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A Smart System for Disabled Person with Wheel Chair Facility by Using IOT

Er.R.Srinivasan, G.Ramajayam, L.Venkatesan, T.Aravinthraj,
Associate Professor, Department of Electrical and Electronics Engineering, Krishnasamy College of Engineering and Technology, Cuddalore, TamilNadu, India.
U.G student, Department of Electrical and Electronics Engineering, Krishnasamy College of Engineering and Technology, Cuddalore, TamilNadu, India.
U.G student, Department of Electrical and Electronics Engineering, Krishnasamy College of Engineering and Technology, Cuddalore, TamilNadu,India.
U.G student, Department of Electrical and Electronics Engineering, Krishnasamy College of Engineering and Technology, Cuddalore, TamilNadu,India.

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ABSTRACT: The motivation behind HEAD MOTION CONTROLLED WHEELCHAIR USING ANDROID TECHNOLOGY project is to build an automated wheelchair that helps the physically disabled peoples to locomote from one place to another. As we know that many wheelchairs are available with different running technologies, but the cost is very high and it is not much effective. Mostly, the idea of building HEAD CONTROLLED WHEELCHAIR is to overcome some disadvantages of the existing systems. The wheelchair is controlled with the help of an android mobile application. The purpose of selecting the Android platform is that nowadays Android mobile phones are commonly used. The user has to first get connected with the wheelchair with the help of the application. The user then has the GUI to control the wheelchair. This system allows the user to robustly interact with the wheelchair at different levels of the control (turn left, turn right, go ahead, go back and stop) and sensing. This project uses microcontroller kit circuit and DC motors to create the movement of the wheelchair.

I. INTRODUCTION

The 2011 census reported increase in country's disabled population by 22.4% between 2001 and 2011. In 2001 count of disabled was 2.19 crore in 2001, which to 2.68 crore in 2011 of which 1.5 crore are males and 1.18 crore are females. Most of the disabled are those with physical disability, accounting for 20.3% for total disabled population .The population of disability is increasing due to various reasons as road accidents, premises fall, suicide attempts, natural disasters such as earthquakes, etc. The disabled population needs a support that is provided by wheelchair. The normal pushing wheelchair is the primitive one in which the user has to push the chair with the hands. It has a stress on the user when traveling for a long distance. So with the help of technology and human intelligence, the idea of an automated wheelchair is evolved. An automated wheelchair based on some inputs interfacing machine which provides inputs to the motor. The motor processes the inputs provided and takes the corresponding action (in terms of movement – move left, forward, backward, right). With the introduction of Android Smartphone in the system, the working becomes less complex. The system becomes quite user-friendly to the user.

1.1 BLUETOOTH

Bluetooth is a wireless technology standard for exchanging data over short distances using short-wavelength UHF radio waves in the ISM band from 2.400 to 2.485 GHz from fixed and mobile devices, and building personal area networks(PANs). It was originally conceived as a wireless alternative to RS-232 data cables.

Bluetooth is managed by the Bluetooth Special Interest Group (SIG), which has more than 30,000 member companies in the areas of telecommunication, computing, networking, and consumer electronics. The IEEE standardized Bluetooth as IEEE 802.15.1, but no longer maintains the standard. The Bluetooth SIG oversees development of the specification, manages the qualification program, and protects the trademarks.[3] A manufacturer must meet Bluetooth SIG standards to market it as a Bluetooth device.[4] A network of patents apply to the technology, which are licensed to individual qualifying devices.

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1.1.1 BLUETOOTH BASED ACCESS CONTROL

The problem area worked upon is access control, i.e. the identification and allowance or prohibition of the entry of users in certain locations like toll plazas or societies, etc. In contrast to the existing system in use the proposed system is that which uses an Android smart phone with Bluetooth functionality running a client side App for access control. Certain changes to the access control mechanism are also proposed. These changes include the use of controller for interfacing the mechanism to provide/ prohibit access using Bluetooth communication. Data collection in the form of logs stored in an database is provided. The major parts of the access control solution are as follows:

Android App

Since Android is used in a number of development projects many of which have comfortable proximity with the concept of smart cities, it was the platform of choice for user end device. A companion application developed in Android Studio running at the user side will be installed on the user's smart phone. This app will take care of the sign-up, login, authentication, log generation and Bluetooth communication with the access control mechanism.

Bridge

The controller does not have built-in Bluetooth capability but has an interface to send and receive RS-232 compatible signals, thus requiring hardware in form of a Bluetooth transceiver module, the BT04. Bluetooth Technology is a wireless technology for exchanging information over a typically short range. It is the bridging technology between the controller and the Android smart phone used in the access control. Bluetooth has a very important role to play in the development of smart cities and is an emerging platform for future telecommunications and thus has a lot to offer. The second interface was between the controller and the motor to drive the access control, the motor driver IC; it takes signals from the controller and can alternate the voltage levels to give a bi-directional rotation for the motor. All that is needed is interfacing of gears to drive a barrier or a sliding gate, whichever the case for access control.

