

DESIGN OF A VOICE-CONTROLLED AUTOMATED WHEELCHAIR

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INTRODUCTION OF THE PROJECT: The people with locomotion disability, some tasks and situations of everyday life can have physical constraints sometimes impossible to overcome for them. In this case manual or powered wheel chairs are devices that help them to increase their locomotion ability and quality of life. But it is very difficult for a wheelchair user to plan to move in a place never visited before. Help from care givers and/or care-giving devices are indispensable to the daily lives of aged or handicapped people. However, help from care givers imposes large physical and time loads on the care givers and imposes a mental burden on those who receive help, such as a feeling of constraint in the care giver's presence. To reduce such loads, it is necessary to introduce an autonomous care-giving device that does not require the help of a care giver.

This project is an advance approach to develop a wheelchair with a voice-recognition system, that is controlled by voice command who have issues in hand movement due to ageing or paralysis. This will assist the physically disabled to detect obstacles in their path & ensure safe movement. It also contains health monitoring, intimation to the doctor with heartbeat, temperature, ECG, SP2 and Bp monitoring. With the growth of technology there has always been an effort to use the technology for the betterment of mankind.

OBJECTIVES:

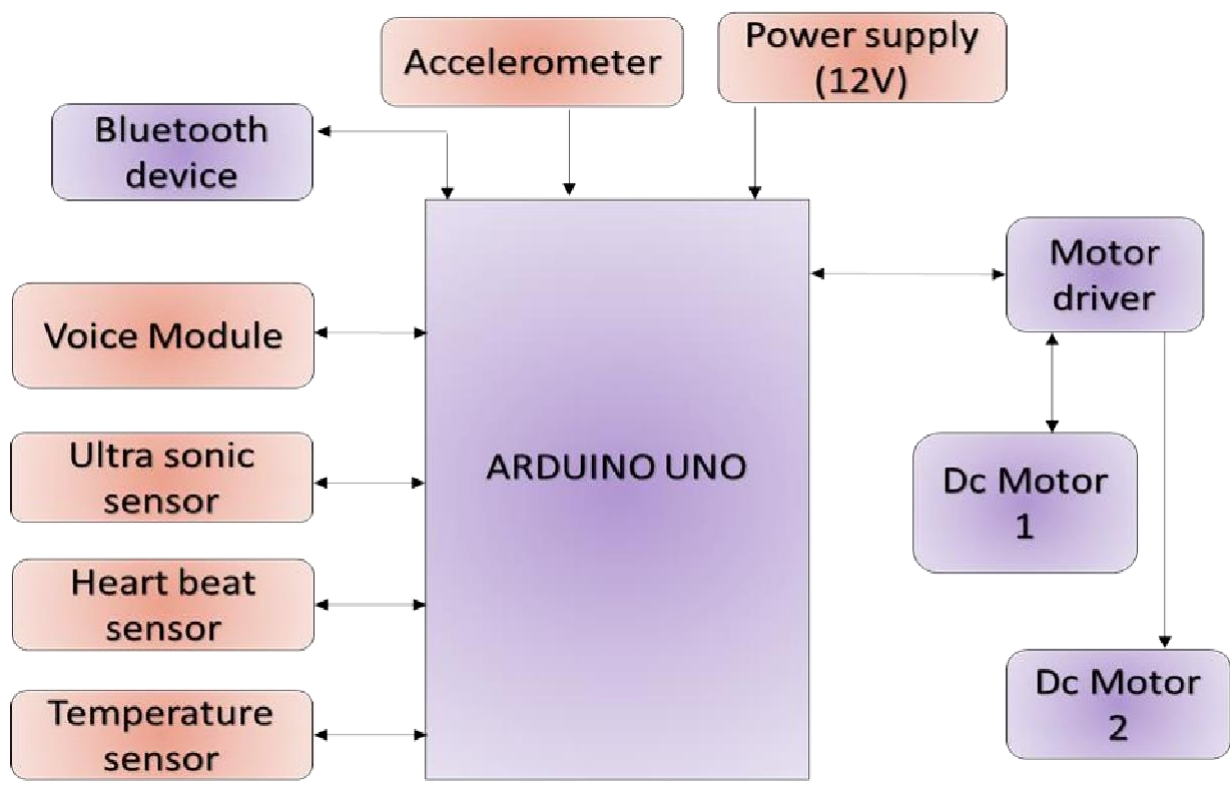
- The main objective of this project is to make a voice and hand/neck gesture-controlled wheel chair using accelerometer as sensor to help the physically disabled people in moving from one place to another just by giving direction from the voice.
- Monitoring the health of the physically disabled person when he/she is alone.
- Fall detection using accelerometer sensor.
- Send alert to the care taker.

