RB Journal of Lib & Information Science ISSN: 0972-2750
(UGC Care Group I Listed Journal) Vol-12 Issue-10 No.01: 2022

A VOICE CONTROLLED ROBOT WITH AUTOMATIC DANGER DETECTION FOR PHYSICALLY IMPAIRED PEOPLE

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ABSTARCT

An ultimate goal of our work will be to create a voice-activated robot car. Typically, these systems are referred to as Speech-Controlled Automation Systems (SCAS) (SCAS). The system that we're working on is a prototype of that already discussed. The goal is to build a robot that can be controlled by voice instructions. There are several articles about the communication between a robot and a smart phone, and the robot is remotely controlled by a mobile phone. Using a smart phone to remotely control a robot is a great way to do it. Numerous useful options are included in this programme. For the purpose at hand, an Android app with a micro controller is used. Bluetooth technology makes it easier to establish a connection between the app and the robot. The module will receive the commands sent across the channel, which will then be processed. As the name suggests, the goal of a voice-controlled robot is to respond to user commands. Accent training is required before the device can understand commands, and codes are used to add commands to the system. The primary reason for creating a VCRV is so that it can recognise and respond to commands given to it via human speech. It is possible to move the robot in any direction, as well as halt it. An android smartphone will be used to operate the car wirelessly.

1. INTRODUCTION

The purpose of this smart wheelchair project is to improve a regular powered wheelchair by combining sensors to observe the surroundings of the wheelchair and a speech interface to comprehend instructions. A future welfare society will benefit greatly from intelligent wheelchairs. Intelligent wheelchairs promote the idea that the machine is a companion rather than just a tool. During the last century, the number of persons with impairments has increased dramatically. To be more specific, robotic wheelchairs can assist in wheelchair manoeuvring and movement planning. Individuals of all ages need to be able to get around on their own. Children who are unable to self-ambulate safely and independently miss out on important learning opportunities, putting them at a developmental disadvantage compared to their classmates who can. Self-esteem issues might arise in adults who lack the ability to go on their own due to a lack of mobility. At any age, being unable to travel on one's own presents significant challenges to one's career and educational aspirations. Up to 40% of the disabled population has difficulty operating a typical power wheelchair. It includes but is not limited to those who suffer from low vision, a lack of peripheral vision, spasticity, tremors, or cognitive impairments, among other things. Several researchers have employed mobile robot technology to make "smart wheelchairs" for this group.

This type of chair has wheels attached to it. Electric motors or hand-cranking rear-wheel steering are also options for propulsion in this gadget. Both are possible. There are usually handles on the back of the seat that allow another person to push it. Due to disease, injury, or disability, many people find it difficult or impossible to walk. A "smart wheelchaif" can be either a mobile robot base with a seat attached or a regular power wheelchair base with a computer and a collection of sensors. When creating a smart wheelchair for the disabled, there are two primary considerations to keep in mind: flexibility to the user and safety needs. As a means of increasing one's chances of A smart wheelchair must be able to adapt to the unique needs of each individual user in order to be accepted by its potential customers. The focus should be on how the remaining abilities of the human operator can be appropriately supplemented, especially in the context of aiding handicapped persons.

The human driver and the robot's software work together to operate a smart wheelchair, making it a highly interactive device. Because of this, the design of a smart wheelchair's human-machine interface is critical. About 2.3 million persons over the age of 15 used wheelchairs in 1999, according to government estimates. 1.4 to 2.1 million of these 2.3 million people, or 61 to 91 percent of all wheelchair users, used a smart wheelchair. They don't always require a high-tech wheelchair. For the most part, this suggests that smart wheelchairs could've helped 61% to 91% of people. Average annual growth of 5.9 percent in the number of wheelchair users. By 2010, the number of users had grown to 4.3 million, of which 3.9 million were smart wheelchair users. People who have major disabilities have traditionally been the only ones to benefit from smart wheelchairs. Investment in smart wheelchairs has a far bigger potential impact than investment in conventional wheelchairs.

One of the most important initiatives of the disability rights and movements and the Americans with Disabilities Act of 1990 is the adaptation of the built environment to make it more accessible to wheelchair users (ADA). The most fundamental premise is that all people, regardless of handicap, have the right to equal access to all areas of society, such as public transportation and buildings, like all other people. An environment devoid of stairs reduces the level of disability experienced by a wheelchair user. For those who are wheelchair-bound (and those who use crutches or canes or walkers or have unsupported walking difficulties), it is required to install facilities like ramps or elevators in order to access certain buildings. Powered doors, lowered basins and water fountains, and toilets with enough space and hold bars to let a person to exit their wheelchair onto the fixture are all vital changes to make. Most new public facilities in the United States are required to meet ADA criteria of accessibility.

