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DESIGN AND HISTORY OF AUTOMATED POWER WHEEL CHAIR CONTROLLED BY HEAD MOTION

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Abstract: Electric wheelchairs are designed to aid paraplegia. Unfortunately, these cannot be used by persons with higher degree of impairment, such as Quadriplegics, and i.e. persons that, due to over age or illness, cannot move any of the body parts, except of the head. Medical devices designed to help them are very complicated, rare and expensive. In this project a microcontroller system that enables standard electric wheelchair control by head motion is presented.

Keywords: FPGA, logic blocks, LUT, programmable

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INTRODUCTION

It is important for everyone to move easily. However, some people have difficulty to do so. Some of these people may have problems in their legs. These people may need wheelchair or crutches to move. Some of these people may be too old to move. They may also need wheelchair to move. In the past, a wheelchair is powered with human hands, and it is very difficult to move for long distance. Currently there is a kind of electric wheelchair, which improves this situation significantly. However, it still needs people to watch out to avoid accident. The energy to watch out accident should be saved, and some elders or handicaps may even not be able to do so. It is very inconvenient for these people in some small areas, such as campus, zoo, museum, or some factories. Therefore, it will help these people significantly if we have a small-area power wheelchair. There are at least three advantages of a small-area power wheelchair compared with traditional autonomous vehicles on road or on highway. These advantages make it possible to be practical and useful widely.

Wheel Chair is a mobility device designed for shifting patients, moving physically challenged people from one place to another with the help of attendee or by means of self-propelling. The wheel chair is divided into two different types based on the power used for mobility.

The aim of this paper is to use wheelchair automatically for moving forward, backward, Left & Right. The overall framework of this project is to restore autonomy to severely disabled people by helping them use independently a power wheelchair. A wheelchair is an electric wheelchair fitted with acceleration sensors, obstacle sensor and computer to help less able drivers achieve some independent mobility. By just tilting acceleration sensor wheelchair can be moved in four directions. The obstacle sensor can help the rider control the wheelchair by taking over some of the responsibility for steering and avoiding objects until he or she is able to handle the job. The amount of work that the rider chooses to do and how much control is taken by the chair is decided by the rider and his or her care.

HISTORY:

R.C. Simpson [2] et al suggested, the wheelchair has its drive wheels in the back and castor wheels in the front. The specialty of that wheelchair model is the active castor wheels. They are always rotated by motors to the orientation that matches the current driving direction. Hence, all the problems that normally occur with passive castor wheels in wheelchairs, such as blocking wheels after a change of the driving direction, are solved in this model. The wheelchair offers a CANBUS interface that allows wire-tapping between the joystick and the motor control. The

Xeno was extended by two laser range sensors (modelS300 by Sick), one in the front behind the foot rests, the other one in the back. They measure the distance to the closest obstacles in a height of 12 cm above the ground and have an opening angle of 270◦. The drive wheels were equipped with wheel encoders with a resolution of approximately 2 mm driving distance per tick. A micro controller board is counting the encoder ticks. The micro controller, a USB-CANBUS adapter, and both laser range sensors (via USB-RS422 converters) are connected to a USB hub. A net book Class PC is controlling the system through a single USB cable connected to the hub.

Thomas Rofer [1] et al suggested, Traditional automated wheelchairs are operated by joy-stick, directly translating the user's hand movements into translational and rotational velocities. While such interfaces suit a large audience, certain disabilities may require appropriate alternatives, e. g. Brain-Computer-Interfaces head posture or gaze interpretation, and natural language communication to name but a few. With regard to people needing specialized input devices due to handicaps such as tetraplegia, this study analyzes the impact of the proposed driving assistance module on a common hand-operated joystick, and a head- joystick While people are familiar with the use of the former device, i.e. the deflection of the joystick maps proportional onto the direction and the velocities of the wheelchair, the later one is more sophisticated. The basic idea is to let the user of an automated wheelchair control the translational and rotational velocity by continuous pitch and roll movements of his/her head still able to observe the environment by turning the head around the free yaw-axis without causing any control commands, the user's head movements around the remaining two axes must exceed a so-called dead-zone in order to evoke a desired movement.

ADVANCED IMPLEMENTATION:

PROPOSED SYSTEM:

Manju Devy & R.Deepa [4] et al suggested, in this proposed system it uses the accelerometer to find out the movement of the head. The proposed system implements a wireless wheel chair which includes only hardware and lacks the software part. The main objective of this project is to design a wheelchair for the quadriplegics patients in a cost effective manner. The implementation is done with more accuracy and cost effective way. The wireless hardware implementation is controlled by the controller and the signals will be transmitted to motor which gives the result as the movement of wheel chair in the respective direction. The project implements the wheelchair that will move according to the head movements of the user. The wheelchair will take the direction of the user according to their head movements. The accelerometer that will be connected and the data signals will be collected from accelerometer. The data will be processed with the help of a processor and the digital signals will give commands to the wheel chair.

WORKING:

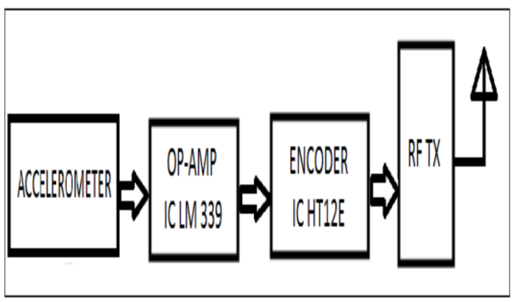

Fig shows the block diagram of transmitter module, which include accelerometer for the sensing the head motion of user. Then the output of accelerometer is given to the input of the op-amp IC. It compares signal with reference voltage which is provided by the preset. The compared signal is encoded by the encoder IC & then transmits the signal through antenna.

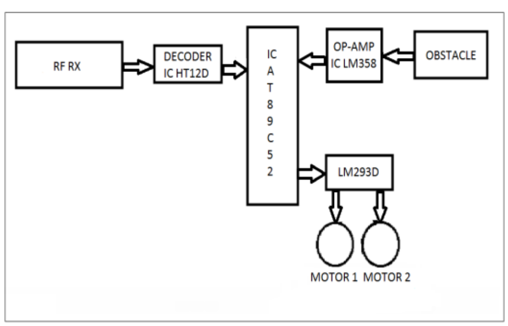

Fig shows the block diagram of receiving module, transmitted signal is received by receiving antenna. The received signal is given to the decoder IC, which decode the received signal & then given to the microcontroller IC89C52. Microcontroller gives processed signal to the driving IC to rotate the wheelchair. If obstacle is detected then wheelchair stops the motion immediately.

CONCLUSION:

The head movement based assist system was developed with an idea of serving the physically handicapped people. In this case, the assist system has proven to be of a simple implementation and of low cost.

The result obtained clearly implies that the system is easy to handle by the patients. This project can be further extended to thought recognition module for controlling the speed and movement of the wheelchair, obstacles on the pathway can be identified and the directions of the movement can be controlled using accelerometer sensor.

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