II. LITERATURE SURVEY

Controlling an automated wheelchair via joystick/head-joystick supported by smart driving assistance

With this work, we encourage the application of smart driving assistance algorithms to support the operator of an automated wheelchair in complex navigational situations. On the basis of an empirical study in which eight untrained subjects performed a given course using a conventional joystick and a proportional head-joystick respectively, we are able to prove benefits resulting from the application of a newly developed driving assistance module. Altering the translational and rotational velocities in situations where an obstacle blocks the user-commanded way, the driving assistance module significantly improves driver-performance by preventing all collisions along the way.

Wheelesley, a Robotic Wheelchair System: Indoor Navigation and User Interface

Many people who use wheelchairs are unable to control a powered wheelchair with the standard joystick interface. A robotic wheelchair can provide users with driving assistance, taking over low level navigation to allow its user to travel efficiently and with greater ease. Our robotic wheelchair system, Wheelesley, consists of a standard powered wheelchair with an on-board computer, sensors and a graphical user interface running on a notebook computer. This paper describes the indoor navigation system and a user interface that can be easily customized for a user's abilities.

Autonomous Control of Eye Based Electric Wheel Chair with Obstacle Avoidance andShortest Path Findings Based on Dijkstra Algorithm

Autonomous Eye Based Electric Wheel Chair: EBEWC control system which allows handicap person (user) to control their EWC with their eyes only is proposed. Using EBEWC, user can move to anywhere they want on a same floor in a hospital autonomously with obstacle avoidance with visible camera and ultrasonic sensor. User also can control EBEWC by their eyes. The most appropriate route has to be determined with avoiding obstacles and then autonomous real time control has to be done. Such these processing time and autonomous obstacle avoidance together with the most appropriate route determination are important for the proposed EBEWC. All the required performances are evaluated and validated. Obstacles can be avoided using acquired images with forward looking camera. The proposed EBEWC system allows creation of floor layout map that contains obstacles locations in a real time basis. The created and updated maps can be share

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by the electric wheel chairs on a same floor of a hospital. Experimental data show that the system allows computer input (more than 80 keys) almost perfectly and electric wheel chair can be controlled with human eyes-only safely.

Automatic Wheelchair using Gesture Recognition Along with Room Automation

Patients who have inabilities in movements will get a much better life by using electronic supports for their daily needs. The aim of this work is to implement wheel chair direction control with hand gesture reorganization. This paper proposes an integrated approach to real time detection, tracking and direction recognition of hands, which is intended to be used as a human-robot interaction interface for the intelligent wheelchair. This paper demonstrates that accelerometers can be used to effectively translate finger and hand gestures into computer interpreted signals. For gesture recognition the accelerometer data is calibrated and filtered. The accelerometers can measure the magnitude and direction of gravity in addition to movement induced acceleration. In order to calibrate the accelerometers, we rotate the device's sensitive axis with respect to gravity and use the resultant signal as an absolute measurement. In this project automatic controls are incorporated in a wheelchair. All the electronic gadgets in patient's room can be controlled by certain gestures from the patient. The signals for room automation are communicated through Zigbee modules. Also there is an emergency call alert system in the wheelchair. For that GSM modules are used. For the wheelchair control we use a 3 axis accelerometer, which effectively translate finger and hand gestures into computer interpreted signals. Integrating a single chip wireless solution with a MEMS accelerometer would yield an autonomous device small enough to apply to the fingernails because of their small size and weight.

Hand Gesture Based Wheelchair Movement Control for Disabled Person Using MEMS.

This paper is to develop a wheel chair control which is useful to the physically disabled person with his hand movement or his hand gesture recognition using Acceleration technology. Tremendous leaps have been made in the field of wheelchair technology. However, even these significant advances haven"t been able to help quadriplegics navigate wheelchair unassisted .It is wheelchair which can be controlled by simple hand gestures. It employs a sensor which controls the wheelchair hand gestures made by the user and interprets the motion intended by user and moves accordingly .In Acceleration we have Acceleration sensor. When we change the direction, the sensor registers values are changed and that values are given to microcontroller. Depending on the direction of the Acceleration, microcontroller controls the wheel chair directions like LEFT, RIGHT, FRONT, and BACK. The aim of this paper is to implement wheel chair direction control with hand gesture reorganization.

III. EXISTING SYSTEM

The existing system uses voice recognition –based android mobile to control the wheelchair. An Android application is to be developed for this purpose. The android mobile is connected to microcontroller fitted inside wheelchair via a Bluetooth controller.The provided Android application gives simple user-interface to the user for voice recognition to control the direction of motion of wheelchair. Based on voice recognition the corresponding signal is sent via a Bluetooth controller to the microcontroller, which takes actions as a form of output. If the user voice command is Go-ahead direction, then both the motors are made to move in the same direction and with the same speed. Similarly is the Goback direction. If the user's voice command is Turn left/right direction than the polarity of both the motors are reversed correspondingly.

