DESIGNING AND DEPLOYING A MIXED-REALITY AQUARIUM FOR COGNITIVE TRAINING OF YOUNG CHILDREN WITH AUTISM SPECTRUM DISORDER

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MENU

- Introduction
- Design of mixed-reality aquarium
- Evaluation
- Conclusions

- Autism spectrum disorder (ASD), a developmental disorder severely affecting cognition and social behavior, is increasing in prevalence. Effective early intervention is essential for the of ASD children.

INTRODUCTION

- Most clinical cognitive and behavioral interventions are conducted by therapists through oral, behavioral, or picture-based guidance. For ASD children, these forms of treatment are not intuitive or vivid enough to catch their attention, stimulate the interest nor bring them positive cognitive outcomes in a sustainable manner.

- Animals are very effective elements in promoting the cognitive training of ASD children. There are lots of positive influences when using training content based on animals to assist ASD rehabilitation training.

- Although many CATs were introduced to support cognitive training for young ASD children, few of the existing works leveraged mixed reality (MR) technology.
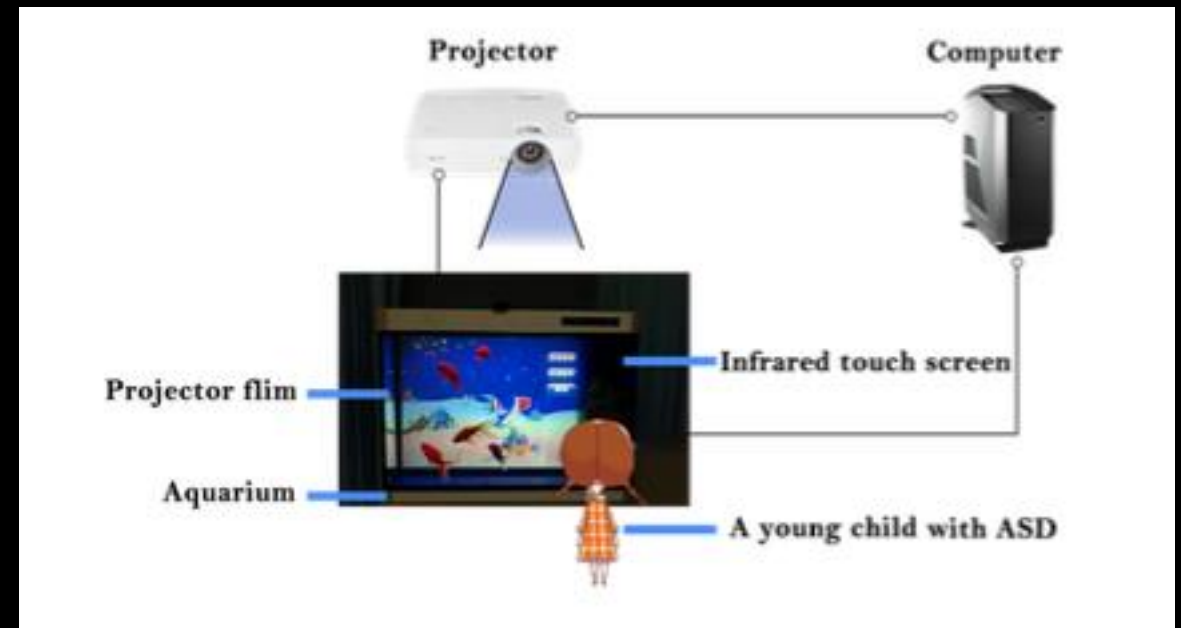
DESIGN OF MIXED-REALITY AQUARIUM

- We develop an MR aquarium system which embeds the professional cognitive training knowledge from ASD therapists.

DESIGN OF MIXED-REALITY AQUARIUM

- Its carrier is an improved physical aquarium with real fish and water plants. A way of back projection is used to project content of training course on one side of the aquarium . There is an infrared touch screen on the other side of the aquarium, composing of infrared emitting and receiving sensing elements mounted on the outer frame of the touch screen, to enable ASD children interact with the virtual creatures via Multi-Touch method.

DESIGN OF MIXED-REALITY AQUARIUM

- Natural and simple interactions is of great need to help ASD children learn or maintain an operation. To make it easy for young ASD children to interact with the virtual world, an intuitive and natural interaction is used, i.e. tapping on the surface of the aquarium with the finger.

EVALUATION

- According to the results of Autism Behavior Checklist and the Chinese version of the psycho-educational profile (third edition) (CPEP3) combined with a period of clinical observation and discussion made by experienced therapists, a total of 20 ASD children (18 males and 2 females) were selected and completed the experiment. The mean age of the final sample was 45.15 ($\pm$9.19) months.

CONCLUSIONS

- After one month of MR course training, the cognitive, language and motor ability of ASD children has been significantly improved. This result basically verified the effectiveness of our MR system in improving the outcome of cognitive training for young ASD children.

- The mechanism of these positive effects and clinical application of this system remain to be explored, and how to balance the impact of the real and virtual world on children is also worth studying in the future.

THANK YOU