

Social AR to support mental health scenarios

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ABSTRACT

Mental health disorders are among the leading causes of mortality and morbidity around the world, besides cancer or cardiovascular diseases. This is a burden for the individuals' wellbeing and quality of life, as well as for the global economy. Technology and advances in Human Computer Interaction and Natural User Interfaces have been proven very useful in helping to support both mental health patients and professionals in different contexts. However, there is still much research required to generalize these outcomes to the population and, especially, there is need to introduce less obtrusive and more engaging mechanisms of interacting with such systems. Therefore, this area offers promising scenarios for the use of Augmented Reality systems to offer support in mental health disorders, both when mediating the interaction between therapists and patients and during everyday life social contexts.

CCS CONCEPTS

• Human-centered computing ~ Human computer interaction (HCI)
~ Interaction paradigms ~ Mixed / augmented reality, Collaborative interaction

KEYWORDS

Mental health, Wellbeing, Augmented Reality, Mixed Reality, Natural User Interfaces

1 Introduction

In recent years, thanks to advances in artificial intelligence and the appearance of new devices, the health area has seen a great increase in the number of studies and developments of technological systems that facilitate the work of the professionals and that provide a more personalized and ubiquitous medicine to the patient. In this regard, the improvement of well-being and mental health are fundamental aspects that are increasingly being addressed through technological solutions [2]. Research efforts have focused on developing interactive systems that facilitate the diagnosis and intervention of disorders [5, 8], the inclusion and adaptation of people with disabilities/functional diversity [3], or systems that foster healthy aging and elder monitoring [1].

Despite growing research and interest in technologies for mental health, major efforts are still needed. For example, a large number of works have focused on the use of mobile devices or web interfaces, with data acquired through self-assessment questionnaires or from mobile usage (GPS, calls, etc.) [7], without

exploiting the full potential that could allow a multimodal user-centered approach and the use of Natural User Interfaces (NUI). These systems could provide less intrusive and more intuitive interfaces for the users, where they do not feel so observed and can behave in a more natural way. This in turn would help gather contextual data that could better reflect the users' personality traits and behavior, providing more accurate information for the therapists and the system. Virtual, mixed and augmented realities have been subject of interest in this area of research, as the scenarios that can be created with these technologies facilitate the observation and analysis of users' behaviors [6], help expose the user to specific scenarios [9], or can mediate the interaction between participants [5].

Especially, Augmented Reality (AR) offers many advantages in these contexts, as it can be facilitated by means of different technological devices, such as phones, tablets or Head-Mounted Displays (HMD), providing a wider range of opportunities. In addition, with the increasing availability of off-the-shelf devices and improvements in behavior recognition and image quality, there is a very promising line of research on how to better design and adapt these technologies in order to build systems that cater to the diverse range of mental health disorders and scenarios that could emerge. It is also relevant to envision how these systems could be designed not only in a controlled and experimental environment, but also how they could be intertwined into the daily life and routines of the user. Some works have proposed gamification or playful technological systems as a natural source of information regarding behavior, motor and cognitive performance, as well as social and emotional abilities in people of any age [4]. This provides a timely opportunity to *explore the role of Social AR for mental health as shared and playful scenarios that could facilitate social interactions, while keeping users engaged with a system that helps to improve their overall wellbeing.*

2 Future of Social AR for Mental Health scenarios

2.1. Design Fictions

As the scope of mental health disorders and spectrums within disorders are wide, there are plenty of scenarios in which social AR could help improve people's wellbeing, inclusion, therapeutic diagnostics and interventions. Some examples will be described in the following paragraphs.

Social AR systems could be used in order to help a therapist to better understand a patient based on displayed information the AR system shows from the patient's personal experiences, preferences and even behavioral aspects the system has been gathering from the patient's daily activities. Such information could be used to facilitate conversations, e.g. providing hints towards which conversation topics seem to elicit more comfort and openness from the patient. Even an emotion recognition system integrated into the AR system could facilitate to interpret the mental state of the patient. This could work both ways, from the therapist towards the patient, in order to guide the intervention, as well as from the patients towards the therapist, in order to facilitate communication. For example, people in the Autism Spectrum Disorder (ASD) might have difficulties interpreting emotional cues, or looking into the eyes of other people, but what if the person has an avatar overlaid on their face/body? Or what if the person displays in its AR world the face of an animal or a cartoon instead of a human one? Could this facilitate the interaction or would it exacerbate the initial problem?

Moreover, therapeutic interventions might not be limited to the specific sessions with the professional. A social AR system could be used so that the therapist designs augmented playful scenarios for the patients' daily experiences based on the aspects she considers relevant to work outside the sessions. For example, a gamified system for a person with ASD that accumulates points and unlocks new levels when they are capable of correctly identifying the emotion of somebody they are interacting with. Another example could be an AR intervention designed to mediate playful social interactions for people with depression who might need a little push to bond with others, people with social anxiety disorders, or people with dementia who often suffer from isolation and loneliness.

2.2. Social, ethical, and privacy concerns

These scenarios present implications and potential concerns in several areas. Certainly, privacy and security issues are transversal topics across technological systems. In this regard, the envisioned AR ecosystems in which personal data could be displayed and shared must guarantee its users' privacy and security.

Social and ethical factors should be taken into account, especially considering that there is still stigmatization and prejudices towards people suffering from mental health disorders. People's beliefs and attitudes towards mental health aspects can determine how they interact or support people with mental disorders or functional diversity. In the same way, attitudes and beliefs towards mental illness frames how, or even whether, a person is more likely to seek help and how they are going to express their own psychological and emotional conditions given the situation [10]. So, on top of current concerns about sharing personal information, we should be really careful regarding which information the system could disclose about the mental health state of a person, or even just its personal information. For example, a social AR system might use information from other individuals' social media feed to help an autistic person mediate the interaction with them by providing hints on topics, shared musical preferences,

or interactive games they could engage with. However, perhaps not everybody would like to disclose that information to the rest of the population. On the other hand, a social AR system could be used in order to help society better understand how to positively include and interact with people experiencing a specific disorder/diversity in a way that could contribute to their therapeutic process. However, perhaps the person does not want to disclose its diagnosis, even if that could help others better understand how to facilitate her comfort and inclusion in specific situations. Hence, control and consent should be of paramount importance.

It is also necessary to address how social AR systems are going to affect specific populations with special needs. We aim to build inclusive technology that helps to reduce disparities and stigma. In doing so, we should consider how both social AR technologies for the broader population affect and include people experiencing any kind of mental health issues. And the other way around, we should also discuss how social AR could facilitate the inclusion of such populations into future augmented scenarios.

3 Alignment with the Workshop Goals

Within the scope of this workshop, we are particularly interested in how different examples of social AR could be based not only in the use of physical markers, but also triggered by other items in the ecosystem. On one hand, people could have their own augmented digital space and public information to be shared with others. On the other hand, some objects might foster dialog and mediate therapeutic interventions based on shared interactions with them and their augmented capabilities. Finally, locations could also provide gamified therapeutic experiences for the individuals that share the space.

Another aspect that we deem interesting is to which extent remote AR interactions between people could help when direct face-to-face interactions are not feasible. For example, would it be the same for autistic people to interact with a hologram of a person rather than the person itself? Could remote AR social interactions help people experiencing anxiety, isolation or depression to feel better when physical contact is not possible? This is especially relevant in the current context of the COVID pandemic, where lockdown and isolation could trigger mental health issues such as anxiety or depression, or even worsen preexisting conditions when patients cannot receive in-person interventions.

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