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# Demo: Wearable Application to Manage Problem Behavior in Children with Neurodevelopmental Disorders

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## 1. INTRODUCTION

Managing problem behaviors in children with neurodevelopmental disorders can be challenging. Such behaviors may discourage social participation and learning. Many of these behaviors warrant intervention, however, are challenging for caregivers to constantly supervise. Previous work focused on developing recognition systems for stereotypical and aggressive behaviors [1,2]. Researchers also developed visualization interface for caregivers to better understand their child's needs [1]. Our goal however, is to design an independent behavior management application to help children manage problem behaviors with minimal supervision.

We conducted a field study at a school for children with special needs in Singapore, and interviewed ten teachers. This study helped us identify behaviors that require management, intervention strategies adopted, and other challenges faced by children and caregivers at home. Our insights informed the vision of WatchMe, a wearable application that sends automatic intervention notification (see Figure 1). Children needed frequent interventions using visual cue cards and verbal reminders. These instructions are delivered through visual-haptic or audio notifications. We developed a prototype of WatchMe, and recruited four children with neurodevelopmental disorders and problem behavior to evaluate the effectiveness of automated instructions. Our results show that a caregiver's voice can be particularly effective.

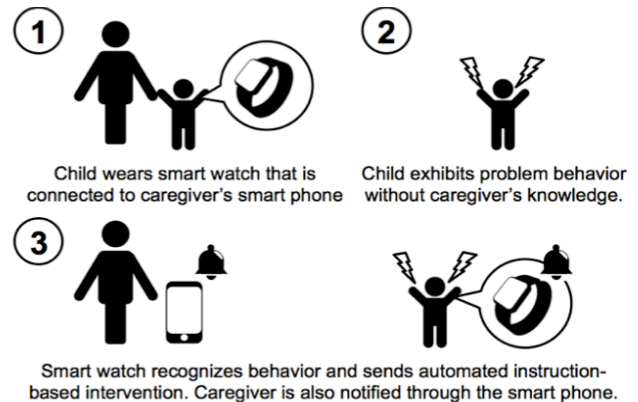
## 2. DEMONSTRATION

We implemented a prototype system of WatchMe using a Samsung Galaxy S2 smartphone that runs on Android Lollipop 5.0.2, and a LG watch, which supports visual-haptic and audio feedback.

*Recognition of Problem Behavior:* WatchMe currently supports the detection of *hand banging* as problem behavior. We used simulated training data from accelerometer sensor built-in the smart watch.

*Instruction-based Notification:* WatchMe delivers instruction-based interventions [3] that our child participants were trained in school. Visual-haptic notifications were photos of cue cards.

Audio notifications were recordings of the teacher's voice speaking the instruction.



**Figure 1. Our vision of a wearable application that supports independent behavior management when a child displays problem behavior.**

## 3. ACKNOWLEDGMENTS

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