Abstract

This paper describes the design of a smart, motorized, voice controlled wheelchair using embedded system. Proposed design supports voice activation system for physically disabled persons incorporating manual operation. Arduino microcontroller and speaker dependent voice recognition processor have been used to support the navigation of the wheel chair. The direction and velocity of the chair are controlled by pre-defined Arabic voice commands. The speaker dependent, isolated word recognition system (IWRS) for a definite utterance of Arabic words to suit the patient's requirements has been programmed and successfully demonstrated. The technique of speech signal processing for extraction of sound parameters, noise removal, intensity and normalization of time, and features matching etc. have been done with the speech processor HM2007 that being embedded efficiently in real time. Arduino receives the coded digital signals from the IWRS which being properly recognizes voice commands in order to control the function of the chair accordingly. The wheelchair does not respond to a false speech command. The overall mechanical assembly is driven by two 14A/24V/200Watt DC motors having an engagement/disengagement clutch and speed reduction gear with built-in locking
Design of Voice Controlled Smart Wheelchair

control. The system is tested using a speech password to start operation and seven Arabic commands to control motion: "Amam (forward), Saree' (fast), Batee' (slow), Khalf (backward), Yameen (right), Yesar (left), Tawaqaf (stop)". It proved a good working in clear and noisy environments with safe movement.

References

2. HMC Company, "HM2007 data sheet".

Index Terms

Computer Science

Artificial Intelligence

Keywords

Speech recognition system, Wheelchair, PWM, H-bridge driver