

# Designing AI Interfaces for Children with Special Needs in Educational Contexts

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## ABSTRACT

The IDC research community has a growing interest in designing AI interfaces for children with special educational needs. Nonetheless, little research has explored the research and design issues, rationale, challenges, and opportunities in this field. Therefore, we propose to host a half-day workshop to bring together researchers and practitioners from the Learning & Education, Accessibility, and Intelligent User Interfaces sub-fields to discuss and identify existing design issues, challenges, and collaboration barriers, to establish consensus on the design of a pragmatic framework, as well as explore future innovation and research opportunities. We aim to foster mutual understanding and in-depth collaboration among researchers in the IDC community.

## CCS CONCEPTS

• **Human-centered computing** → Interaction design; • **Human-centered computing** → Accessibility.

## KEYWORDS

AI interfaces, children with special needs, education, design framework, design challenges and opportunities

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## 1 INTRODUCTION

The advances in Artificial Intelligence (AI) [8] have benefited interface design for educational purposes (e.g., language learning, social emotion learning) for children with special needs (e.g., autism, dyslexia) [2, 3]. Although AI empowers design by offering efficient tools and various functional possibilities, it also brings many risks and challenges because of the complexity and interdisciplinary nature of the design issue [5, 7]. Designing AI interfaces for children with special educational needs is a challenging task. It heavily relies on joint research efforts between researchers and partitioners from interdisciplinary domains in Interaction Design and Children (IDC) community. Previous research has focused on reviewing the issues [5, 7] and guidelines [1, 9] of designing AI for children in general, or designing and implementing specific AI technologies for children with special needs [4, 6]. However, little research has explored the research and design issues, rationale, challenges, and opportunities in designing AI interfaces for children with special needs in educational contexts. Children with special needs experience different challenges in learning, accessibility, and ethics compared to normal children when using AI interfaces. Therefore, discussing the common challenges may contribute to discovering potential solutions and envisioning future design opportunities. In this workshop, we want to invite researchers from the IDC community to (1) discuss and identify the existing design issues, challenges and opportunities, and collaboration barriers; (2) build consensus on critical research questions and research methods; and (3) formulate a potential design framework with principles and guidelines for educational AI interfaces for children with special needs.

## 2 ORGANIZERS

**Min Fan** is an Associate Professor in the School of Animation and Digital Arts at the Communication University of China. Her research interests are child-centric and tangible interaction design. She has published more than 30 papers in top HCI journals and

conferences and has served as an associate chair in CHI'22, IDC'22, and CHI'23. She has also organized three design workshops at TEI, IDC and Chinese CHI conferences (mfan@cuc.edu.cn).

**Xin Tong** is an Assistant Professor of Computation and Design at Duke Kunshan University (DKU). She is also a senior research scientist at the Global Health Research Center, and the founding director of DKU HCI Lab. Dr. Tong has published in top-tier academic venues, and she has been an editor, reviewer and associate chair for high-impact conferences and journals, such as CHI, CHI Play, CSCW, DIS, Frontiers, IEEE VR (xt43@duke.edu).

**Zikai Alex Wen** is a Postdoctoral Fellow at the Hong Kong University of Science and Technology (Guangzhou). He received his Ph.D. in Computer Science from Cornell University. His research focuses on human-centered artificial intelligence application and technological innovation, and usable security and privacy. He has published multiple papers at top human-computer interaction conferences and top security conferences, such as ACM CHI, ACM ASSETS, IEEE S&P, and ACM CCS (zikaiwen@ust.hk).

**Özge Nilay Yalçın** is an Assistant Professor at Simon Fraser University with a background in Cognitive Science, AI and HCI. Her research focuses on modeling socio-emotional behaviors in computational systems in order to develop interactive systems that can understand human behavior and advance our understanding of human cognition by providing us means to evaluate our assumptions in a systematic and controlled environment. Her research has been published in major AI conferences and journals (e.g., NeurIPS, ICMI, IUI) (oyalcin@sfu.ca).

**Lawrence H. Kim** is an Assistant Professor of Computer Science at Simon Fraser University. His research lies at the intersection of human-computer interaction, robotics, and haptics. Specifically, He designs and builds affective tangible interfaces to enable new interaction and facilitate physical and mental well-being. His work has received best paper and best paper honorable mention awards at CHI, UIST, and HRI conferences, and a Fast Company's honorable mention award in Innovation by Design (lawkim@sfu.ca).

**Zhuohao Wu** is an Associate Professor in the School of Animation and Digital Arts at the Communication University of China. He has been focusing on the research and practice of AI Creativity in culture, entertainment, and education. He was a UX/Design lead at Google China and Airbnb China (how@cuc.edu.cn).

**Laura Benton** is a Senior Research Associate based at the UCL Knowledge Lab. Her research interests focus on the areas of digital technology, interaction design, games, personalized learning and user-centered design methods, with particular concerns around the involvement of more diverse stakeholders in the technology design process (l.benton@ucl.ac.uk).

