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# **Smart Wheel Chair**

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# Abstract

This paper describes the voice controlled wheel chair which operates on user's command .Nowadays the physically challenged person's use the wheel chair without depending on others. The wheel chair can be controlled by the simple voice commands given by the user. The wheel chair can also be used by the people who are unable to drive by using the hand. The location of the user can be traced by the GPS module that tracks and send the information by using IOT. The system also offers the obstacle detection by using the IR sensor. Few patients such as quadriplegic, cerebral palsy and multiple sclerosis are dependent on other people to move from one place to another. Depending upon the direction specified in the commands, the Arduino will drive the motors. It can sense the body temperature and the heart beat rate. The system also controls the movement of wheel chair by using the accelerometer. As this system simultaneously offers voice operated wheelchair, motor speed control, obstacle detection and GPS tracking of patient using android app, hopefully it will be a fruitful system for the handicapped people worldwide.

**Keywords**: Voice recognition module, GPSmodule, IR sensor, IOT, Accelerometer, Aurdino, heart beat sensor.

# I. INTRODUCTION

People with differently abled people usually depend on others in their daily life especially in moving from one place to another. People with arms and hand impairment finds difficult to use a normal wheelchair as their hands are not capable of operating the normal wheelchair and cannot move it to any direction. Therefore, voice controlled wheel chair is built to overcome the problems faced by such people and enable them to operate the wheelchair. The wheelchair will be operated using the voice commands through the given input. The Arduino will take care about all the directions the user wants. The instruction for each and every direction is written in the form of program in the Arduino itself. The first automated electric wheelchair was introduced by George Klein in 1953 for the World War II veterans . Later, many researchers have proposed and developed many designs for wheelchair based on image processing, eye movement signal (EOG) control,

Tongue control, EMG control and EEG control and so on. However, many limitations including complex signal processing, high cost and additional hardware requirement made these systems not much suitable. Other than these, joystick controlled electric wheelchair has also been developed which is of no use to the users with paralyzed hand or who have problems in hand. After that, voice recognition based wheelchair has been proposed as voice is an easy and popular way of communication. The output is then received by Arduino. The already written programs in the Arduino helps Arduino to convert this voice commands into considerable output and the wheelchair will move according to the user's commands. .The basic commands such as forward and reverse direction, left and right turns, rotate and stop. The movement of wheel chair is controlled by accelerometer and Heart beat sensor is used to sense the heart beat level. All these movements are monitored by IOT server it will communicate with android app received by physically challenged person relative and it will alert in case of any emergency.

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# **II. RELATED WORK**

People have disabilities with their hand, and lower extremities because of which they are unable to perform regular tasks. Many technologies are available to overcome this problem. To overcome this problem, there are several applications. With using this technology we create a solution for anything. In our project using embedded technology we are creating a smart wheel chair for physically challenged person. In the market which help handicapped people to perform their tasks. If a person is physically challenged, they are dependent upon others for their day to day operations such as orientation etc. Several studies have shown that the independent mobility, which includes power wheelchair, manual wheelchair and walker access the benefit to both children and adults. Independent mobility reduces dependence on caregivers and family members and promotes feelings of self reliance. This kind of system reduces the manual effort for acquiring and distinguishing the command for controlling the motion of a wheelchair. The speed and direction of wheel chair could be directed by using accelerometer. The only important thing to ride the wheel chair is the trained voice. Besides that, the development of this project can be done with less cost and affordable. This design could be improved by implementing wireless communication in the wheelchair. By developing this system, we can directly enhance the lifestyle of the disabled people in the community. The motor drive and control system of the intelligent wheelchair has been presented. The proposed microcontroller based voice operated intelligent wheelchair would bring more convenience for the disabled people. This system also enhance the health monitoring and the safety for the users who use ordinary joystick-controlled powered wheelchairs

