
DataSpoon: Assisting Caregivers of Children with Cerebral Palsy

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Abstract

Many children with cerebral palsy (CP) encounter great difficulties mastering self-feeding. We present a prototype for assessing their self-feeding skills via a novel instrumented spoon that monitors upper extremity biomechanics involved in eating.

Author Keywords

Cerebral palsy; self-feeding; assessment; children.

ACM Classification Keywords

K.4.2. **[Computers and Society]:** Social Issues - Assistive technologies for persons with disabilities.

Introduction

Cerebral Palsy (CP) describes a group of developmental disorders of movement and posture leading to activity restriction that is attributed to disturbances occurring in the fetal or infant brain [2]. Children with CP often have significant difficulties mastering self-feeding [3]. Disruption in eating may lead to malnutrition, poor growth, developmental delay and loss of general health and well-being [1].

We set out to assess the self-feeding skills of young children with CP via a novel instrumented spoon that monitors several biomechanical variables of the upper extremity involved in self-feeding. Providing this data

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to professional caregivers will lead to more effective treatment of self-feeding difficulties.

DataSpoon

DataSpoon uses the IMUduino BTLE board (<http://www.femtoarduino.com/spex/imuduino-btle>) for sensing and communication. This 40x16mm Arduino clone includes a 3-axis gyroscope, 3-axis accelerometer, and 3-axis digital compass. Cell batteries are used to power the board. The board also contains a Bluetooth Low Energy chip, which we pair wirelessly with an Android phone to perform data logging. The phone receives the data in realtime.

The exterior part of the spoon is 3-D printed, tailored to the exact size of the electronic parts (see Figure 1). The chosen material is plastic, which is water-resistant, light-weighted, and suited for children.



Figure 1. Initial prototype of DataSpoon.

We developed an application for Android mobile devices, which analyzes the data collected with DataSpoon, and presents it as a graph (see Figure 2). Based on this graph, professional caregivers can adjust treatment plans to the specific skill level of each child, and track subtle changes in hand movements.

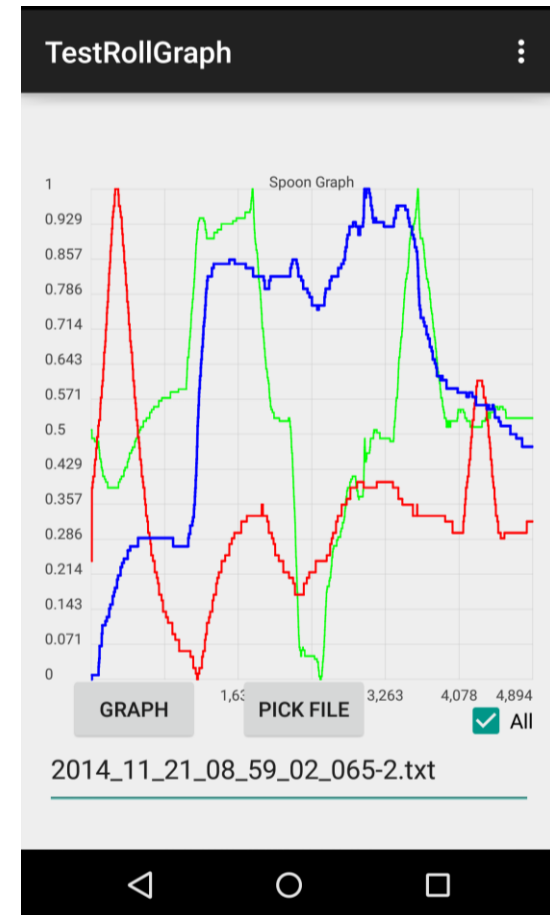


Figure 2. The output of DataSpoon is presented as a graph.

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