



Combining Conventional Healthcare Therapy with Smart Phone Application

Project Objective

- Combine occupational therapy with smart phone
- Collect data to analyze and keep track of patient's conditions (IoT)
- Set down the limitation of rehabilitation
- Provide prospect and foresight of the combination of occupational therapy and smart phone

Background

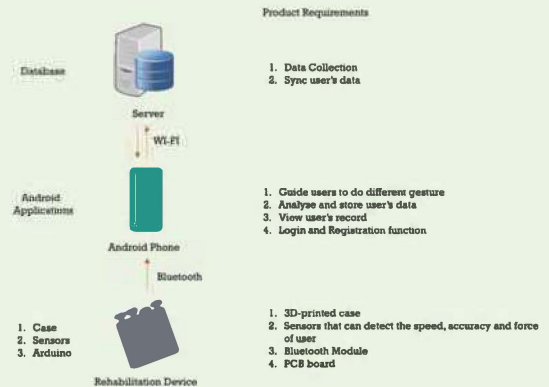
Smart therapy is an innovative idea combining conventional health-care products with the latest technology. Smartphone now works like a mini size computer but with high processing power and multi-connection tools to external source. Applications are easy to be programmed and installed by users. With its portability, users can use their application to complete different tasks, anywhere and anytime.

This project combines hand-finger exerciser (therapy), smart-phone and cloud server (database) to allow flexible and home therapy. Application software is developed to enable on-line monitoring and training.

System Overview

The project is divided into three parts: force-sensor module, smart phone application and server.

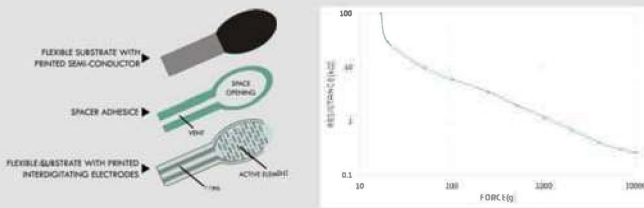
The force-sensing resistor will experience pressure when the user exerts forces on the button. The I/O ports, which are connected to the resistors, detect the varying resistance. The acquired data are sent to smart phone via a bluetooth connection. Application software (phone) gives instruction and guide the user to go through the therapy interactively. Data are sent back to server for storage. The server is able to handle multiple users.



Main Components

Force Sensing Resistor

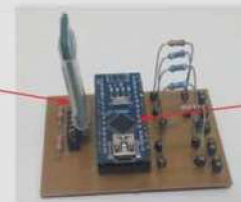
Interlink 400 is a resistive force sensing resistor which changes its resistance depends on the force of user. The resistive force sensing resistor is made of two layers of thick film conductive polymers. The more pressure the user gives, the more area of the resistive ink and traces contact and hence the resistance of the force-sensing resistor decreased. This property allows continuous measurement of force.



PCB

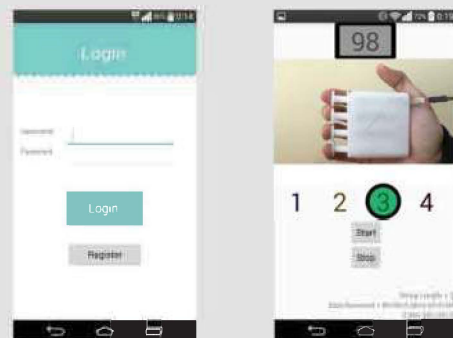
Bluetooth Module
HC-05

Arduino Nano



Android Application

An Android Application is designed to guide users to achieve different gesture of hands. The sensors reading are received by Bluetooth. The Program can analyze the reaction time, strength and accuracy of the result. The result is sent to the database. Users can retrieve past records from the server for analysis.



Minimum Requirement: Android 4.0+

3-D printed case

The case is custom-designed. It takes references from the existing hand finger exerciser in the market. The case has a smooth round-shaped design and is divided into upper part and lower part. The upper part is for button movements and the lower part is the storage of android board and circuit connection.



Conclusion

- A system connecting force-measuring device, mobile phone and database is implemented.
- Data is able to be sent from the Arduino Nano board to the android phone and the android phone is able to record accurate force.
- Data is able to be sent from the phone to the database and database can distinguish different users.