A growing elderly population has prompted architects to build wheelchair ramps that are less conspicuous and better match the overall architecture of a home's construction. Larger bathroom doors that can accept wheelchairs and accessible showers and bathtubs are also crucial improvements to private residences. For those with impairments, these designs allow for the use of mobile shower chairs or transfer benches. In a "wet room," the shower floor and the rest of the bathroom floor are one and the same. Patients in shower chairs can be pushed directly into the shower using these floor designs, eliminating the need to get over a lip or barrier. The usage of patemosters in public buildings without any other means of transportation has been criticised because of the lack of access they provide for those in wheelchairs.

2. LITERATURE SURVEY

Stone slate inscriptions from China and a child's bed represented in Greek vase friezes from the 5th century BCE are the first evidence of wheeled furniture. It wasn't until three centuries later in China that wheeled seats were utilised to convey the crippled. Chinese art, which began to feature wheeled chairs constructed expressly for cany persons around 525 CE, did not make the distinction between the two functions until several hundred years later. Later in the German Renaissance, Europeans began to use this technology. The Bath Chair, or Invalid Carriage, is thought to have been in use by the middle of the 18th century. Disabled visitors to Atlantic City's Boardwalk could rent wheelchairs ("rolling chairs") starting in 1887. Eventually, many healthy tourists began renting the "rolling chairs" and slaves to push them as a show of opulence and treatment they could never enjoy.

In 1933, mechanical engineers Han-y Jennings and Herbert Everest, both of whom were wheelchair-bound, built the first lightweight, steel, folding chair. An accident at a mine had resulted in Everest's back being fractured. Everest and Jennings were the first to mass-produce wheelchairs after seeing the invention's commercial potential. However, with newer materials and other enhancements, the "x-brace" design is still widely used.

Rehabilitative Engineering Center published a paper in 1993 stating that wheelchair selection is based on a person's physical condition, functional abilities, and needs. There is little in the way of support and few options for adjusting the chair to the user in light-duty chairs. This is the most cost-effective option for a simple wheelchair if the user wishes to take a break from walking. At the cost of some compactness, heavy-duty chairs overcome many of the comfort and adjustment difficulties that light-duty seats lack. Cushions and hard backs can be added to these sorts to boost the user's comfort and support.

ISSN: 0972-2750
Vol-12 Issue-10 No.01: 2022

To help individuals with lower-limb motor difficulties, technologies such as wheelchairs are needed that allow them to move around while still maintaining mobility. Wheelchair technology has advanced tremendously in recent years. Despite these substantial advancements, quadriplegics are still unable to navigate their wheelchairs on their own. We were inspired by the idea of implementing Automation in a wheelchair at a reduced cost to examine numerous publications on the subject. Referred materials have a number of interesting tidbits, such as these:

A voice recognition system and ultrasonic and infrared sensor systems have been combined into this suggested wheelchair for physically challenged people. An automated wheelchair that can be steered by voice instructions, avoid obstructions using infrared sensors, and detect down stairs or holes using ultrasonic sensors was proposed in this study. Additionally, the wheelchair has been designed to work with the movement of an accelerometer, which will aid those who have no functioning limbs. The HM2()()7 IC recognises the speech and then processes it, providing instructions to the microcontroller and, ultimately, to the robot. The wheelchair's motors move when the accelerometer tilts or moves. This analogue signal is sent to the microcontroller, which then converts it to the proper digital level. Obstacles are detected using infrared sensor technology. The microcontroller will stop the motors if it detects an obstruction.

The robot's motions are controlled by a microcontroller.
A wheelchair-integrated infrared sensor and head movement recognition system are used to automate a wheelchair. A wheelchair that can be manoeuvred around obstacles with the use of an acceleration sensor and head movements.

The wheelchair will automatically stop if it detects an obstruction in its path. The wheelchair can also communicate with computers and head motions. This means that a person who is unable to use his hands to operate a wheelchair or another assistive equipment can nonetheless manage the chair using only the movement of his head.

Using Hand Gestures to Control Wheelchair Movement in a Disability Making Use Of MEMS In this research, Acceleration technology is used to produce a wheelchair control that is beneficial to those with physical disabilities. Additionally, this paper shows that accelerometers can be used for the successful translation of hand and finger gestures into computer-interpreted signals. The accelerometer data is calibrated and filtered for gesture recognition. In addition to movement-induced acceleration, the accelerometers can measure the magnitude and direction of gravity.

Wheelchair with voice and accelerometer control- The wheelchair's movement and direction are controlled by a glove with an accelerometer worn by the chair's intended users. The wheelchair is also equipped with a Voice Recognition Kit, which allows the user to control the wheelchair with their voice. Real-time obstacle detection is accomplished by the use of ultrasonic sensors. An ultrasonic sensor that identifies barriers within a 25cm range removes the option of avoiding impediments. Manual driving is now possible with the wheelchair. A micro-controller, chosen for its inexpensive cost, as well as its versatility and performance in mathematical calculations and connectivity with other electrical devices, is used to build the prototype of the wheelchair.