### 3 WEBSITE

www.AIDesign4SpecialChildren.net

### 4 PRE-WORKSHOP PLANS

We will recruit participants with interests in AI and child-computer interaction via social media (Facebook, Twitter, and LinkedIn), international IDC community mailing lists, and our personal and professional research networks. Potential participants will be asked to submit an abstract, or a design example or personal experience,

or a short (research, opinion, position) paper that describes their prior, on-going, or future research on AI, education, and children with special needs. Additionally, we will further inquire about participants' concerns, feedback, and inspirations for the workshop. Following the review of the submissions, the organizers will select up to 20 participants. Submissions will be accepted based on quality, diversity of topics and perspectives, and expected ability to inform the workshop. We will tailor the workshop accordingly as we work together with the accessibility chairs to ensure sign language interpretations, captioning or any other additional services are acquired, if any.

## 5 WORKSHOP STRUCTURE

The half-day workshop (three-hour) is structured as follows.

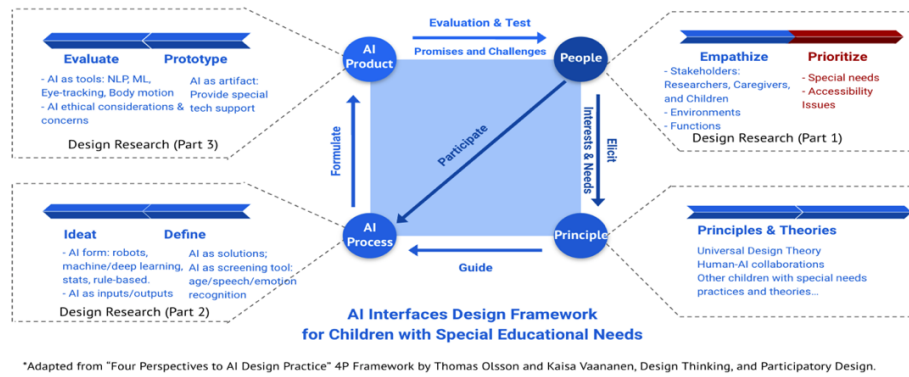
- **Brief Presentation of Each Workshop Participant (60 minutes):** The attendees will briefly present their submissions, ideas, or opinions (3 minutes each).
- **Panel Discussion with inspirational Talk (30 minutes):** We will have a group discussion and provide attendees the opportunity to go in depth on a specific topic.
- **Coffee Break (10 minutes)**
- **Group Activity (60 minutes):** We will divide the attendees into 3-4 groups, prompt each group with a special target children group (e.g., children with autism, hearing impairment, depression), and invite them to discuss, revise or add details on it. Then, each group will reflect, summarize, and present their proposed design framework (Figure 1), principles, and guidelines.
- **Wrap-up (10 minutes):** Organizers will summarize the workshop activities. Attendees will be asked to provide feedback on the workshop via an anonymous survey. The organizers will talk through the post-workshop plans and let participants opt into or out of these.

## 6 POST-WORK PLANS

All notes and recorded sessions from this workshop will be documented and made accessible in a password-protected cloud drive with participants through emails, after obtaining consent from all participants. The organizers will share learning outcomes with the broader IDC community too. The organizers will integrate this information into an article draft which may be considered for publication at future IDC or CHI conferences.

## 7 CALL FOR PARTICIPATION

The advances in Artificial Intelligence (AI) have benefited interface design for educational purposes for children with special needs (e.g., autism, dyslexia). However, little research has explored the research and design issues, rationale, challenges, and opportunities in designing AI interfaces for children with special educational needs. What are the potential factors that impede effective collaboration between stakeholders from multiple disciplines? What are the fundamental theories/principles that underpin AI design for children with special needs? We are interested in a variety of submissions that concern design, technology application, evaluation, reflections, and personal experiences related to AI interface design for children with special educational needs. Participants should submit 1). an



**Figure 1: A Tentative Framework for Designing AI Interfaces for Teaching Children with Special Needs**

abstract (300-500 words), or 2). a design example or personal experience relating to AI design for special children (600-800 words), or 3). a short (research, opinion, position) paper (single column ACM Master Article Submission Template, up to 4 pages excluding references). Submissions can be made by directly emailing us at [aidesign4children@gmail.com](mailto:aidesign4children@gmail.com). We invite submissions on questions including but not limited to:

- collaborations between multiple stakeholders
- human factors and fundamental theories/principles
- practices, methods, and tools
- innovative use of AI technologies in design and education
- evaluation and case studies
- ethics, issues, and challenges

We will select up to 20 participants to participate in this workshop. Submissions will be accepted based on quality, diversity of topics and perspectives, and expected ability to inform the workshop. Accepted submissions will be featured on the workshop’s website. At least one author of each accepted position paper must attend the workshop and that all workshop participants must register for both the workshop and the main conference. Our website ([www.AIDesign4SpecialChildren.net](http://www.AIDesign4SpecialChildren.net)) will include detailed instructions on submissions instructions.

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