will take input and the chair can be moved to the right facet. Whilethe tongue is moved towards front side within the mouth, the sensor will take input, then the chair moves in ahead course. The RF receiver affords the information to the microcontroller from RF transmitter and the controller judges whether the instruction is right or left motion based on the tongue movement and controls the chair.

Existing Method

To manage the physically impaired individuals they require neighbors help for route and direction so that they utilized tongue driven framework and it comprises of a of Hall Effect magnetic sensors and perpetual magnet which is hung on tongue utilizing tissues adhesive and tongue penetrating. Subsequently of tongue development attractive field created by a magnet that will change around the mouth. These variations are detected by a variety of magnetic sensor which is mounted on the headset outside the mouth. The sensors yield is remotely transmitted to the microcontroller and the chip will prepare the flag to control the development of force wheelchair.The significant downside of the framework is loss of signals on account of the more prominent going into the transmitter and it expends more power and cause Trouble in distinguishing the obstacle and hindrances.

Proposed System

In this paper tongue is our object which is recognized by utilizing infrared sensor serially associate with controller, which thus, controls the wheel chair developments. This correspondence act with as the remote and it additionally gives information about deterrent .

Proposed System Advantages

- Voice Guidance
- IR sensor to control wheel chair
- Obstacle detection
- Reports about detected obstacle

II. METHODS AND MATERIAL

LITERATURE SURVEY

[1]. TorqueSensorlessControl inMultidegree-of-Freedom Manipulator
-T. Murakami, F. Yu and K. OhnishiTorque, Apr. 1993

The paper describes a torque sensor less control in amultidegree-of-freedom manipulator. In the proposed method, two disturbance observers are applied to each joint. One is used to realize the robust motion controller. The other is used to obtain a sensor less torque controller. First, a robust acceleration controller based on the disturbance observer is shown. To obtain the sensor less torque control, it is necessary to calculate reaction torque when the mechanical system performs a forcible task. Second, we explain the calculation method of the reaction torque. Then the proposed method is expanded to workspaceforce control in the multidegree-of-freedom manipulator. Finally, several experimental results are shown to confirm the validity of the proposed sensor less force controller.

[2]. Vibration Suppression for Uprising Control of Two-Wheel Driven Wheelchair
- T. Kawamura and T. Murakami–Nov2011

The wheelchair is an essential vehicle for impaired and matured individuals. In any case, conventional wheelchairs have two issues, low portability and troublesomely of going over strides. These issues are brought on by their two front casters. To take care of these issues, two-wheel driven wheelchair which has no caster was proposed. By the past research, it can keep stable demeanor by the adjustment control, and turn by the turning control. Be that as it may, on the grounds that riders get on after the wheelchair is settled on a level plane, it is anything but difficult to lose an adjust by unsettling influence when a rider gets on. In this paper, the uprising control of two-wheel driven wheelchair is proposed. Pitch point aggravation eyewitness (PADO) and Lyapunov-based controller are used to acknowledge uprising and adjustment. So as to smother the vibrations, the variable pick up is proposed. By the proposed control strategy, riders can get on two-wheel driven wheelchair effortlessly.

[3]. A Stabilization Control of Two Wheels Driven Wheelchair
-A. Nakamura, T. Murakami - Oct 2009

The paper depicts an adjustment control of two wheels driven wheelchair in light of pitch edge unsettling influence eyewitness (PADO). PADO makes it conceivable to balance out the wheelchair movement and expel casters. This brings a complex versatility of wheelchair on the grounds that the casters are hindrance to acknowledge step section movement et cetera. The proposed approach in light of PADO is hearty against the unsettling influence of pitch edge holding and the more practical wheelchairs are normal in the created framework. The legitimacy of the proposed technique is affirmed by recreation and examination.

[4]. Force Sensorless Power-assist Control of Yaw Motion Direction for Two Wheels Driven Wheelchair
- T.Kuramatsu, T.Murakami – Sep 2010

Two wheels driven wheelchair doesn't have any front casters hence it is superior to a normal wheelchair in terms of mobility. However, it cannot keep the stable attitude without control. Also, it is necessary to realize power assist control of yaw direction motion in order to obtain operability equal to normal wheelchair. In this paper, pitch angle disturbance observer (PADO) is utilized to realize robust stabilization. PADO can estimate disturbance of pitch angle. Estimated

disturbance is compensated in Lyapunov-based controller, which stabilizes the pitch angle. To realize power-assist control of yaw direction, reaction torqueobserver (RTOB) is applied to yaw direction. The validity of the proposed method is verified by experiment.Proposed gadget is in comparison with OS-CFAR, the AND-CFAR, and the OR-CFAR detectors.