# III. PROPOSED METHODOLOGY

The purpose of this paper is to develop wheelchair which will move as per the user's commands. This system works on voice commands given by the wheelchair user. The system is fully independent as the user does not need any other person to help him to move the wheelchair. There are basically five commands, which command is given by the user, accordingly the wheelchair will move. The voice commands of the user are recognized in the first step. Once it is recognized, the commands are converted into its equivalent instructions which drive the system. This system consists of two major modules namely Voice recognition module and the health monitoring module. The voice recognition is done through the voice recognition module. The input to the system is the unilateral mic. It's capable to take user's voice commands and not bother about other noises. The mic will be placed as per the user's comfort. The output is in the form of voice signals and transferred to the voice recognition module which acts as an interface between mic and arduino. The Arduino then receive the output from voice recognition module thus converting it into binary code. It is connected with motors to drive the wheelchair anywhere. Motors are responsible for the movement of wheelchair. Hence, motors receive input from the Arduino and depending upon the instruction type, motors moves accordingly. This system uses two motors connected with motor driver. There are five different instructions that can be given to the motors, they are forward, backward, left, right, rotate and stop. The movement of wheelchair depends only upon these five commands. The system monitors the body temperature, heart beat and the movement is controlled by accelerometer. In this GPS is used to trace the user location and it is intimated to the family

# **IV. HARDWARE DESCRIPTION**

The system uses mic, arduino, accerlerometer sensor, heart beat sensor, motor,GPS technology,Voice recognition module.

#### 1. Mic

A microphone is an example of a transducer, a device that changes information from one form to another. Sound information exists as patterns of air pressure; information into patterns of electric current. This voice controlled wheel chair uses unilateral mic.This unilateral mic is capable of ignoring noises apart from the actual voice command. This mic receives the voice commands from the user and send to the voice recognition module.

#### 2. Arduino

The Arduino Uno R3 acts as an intermediate agent between the voice recognition module and the motors to drive the wheelchair. It is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins, 6 analog inputs,a16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller. It receives the input given to the voice recognition module and converts into the format accepted by the motors and thus the motors works according to the command given. The Arduino needs to be interfaced to the motors as well as the voice control module.

#### 3. Voice Recognition Module

The voice recognition module ie v3.1 is used to recognize the voice commands given by the user and it can be trained by the user. It's a 48-pin single chip CMOS voice recognition LSI circuit with on-chip analog front end. In this system, the voice recognition module is trained and it takes the input from mic available in the system. The wheelchair uses the voice recognition module interfaced with the Arduino Uno R3 to convert the voice commands into motor understandable instructions to move the wheelchair as commanded by the user.



Figure 1: Block diagram of smart wheel chair.

# 4. Gps Technology

GPS is the abbreviation of global positioning system. It consists of 24 satellites circling around the earth. There are several kinds of GPS having the same basic function and that is to track the accurate location of the device the tracking is done by the emission of radio signals from the satellites. The GPS receiver receives the radio signals from at least three satellites so that it can provide accurate data.in our system the GPS is used to track the location of the handicapped people it also used in different fields such as agriculture, astronomy, automated vehicle, cellular telephony, emergency services, navigation, and so on.

#### 5. Motor

The Arduino is coupled with motors to drive the system as per the user's demand. The proposed system consists off our,DC magnetized, 100 rpm motors (Johnson motors) to equalize the weight distribution and stall torque. The motors will be attached to all the four wheels and two motor drivers will be connected to each side.

#### 6. Accelerometer Sensor

An accelerometer is an electromechanical device used to measure acceleration forces. Such forces may be static, like the continuous force of gravity or ,as is the case with many mobile devices ,dynamic to sense movement or vibration of the user. Accelerometers are movement monitor that have the ability to capture intensity of physical activity. They are typically attached to the wheel chair. To sense motion in multiple directions, it must be designed with multiple axis sensors or multiple linear axis sensors.

# 7. Heart Beat Sensor

Heart beat sensor is an electronic device that is used to measure the heart rate i.e speed of the heartbeat. Heart beat sensor is designed to give digital output of heart beat when a finger is placed on it. It works on the principle of light modulation by blood flow through finger at each pulse. Monitoring body temperature, heart rate and blood pressure at the basic things.

# **V. CONCLUSION**

The design and implementation of a smart wheelchair for disabled people using arduino.The direction of the wheelchair now can be selected using the specified voice commands. The design not only reduce the manufacture cost compared with present market but also will give great competitive with other types of electrical wheelchair. The only thing needed to ride the wheelchair is the voice commands of the person. This project has many advantages like safety, comfort, energy saving, full automation etc. The technology is enhanced safely for users who use wheelchair, by preventing collision with walls, fixed objects, furniture and other people with the help of object sensor. The technology can also enhanced safely for users who use ordinary joystick-controlled wheelchair, by preventing collision with walls, fixed objects, furniture and other people. Thus all the drawbacks of the joystick controlled wheelchair are overcome by this "voice controlled wheelchair".

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