3.1 PROPOSED SYSTEM

In this paper a microcontroller system that enables wheelchair control by head motion is presented . The system comprises electronic and android application. A novel head motion recognition technique based on Android tecnology. The application gives simple user-interface to the user for head motion recognition.The Android-based wheelchair controller that consists of automaton device and a controller that can be attached to wheelchairs to control the movement by using a DC motor. In this system, Bluetooth module communication protocol is used to communicate sensory and command information between the android device and the controller.The system will work even using voice control instead of head motion. The application will be included on android platform.There are 4 options for basic motions of a wheelchair to be applied by the user.

The four conditions of the wheelchair can be,

- Moving forward
- Moving backward
- Turning to the right
- Turning to the left

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The Android Mobile is used as an input. The Application is developed on the Android platform. When the application (app) is opened at that time an announcement comes to turn on the mobile Bluetooth.

ATMEGA328 ARCHITECTURE

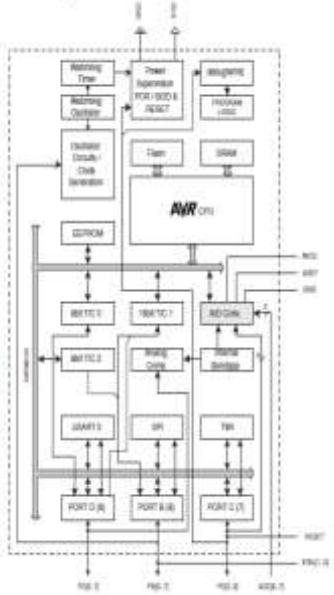

Fig1.ATMEGA328 architecture

When the user touches the virtual button at that time a sequence is passed that and then transmitted from the transmission unit to the receiving section through the mobile phones Bluetooth. At the receiving end the Bluetooth accepts the sequence and sends it to the At mega 328 Microcontroller and it operates on 5V supply. The microcontroller converts the sequence into ASCI code and then this code is decoded and according to it the motors are given supply and turned to have linear motion of the wheelchair. Bluetooth module is used for wireless transmission of data, operated on 5V. Single Battery of 12V is used to drive the wheelchair. Battery is used for the purpose of mobility.

DC motors are driven by driver IC. The driver IC is a dual bridge IC. For forward movement the motors are moved forward and for reverse movement the motors are moved in backward direction. For left movement the left motor is stopped and right motor in forward direction and for right movement the right motor is stopped and left motors are moved in forward direction.

AT MEGA328

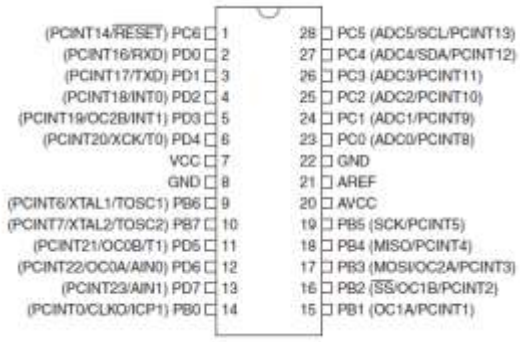

Fig2.pin diagram

3.1.1 Modules

- **Android Mobile**

The Android Mobile is used as an input. The Application is developed on the Android platform.

- **Bluetooth**

When the application (app) is opened at that time an announcement comes to turn on the mobile Bluetooth. When the user touches the virtual button at that time a sequence is passed that and then transmitted from the transmission unit to the receiving section through the mobile phones Bluetooth. At the receiving end the Bluetooth accepts the sequence and sends it to the At mega 328 Microcontroller.

- **Microcontroller**

The microcontroller converts the sequence into ASCI code and then this code is decoded and according to it the motors are given supply and turned to have linear motion of the wheelchair.

- **Battery**

Bluetooth module is used for wireless transmission of data, operated on 5V. Single Battery of 12V is used to drive the wheelchair. Battery is used for the purpose of mobility.

- **DC motors**

DC motors are driven by driver IC. The driver IC is a dual bridge IC.

HARDWARE OUTPUT

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3.3ADVANTAGES

- Reduces manpower and dependency on other human drive.
- Wheelchair is compact and economical.
- Android application can scan the valid input at a faster¬ rate and hence control the movement of wheelchair.
- Provides easy movement for physically challenged people.
- Easy to develop an existing wheelchair and does not require any sophisticated components.

Low power consuming and easy to operate the wheelchair.

IV. CONCLUSION

- The main aim of this project implementation is to help all the people who are dependent on wheelchair for their mobility.
- Wheelchair is simple to operate and does not need any external help.
- The objectives of this project have been achieved successfully. This project was able to develop an android system that can control the movement of the wheelchair.

The application built can be useful for many android phones.

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