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# TouchView: Cognitive Assistance for MPS Children

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**Abstract**

Developmental disabilities, such as Autism and Mucopolysaccharidoses (MPS), require minute-to-minute, burdening care on the part of the parents. Often, one of the parents has to be dedicated 100%, 24/7 to support and sustain their child's life. To enhance children's cognitive ability in expressing some of their desires, we designed a simple DVD controller in a specific form factor suitable to MPS children. Our design was participatory, allowing one family with MPS children to provide guidelines. TouchView is intended to provide intuitive way for MPS children to express their wishes and desires of watching a particular movie.

**Keywords**

Touchpad, MPS children, pervasive, cognitive assistance, cognitive enhancement

**ACM Classification Keywords**

H5.2. [User Interfaces]: User-centered design.

**Introduction**

Parents have responsibilities to take care of their children. In the case of children with degenerative cognitive diseases, parental care is more than simply attending to the children, it entails constant and careful reading and guessing of the children's intentions and needs. In this project, we describe an intuitive interface

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system that enhances the cognitive ability of children with MPS, to reduce their parents' efforts of care and to improve the children's quality of.

### **Mucopolysaccharidoses Characteristics**

MPS is genetic lysosomal storage disease (LSD) caused by the body's inability to produce specific enzymes [1]. Indications of the MPS are cognitive impairment, gargoyle-like facial features & bone & joint abnormalities.

### **Cognitive Enhancement**

MPS children are not able to represent their demands through speech. In order to convey an expression, they react to the only language they are capable of, which is abnormal activities, such as shacking, biting and touching. Interactions by MPS children with objects that they may recognize are therefore impossible unless, somehow, the objects are adapted to respond to such abnormal interaction modalities. Usually, the process of cognition can be divided into five parts: perception, attention, understanding, memory and reasoning [2].

### **TouchView for DVD Control**

In this project, a multi-slot DVD changer has been used. MPS children spend part of their leisure watching DVD movies. When attempting to select a movie, they cannot be aware of exactly what they want to watch using traditional remote controller usually equipped with tiny buttons. We designed and developed a touchpad, we call TouchView, to improve the core parts of cognitive enhancement as follows: (1) Perception: Designed actual size/shape slots (approx 5"x7") to represent movies, instead of the tiny buttons on the remote controller, (2) Attention: Provided actual DVD contents to attract children's interest by its colorful ad distinguished cover page, (3) Understanding: When the pressure sensor attached behind the slot is pressed,

TouchView sends a packet of its slot number to the DVD player. Then the DVD player, which is fitted with a Bluetooth receiver that communicates with TouchView, will play the selected movie, an action that would reinforces to the child a linkage between the slot and the movie, and (4) Memory and Reasoning: They watched movies based on their demand through image representation. We found that feasibility of image-based self-access is a very promising approach for cognitive enhancement.



**figure 1.** Engineering prototype of the tangible touchpad.

### **Further Study**

To utilize our preliminary result, we are re-designing our prototype by making each DVD case a stand alone, single-slot TouchView. This increases ubiquity and allows for much more flexible interactions. Single-slot TouchView will be shown on the finished poster.

### **Reference**

- [1] National MPS Society, <http://www.mppsociety.org/>
- [2] Bostrom et al. Cognitive Enhancement: Methods, Ethics, Regulatory. Future of Humanity Institute, 2009

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An optional single page

## Single-Slot TouchView Installation



Purchase



Brand New DVD Title



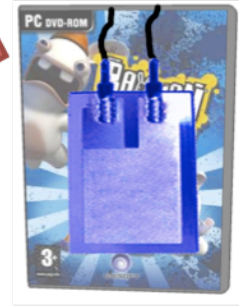
Open



Take DVD away  
Put into DVD Player



Attaching  
Control Board



Attaching  
Pressure Sensor  
With Wiring

## Experimental Environment



## General Usage



Shacking



Touching