Development of Dynamic Arm Support For Children With Duchenne Muscular Dystrophy

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Introduction

Duchenne muscular dystrophy briefly DMD, patient muscle is missing a key structural protein called dystrophin. This causes making it more susceptible to injury. Eventually the body cannot keep up with repair and regeneration, which leads to muscle loss and weakness. Despite the intense work of scientists, there is no cure for this disease. For this reason, the only treatment method that can be used is to reduce the patient's muscle loss with the help of exercises.

Specifications and Design Requirements

- Lightweight design suitable for patient ergonomics
- Wireless control system
- Remote control capability by using the Graphical User Interface (GUI)
- High speed data processing and storage capability
- Communication via local network

Solution Methodology

- EMG sensor ,FSR and Gyroscope data are collected by using STM32f103 microcontroller
- The collected sensor data is transferred to the computer wirelessly via ESP8266
- This data is processed by the control algorithm in the computer.
- Commands are sent wirelessly back to the orthosis system
- Advantage of processing of the data on the computer, it is possible to store data and access data over the web.

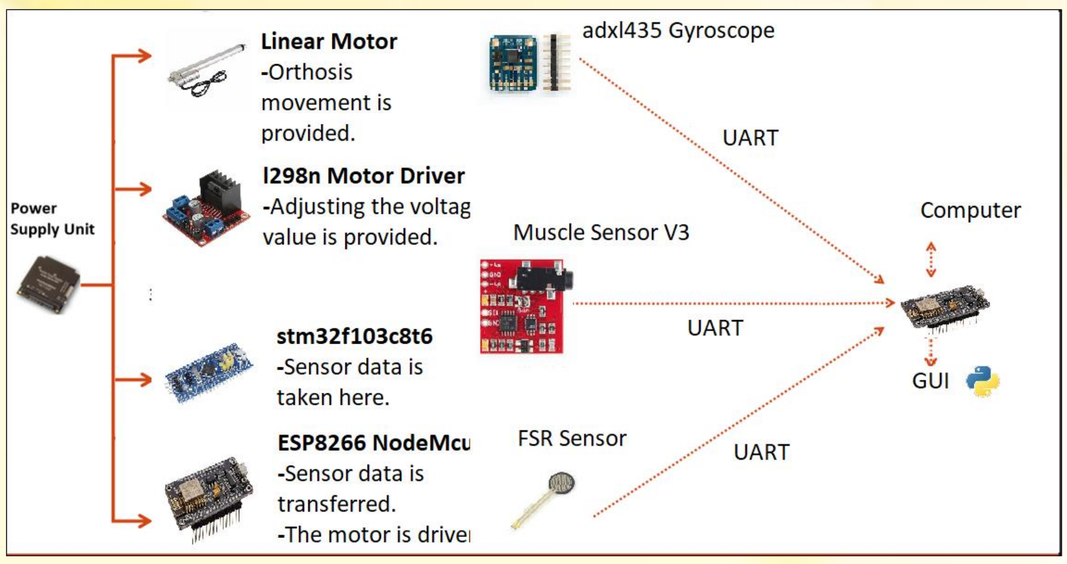
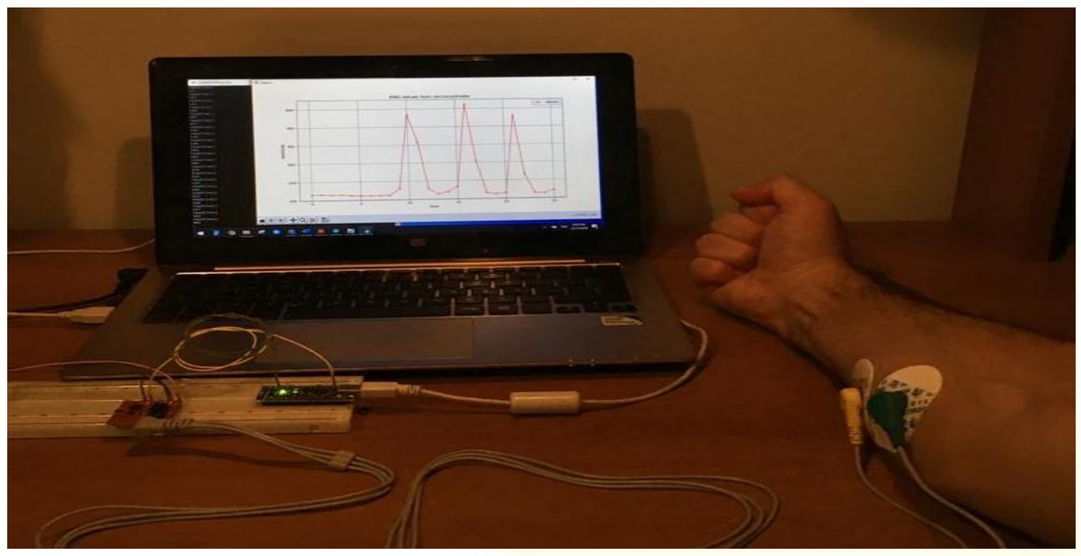


Figure: An overall description of the project components.

Application Areas

- This equipment can be used in physiotherapy field
- Can be used in the treatment of patients who have lost their mobility
- Can be used in motion support applications such as exoskeletons
- Scientific studies on motion analysis with EMG data



Results and Discussion

- High resolution data was obtained by using the high precision gyroscope and fast processor
- Using the ESP8266's esp now feature, this data was transferred to the computer without loss. In this way, the processing and storage of the obtained data became easier. In addition, a useful prototype for future work in the field of active orthoses has been created.

Acknowledgements

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