Holland Bloorview
Kids Rehabilitation Hospital

Institute of Biomaterials & Biomedical Engineering
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Quantifying real-time engagement in interactive computer play-based therapy for children with disabilities

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INTRODUCTION

Engagement is crucial to achieving functional outcomes in rehabilitation. Technology and game-based therapy have shown promising results.

Engagement in game-based therapy can *vary over time* based on various factors (familiarity, level of challenge, etc.)

Questionnaires and *observational* techniques are primarily used to measure engagement, which makes it difficult to measure dynamically and in home-based settings

RESEARCH OBJECTIVE

- Design and evaluate an unobtrusive engagement monitoring system using accessible smart devices in ICP-based therapy for children with disabilities.

SIGNIFICANCE AND IMPACT

Enable *intelligent* rehabilitation systems that can *dynamically adapt* to retain engagement for children with diverse needs

Empower *remote* monitoring of engagement to support research of game-based rehabilitation interventions.

Can **smart devices** be used to **quantify engagement** in game-based rehabilitation for children with disabilities?
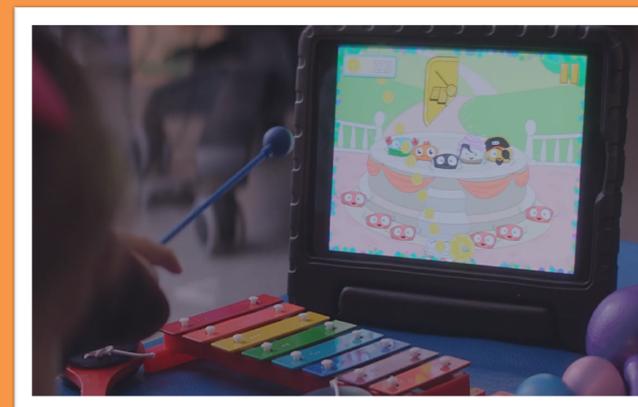
METHODS

- The engagement monitoring system will use in-game metrics and unobtrusive sensors to measure relevant features (eye gaze, head pose, facial expressions, etc.)
- Machine learning techniques such as *neural networks* will be explored to develop a model for engagement that integrates multiple modalities.
- Data collection for training the model will involve ten research participants at Holland Bloorview, where participants will interact with custom virtual tasks. System validation will be performed with six participants (children with no know attentive disorders) using an ICP application.
- Post-event questionnaires and observation techniques will be used to validate results from the system.

NEXT STEPS

System development to measure audio, video and game performance data using accessible smart devices

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Implementing algorithms to calculate metrics such as eye-gaze in real-time

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Developing data collection protocols for model training and system validation

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