Department of Mechatronic Engineering

Voice-controlled wheelchair

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Introduction

The most critical challenge faced by quadriplegic patients is controlling personal mobile devices. With this in mind, we propose a voice-controlled wheelchair. Patients can use their voice to manage mobility aids through which their mobility is improved.

Research

Some points of research include:
- Sound recognition (EasyVR 3)
- Control/Processing (Arduino Mega, Stepper motor)
- Power Source (Lead Acid battery)
- 3D Printing (CAD Modelling, UltiMaker Cura Software) Plastic (PLA)
- Inductive proximity sensor (Ultrasonic, Optoelectronic)

Visual Working Process
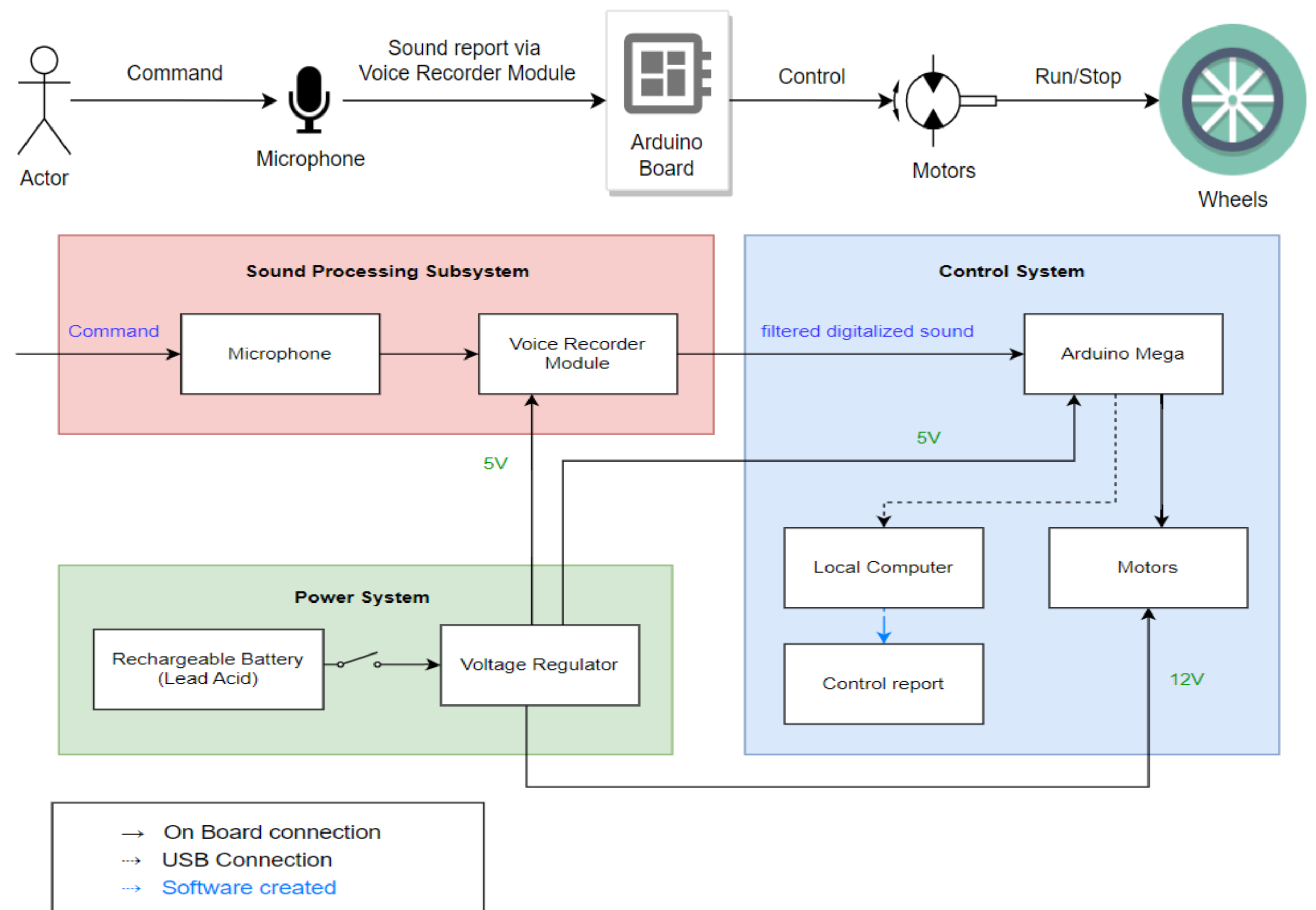
Sound Processing Subsystem