[5]. Wheelchair operated by Tongue Motion -AmritaMahadevChavan, BhagyashriBalkrishnaPatil,SayaliBalasoJadhav, PriyankaDinkarYadav-Feb 2016

The tonguehas driven framework is another remote assistive innovation, which is utilized for crippled or it is extraordinarily intended for deadened individual. Tongue driven framework comprises of Hall Effect sensor. The tonguehas driven framework furnishes individuals with insignificant or no development capacity in their upper appendages with an efficious device for condition control. The tonguehas driven framework comprises of a variety of Hall Effect attractive sensors and lasting magnet which is hung on tongue utilizing tissues glue and tongue puncturing. Therefore of tongue development attractive field produced by a magnet that will shift around the mouth. These varieties are detected by a variety of attractive sensors which is mounted on the headset outside the mouth. The sensors yield is remotely transmitted to the microcontroller and the chip will handle the flag to control the development of force wheel seat. This innovation gives speedier propelled smoother and more helpful control.

[6].Electronics Guidance For TheNavigation Of Visually Impaired Person -MarutTripathi, Manish Kumar, Vivek Kumar , WarshaKandli.-June 2014

This paper presents a Navigation System for visually impaired individuals to explore securely and rapidly, in the framework a snag discovery and acknowledgment is done through ultrasonic sensors and USB camera. The proposed framework identifies the hindrances up to 300 cm by means of ultrasonic sensors and sends input as beep sound by means of headphone to educate the individual about the impediment. USB webcam is associated with a Raspberry Pi Embedded board which catches the picture of the snag, which is utilized for finding the properties of the deterrent (Human Being). Human nearness is related to the assistance of human face location calculation written in Open CV. The imperatives coming while at the same time running the calculation on Embedded System are restricted memory and preparing time and speed to accomplish the ongoing picture handling necessities. The calculation is executed in Open CV, which keeps running on Debian based Linux condition.

III. RESULTS AND DISCUSSION

Implementation

MODULES

1. IR Sensor

In this module tongue is moved closer to left facet inside the mouth, the sensor will take input and the chair is moved to the left facet. When the tongue is moved closer to right facet in the mouth, the sensor will take input and the chair can be moved to the right facet. While the tongue is moved towards front side within the mouth, the sensor will take input, then the chair moves in ahead course.

2. Object Detection

In this module ultrasonic sensor is a gadget that can gauge the separation to a question by utilizing sound waves. It apportions separate by sending a sound wave at a particular recurrence and tuning in for that sound wave to bounce back. By recording the passed time between the sound wave being created and the sound wave bouncing back, it is conceivable to figure the separation between the sonar sensor and the obstacle.

3. Capturing Obstacle .

In this venture, we are utilizing a web camera which is associated with the Raspberry Pi board through USB , that catch the picture in light of the snag identified by ultrasonic sensor , and it reports the caught picture to the Raspberry Pi board for picture handling.

4. Image Recognition

The pictures are gotten through web camera which is associated with the Raspberry Pi board. These pictures are perceived and distinguished utilizing picture handling with open CV. The calculation utilized is an ORB calculation in open CV. The primary reason for

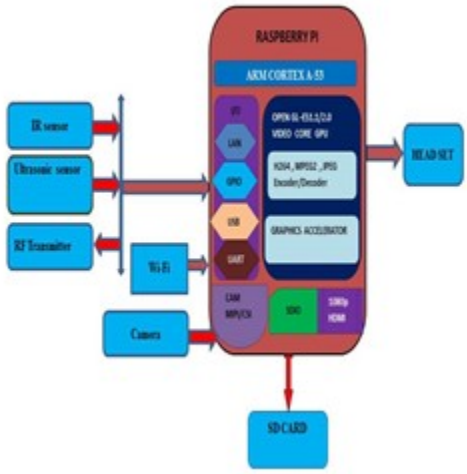
utilizing this calculation is to precisely recognize these pictures so that legitimate activity is finished.

5. Reports through headset

In this module after the image has been recognized by the raspberry pi boardits report to the physically challenged person about the obstacle through the headset which was present in their path.

WORKING

The framework, which comprises of two units, to be a specific transmitter unit and recipient unit. In the transmitter side IR sensor is associated, then the input to IR sensor is given through the tongue. The tongueis drawn nearer to left facet inside the mouth, then the sensor will take information and chair is moved to one side feature. At the point when the tongueis drawn nearer to right facet into the mouth, the sensor will take input and the chair can be moved to the right side. Whilethe tongueis moved towards front side inside the mouth, the sensor will take input and then the chair moves in ahead course.



On the receiver side ultrasonic sensor is a gadget which is associated with raspberry pi board, which can gauge the distance of a object by utilizing sound waves. It measures distance by sending a sound wave at a particular recurrence and tuning in for that sound wave to ricochet back. By recording the time passed between the sound wave being produced and the sound wave bobbing back, it is conceivable to complete the separation between the sonar sensor and the object. On the off chance that assume ultrasonic sensors does not distinguish any impediment in their way, then it moves advance in the same course as indicated by the IR sensor input.