METHODOLOGY:

- This project is implemented concentrating to design a power wheelchair which has both control systems for the people suffering from disabilities and weakness due to ageing.
- So, the whole system besides these, the output signal from the obstacle detection unit is always observed by the Arduino shield. In addition, a PING (packet internet groper).
- Sensor is used to perceive obstacle. The ultrasonic distance sensor which is used for an accurate, non-contact distance measurement, ranging from about 0.2 meters to meters.
- The working procedure of UV sensor is to transmit an ultrasonic surge and to provide an output pulse resembling to the time required for the burst echo to reappearance to the sensor.
- The detachment to target can just be calculated through appraising the echo pulse width.
- Once it finds a hindrance within its quantified range, it contributes an output to central control unit which stops the wheelchair instantaneously.
- When the output signal from the UV sensor is low, Arduino shield process the required signal to the motor driver circuit to power up the motors. The driver circuit consists of four 12V relays (Each two of them are used to make H- Bridge [20] to drive any single motor) and four n-p-n transistors (to magnify the driving current to drive the relays).
- Two 24v DC series motors are used. DC series motors are chosen because of offering high starting torque, vigorous, having a simple design and pretty low cost.
- The voltage and current ratings of both motors are 24V and 5 Amp. The RPM (Revolution per Minute) of both motors is 1050 and after a gear mechanism which has the gear ratio is 15, it appears as 70 finally.
- It also contains health monitoring, intimation to the doctor with heartbeat, temperature, ECG, SP2 and Bp monitoring.

MODULES IDENTIFIED:

- 1) Voice recognition module
- 2) Obstacle detection module
- 3) Health monitoring module



CONCLUSION:

Due to rapid technological development, more advanced user-friendly electronic devices are available in more compact form than that of the previously produced ones. These developed devices are being used to improve the lifestyle of the physically disabled persons and able them to keep pace with others in the society. The Arduino based voice controlled wheelchair prototype was successfully built and tested to respond to voice commands. It will greatly improve the quality of life for those with severe disabilities. The cost has also been kept low by adding the design to any manual wheelchair.

Scope for Future work:

The future scope for voice-controlled wheelchairs using machine learning is promising. Advancements include enhanced voice recognition, contextual understanding, adaptive learning, obstacle detection/avoidance, multi-modal interaction, integration with smart home systems, user experience/interface design, and collaborative navigation. These developments aim to improve control, safety, and user experience, enabling personalized and intuitive wheelchair operation in diverse environments. By leveraging machine learning algorithms and sensor technologies, voice-controlled wheelchairs can interpret voice commands, navigate obstacles, adapt to user preferences, and integrate with smart devices. Continuous research and innovation in this field hold great potential for empowering individuals with mobility limitations and enhancing their independence.

REFERENCE:

- [1] Android Controlled Wheelchair, Authors: Mohit D Patel¹, Sagar Lakhapati, Rohit Chavan and Anish Pathak, Published in: INTERNATIONAL JOURNAL FOR RESEARCH IN EMERGING SCIENCE AND TECHNOLOGY, VOLUME-4, ISSUE-1, JAN-2017.
- [2] Arduino based voice controlled wheelchair, Authors: Tan Kian Hou, Yagasena and Chelladurai., Published in: Journal of Physics 2019.
- [3] Low-Cost Self-assistive Voice Controlled Technology for Disabled People, Authors: R. Puviarasi, Mritha Ramalingam, Published in: International Journal of Modern Engineering Research (IJMER).
- [4] “A hand gesture based wheelchair for physically handicapped person with emergency alert system”, Authors :Prof. Chitte p.p. , Miss: Khemnar S.B. ,Miss: Kanawade A.A., Miss:Wakale S.B.4, Published in:International Research Journal of Engineering and Technology.
- [5] Wireless Gesture Control Wheelchair ,Authors : Shanelle Fernandes, Rushia Fernandes, Jessica Kakkanad ,Published in : International Journal of Recent Technology and Engineering (IJRTE) 2020.

Signature of the Guide