Receiving commands from the user and processing them into a digital command by comparing it with the built-in command through EasyVR 3 voice-recognition Module. That means we don't have to train it again by voice; everyone can use the product.
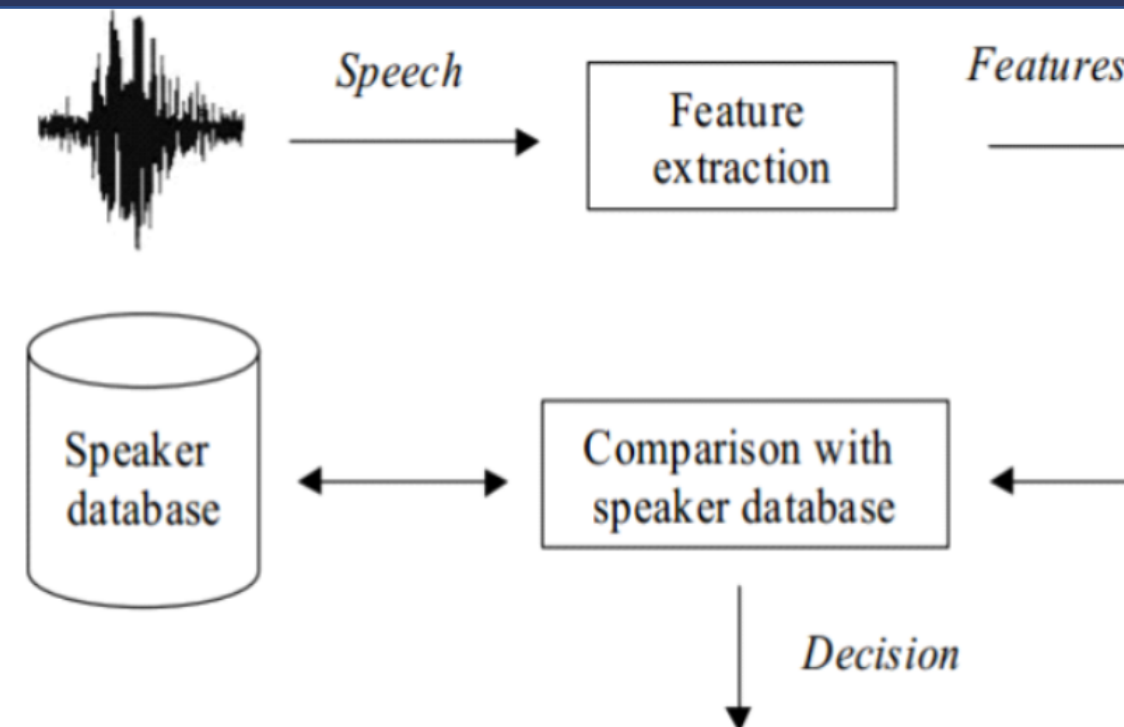
Additional Safety Systems

Using Ultrasonic sensors to calculate the distance between the product and the hazardous obstacles in case of blocking voice and send it to the microcontroller. Then, the microcontroller will stop running the motors directly.

Control system

Receiving the commands from Sound Processing Subsystem and providing them to the stepper motors through Arduino Mega 2560. Then the data is generated and saved to a control report.

Power system

Using a rechargeable lead acid battery to provide power for all components. to last a long time.

Conclusion

The creation of this project was very beneficial for quadriplegic patients and was a valuable method of gaining new knowledge. The main aim was to test the running possibility of a voice-controller wheelchair. With this in mind, the project has been successful. Furthermore, it has shown the usefulness of the proximity sensor in protection and safety now and in the future.

Issues Encountered:
- Programming the EasyVR to recognise voice: Because of the heading for everyone using this wheelchair, the built-in command was used. Unfortunately, that leads to some errors when recognising the words.

Result

Table of results based on Arduino Software's Serial monitor:

Command \ Working	Forward	Back	Right	Left	Stop	Error
Forward	88					12
Back		73			11	16
Right			87	7		6
Left			6	76	9	9
Stop					92	8

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