Calculation of Distance

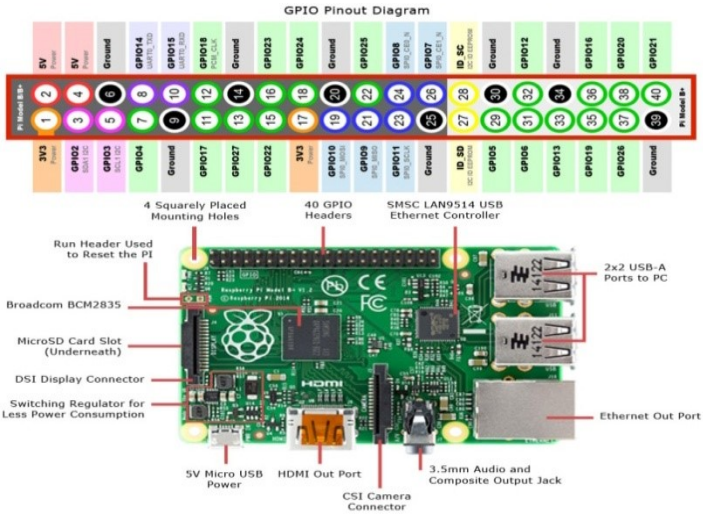
The distance of the deterrent from the user is figured utilizing the microcontroller. The time from transmission of the pulse to the gathering of the echo is the time taken for the sound energy to set out through the air to the obstacle and back once more. Since the speed of sound is steady through the air, the distance of the object is calculated by measuring the echo reflection time:

In view of the response produced with the hindrances cautions the users to pick an alternate way

Pulse_duration = pulse_end - pulse_start
Distance = pulse_duration*17150

If the obstacle is present in the path of wheelchair, then it captures obstacle through web camera which is connected to the Raspberry Pi board through USB. The image captured is based on the obstacle detected by ultrasonic sensor and it reports the captured image to the Raspberry Pi board for image processing. Then the captured images are recognized and identified using image processing with open CV. The algorithm used is ORB algorithm in open CV. The main reason of using this algorithm is to accurately identify these images so that proper action is done. After the image has been recognized by the raspberry pi boardits report to the physically challenged person about the obstacle through the headset which was present in their path.

Pin Diagram



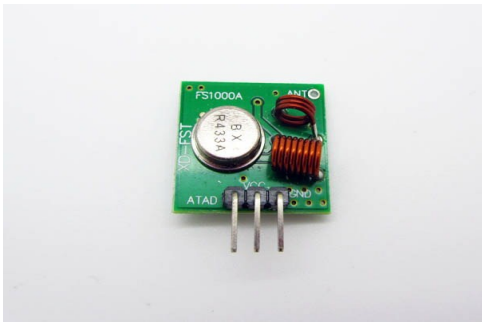
RF Module

Radio Frequency, any frequency inside the electromagnetic range related with radio wave propagation. At the point when a RF current is provided to a reception apparatus, an electromagnetic field is made that can spread through space. Numerous remote advances depend on RF field propagation.

Transmitter

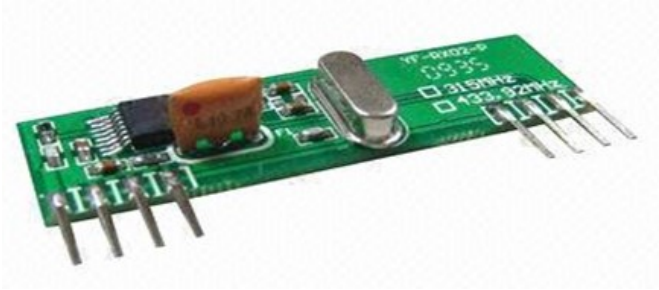
The TWS-434 greatly little, and are fabulous for applications requiring short-range RF remote controls. The transmitter module is just 1/3 the span of a standard postage stamp, and can undoubtedly be put inside a little plastic walled in area.

TWS-434: The transmitter yield is dependent upon 8mW at 433.92MHz with a scope of roughly 400 foot (open region) outside. Inside, the range is around 200 foot, and will experience generally dividers.

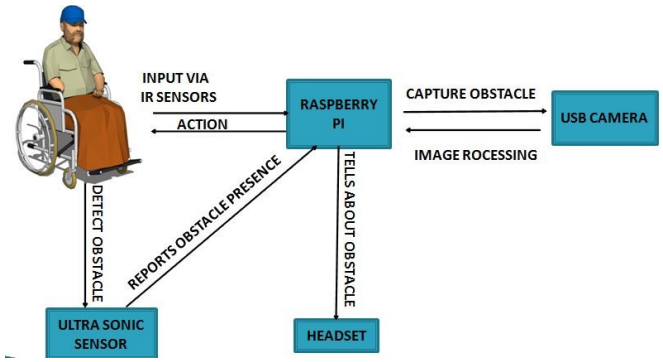


Receiver

RWS-434: The receiver also works at 433.92MHz, and has an sensitivity of 3uV. The WS-434 collector works from 4.5 to 5.5 volts-DC, and has both straight and advanced yields.



Architecture Diagram



IV. CONCLUSION

Wheelchair are constructed to implement the Intelligent Navigation System. The wheel chair is programmed to move in all the directions. Ultrasonic detector module detects the intruders that may appear in the path and stops the wheel chair for the response of identifying the intruder. The proposed wheel chair is functioning as a voice controlled load carrying robot that is very useful for aged and physically challenged persons.

V. REFERENCES

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