Designing Mobile Technologies for Neurodiversity: Challenges and Opportunities

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Abstract
Mobile applications have a great potential in making everyday environments more accessible from the cognitive point of view, allowing neurodiverse people, such as individuals with autism, dementia, or ADHD, to gain independency and find continuous support. This workshop will discuss the main technological, methodological, theoretical and design issues that researchers and practitioners are facing when designing mobile devices and services for neurodiversity, exploring novel strategies to address them. In doing so, we want to focus on the neurodiverse people's idiosyncratic needs, also exploring ways for directly involving them in the design process.

Background
Neurodiversity is a movement advocating different cognitive and perceptual capabilities than what is normative, in other words, neurotypical [1]. The term was coined in 1999 [11], and has been used to advocate autistic people's rights, whereas neurotypical started indicating all those individuals not belonging to the autism spectrum. Over time, populations with other neurological conditions, such as ADHD (Attention Deficit Hyperactivity Disorder), joined the movement by using

Workshop Topics

Relevant workshop topics include but are not limited to:
i) Novel mobile technologies for specific neurodiverse user groups, e.g., people with autism, or dementia, aged individuals, etc.;
ii) Novel interfaces addressed to increase the cognitive accessibility of mobile applications and devices;
iii) User studies focusing on neurodiverse people addressed to inspire novel designs;
iv) Methodologies for involving neurodiverse individuals in design;
v) Thought-provoking insights and theoretical reflections on how mobile technology could impact neurodiverse users in the future, and how we can face the challenges that this diversity poses for the research/design
vi) Use cases that investigate the effectiveness of mobile solutions for neurodiversity

the term to refer to their own community. Currently, the term may include a variety of conditions, from dementia to dyslexia and dyspraxia [2].

Designing technology for these kinds of populations primary entails the willingness to understand their neurodiversity, especially if we want to go beyond the simplistic idea that a unique mode of existence and experience is legitimate in our societies. For a long time, neurodiverse conditions have been inserted into a sort of "medical model," which defines "being disabled by people's physical or cognitive differences and the resulting functional limitations" [3]. In the early 1980s, the disability rights movement encouraged a rethinking of the concept, and the "social model" looked at disability as a social and environmental construction resulting in impaired people being disadvantaged [4]. A social constructionist perspective characterizes the "cultural model" as well, which aims to dissolve the disability/normal categories by making emerge the processes through which we culturally construct them.

A good example of this latter approach when designing technology is represented by the recent attempts that part of the HCI community has made to capture the complexity of the neurodiverse experience. For many years, the relationship between technology and people with disabilities has been framed within the medical model, because it has proven to be pragmatically useful in providing requirements for design [3]. However, if we want to really satisfy the needs of the neurodiverse populations, surpassing the idea that the only thing we can do is to mitigate deficit, we have to understand what is meaningful in their lives and develop solutions that are situated in their lifeworld [5]. In this perspective, rather than focusing on designing to "help," which might represent others with disabilities as worse off in some way when compared with the researchers themselves [10], we may start paying attention to what it means to "be-in-the-world" as a neurodiverse individual, shifting the attention from aiding to empowering "the other." In recent years, a lot of work on mobile technology has been created for neurodiverse people. As they are meant to be carried around everywhere at every moment of the day, mobile devices, such as smartphones and wearables, may impact a variety of life domains, representing an always-on support that may make their lives easier and more autonomous. For instance, mobile technologies may increase the independence of people with dementia in their everyday transfers, by providing an orientation support and a tool for finding their way back home [9]. Further, they may make our urban environments more accessible to people with autism, by suggesting places that may fit their specific sensorial experiences [8].

Although we know that these technologies can be beneficial, there are a variety of open issues that still need to be addressed. For example, how can we design personalized applications that fit the idiosyncratic experiences of these populations also taking into account comorbidities? How can we design systems that address physical impairments combined with neurodiversity? How can we design technology that bridges the misunderstandings between neurodiverse and neurotypical people, facilitating their collaboration and helping both to be full members of the everyday world? What do we need to go really beyond "assistive" technologies? What are the theoretical and moral foundations that would enable us to do so? What changes are needed in the methodologies we use to

Important dates

Deadline for submissions: TBD, 2019
Response to authors: TBD, 2019
Camera ready submission deadline: TBD, 2019
Workshop day: 1 October, 2019

Schedule

09:15 - 09:30 Introduction
09:30 - 10:30 Paper discussion and challenges definition
10:30 - 11:00 Coffee Break
11:00 - 12:30 Work group: concept generation
12:30 - 14:00 Lunch
14:00 - 15:30 Work group: presentations and discussion
15:30 - 16:00 Coffee Break
16:00 - 17:15 Work group: definition of strategies
17:15 - 17:30 Closing remarks

create and evaluate technology? In this workshop, we recognize that mobile applications have a potential in making everyday environments more accessible from the cognitive point of view. But what we aim to identify are the challenges that we are facing now in this field and the strategies to tackle them. In doing so, we want to focus on the neurodiverse people's idiosyncratic needs, also exploring ways for directly involving them in the design process. There are a variety of challenges for researchers in co-designing with people with cognitive impairments [6], like differences in their mutual experiences and the inappropriateness of many well-established co-design techniques, which we want to investigate in this workshop as well.