Wheelchair with Collision Avoidance Activated by Voice This research uses sensor data to construct a functional voice-activated wheelchair. Collision avoidance function (CAF) is used by the system to ensure that the wheelchair avoids a wall or barrier without the user's verbal input. Using a headset microphone and ten sensors (two ultrasonic and eight infrared), the user can control the wheelchair by speaking into the laptop's microphone. In order to control the wheelchair, the user interacts with the PIC system, which uses Japanese fifteen instruction commands: eight fundamental movement commands, four little movement commands, two speed controls, one repetition command, and two verification commands. To avoid wrong wheelchair movements, a false recognition system is developed. In order to avoid collisions with both fixed and moving objects, the movement of the top is set. This difficulty is reduced by the avoidance movement. When the wheelchair decelerates diagonally against a wall or obstruction, this movement rotates the wheelchair's posture to be parallel to the wall or impediment. To prevent hitting a wall or object, the user must first utilise verbal commands to reduce their speed before applying the stop movement.

3. PROPOSED SYSTEM

• The top movement is regulated to avoid colliding with both fixed and moving obstacles, such as a person, as in the case of a wall. This difficulty is reduced by the avoidance movement.

When the wheelchair deceleration movement is diagonally close to the wall or obstacle, this movement rotates the wheelchair's posture to be parallel to the wall or obstacle.

A user can use voice commands to avoid hitting a wall or obstruction by slowing down and then stopping as soon as they are within shouting distance of one.

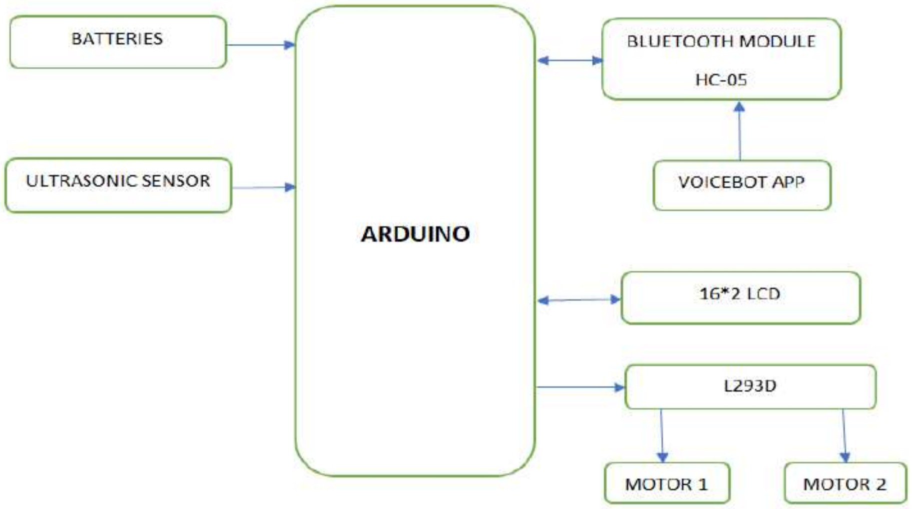

Fig 1: Block Diagram

Hardware Requirement:

- Arduino Uno
- Ultrasonic Sensor
- Fire Sensor
- Gas sensor
- L293D
- Dc motors
- Bluetooth Module
- 16*2 LCD

Software Components:

- Arduino IDE
- ProteouS

ADVANTAGES

- Its very useful for physically challenged people
- No another human being needed for help
- Easily accssed with the help of sensors

APPLICATIONS

- Used for the physically challenged people
- To protect from accidents

4. RESULST AND DISCUSSION

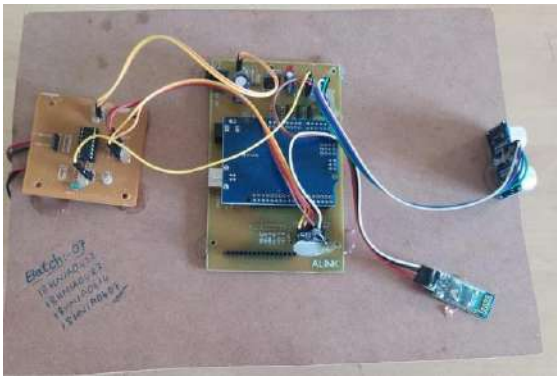

Fig 2: input image

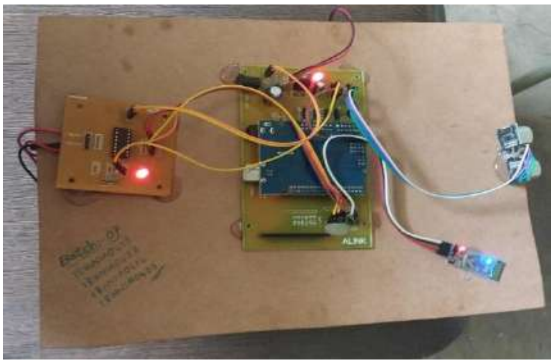

Fig 3: Output image

5. CONCLUSION

In many industrial situations, a trained robot can perform tasks that are physically impossible for humans, but can be done successfully by a robot taught in human language and vision. They are essential in situations where human life is under jeopardy, such as in warzones. Because of this, it could be used in the medical field to benefit physically challenged patients.

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