To summarize, the workshop aims to discuss the main technological, methodological, theoretical and design issues that researchers and practitioners are facing when designing for neurodiverse people, exploring novel strategies to address them.

Goals of the Workshop

The workshop aims to establish itself as the premiere shared forum for scholars and practitioners interested in designing mobile technologies for neurodiverse individuals. We aim to create a multidisciplinary space where researchers can discuss the challenges that mobile technologies may face to fit the neurodiversity experience, developing strategies to address them. The long-term objective of the workshop is to build a community interested in sharing ideas on these themes.

Audience

The workshop will be open both to the attendees with an accepted paper and participants simply interested in the workshop topics. This includes researchers with different backgrounds, from engineers and computer scientists, to designers, social scientists, ethnographers and psychologists. We also welcome submissions or manifestations of interest for participating coming from neurodiverse people. We expect to attract 15-20 participants and 10-12 accepted papers.

The workshop website will go online before the CfP is sent to all the major HCI, CSCW, Design, and UbiComp mailing lists. The organizers will then publicize the call in their home organizations, among their peers, and through social media. We will accept research papers, case studies, and theoretical/methodological reflections, four-to-six pages long. Positions papers two-to-four pages long outlining the submitter's perspective on the workshop topics and her reasons for participating will be welcomed as well. Papers will be reviewed by two members of the program committee on the basis of their relevance to the workshop topics, quality of the exposition and, mainly, potential to elicit discussion during the workshop.

Workshop Structure

The workshop will follow a full single-day format. Two weeks before the workshop day, the organizers will distribute the accepted papers and invite participants to read 3 of them. During the workshop day, organizers will split participants in 4 or 5 small groups (depending on the number of attendees), inviting them to discuss the papers they have read. After 30 minutes, we will engage participants in an open brainstorming (using post-it notes to be pasted on a wall) asking what the pressing issues are that they want to discuss. Participants could of course use what they have written about in their position paper in such a discussion.

Having everyone written down their personal key issues or questions they want to tackle and clustered these on a wall will help to see what challenges could then be addressed in the subsequent phase.

After the coffee break, participants will be involved in a hands-on session. They will be split in groups again and each group will focus on an open issue identified in the previous phase: they will have to turn such issue into a design opportunity. Participants in each group will first work individually to generate new ideas related to the challenge to be addressed. They will be requested to sketch a variety of concepts in a short time span. After 20 minutes, they will present their ideas to their group companions, who will in turn discuss and constructively criticize them. Then, each group will collaboratively choose the best idea and develop it into a concept design. We will encourage the group to embed the designed concept into a future narrative scenario, to generate critical reflections on how it could impact on that specific context (e.g. moral concerns, unexpected side-effects). Then, participants will present and discuss the concepts and scenarios produced during the day in order to transition from specific scenarios to a higher level of insights, which could help push the debate forward. The day will conclude with the collective definition of a series of strategies that aim to address the challenges identified in the first part of the workshop. These could work as "design suggestions" for scholars and practitioners to be shared and used in the development of novel mobile services for neurodiverse people.

Planned Outcomes

We aim to create an "annotated portfolio" [7] embracing all the design concepts and scenarios produced during the workshop to be made available on the workshop website. Moreover, we plan to: i) include all the participants in a mailing list where they can easily discuss new ideas related to the workshop topics; ii) produce a report of the workshop to disseminate the strategies emerged during the day; iii) seek a special issue of a journal in this area (e.g., Computers in Human Behavior).

Organizers

Amon Rapp (main contact). Research fellow at Computer Science Department of the University of Torino, where he directs the Smart Personal Technology Lab. His research areas are mainly focused on self-tracking devices, gamification design, and behavior change technologies.

Federica Cena. Associate Professor at the Department of Computer Science of the University of Torino, where she is currently the head of Smart City Lab. She is working on user modeling and personalization

Christopher Frauenberger. Senior researcher at the HCI Group, TU Wien (Vienna University of Technology). He designs meaningful technology in participatory ways, often with marginalised groups.

Niels Hendriks. Researcher at the LUCA School of Arts (KU Leuven, Belgium). He researches design in health contexts, mostly zooming in on design for and with people with dementia. Founded the Dementia Lab conference, a conference on the topic of design and dementia.

Karin Slegers. Assistant professor at the Department of Communication and Cognition of Tilburg University and at Mintlab (Institute for Media Studies), KU Leuven. She teaches new media design and her research mostly focuses on human-centered design methodology.

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