Accessibility to Clinical Care for People with ASD: Design and Integration of the ACCESS Technological Tools

Elisa Salatti*, Susanna Pelagatti*, Stefano Chessa*, Francesca Forli*, Ramona Nicastro*, Alexander Kocian*,
Camilla Poggianti*, Federica Cena†, Noemi Mauro†, Liliana Ardissono†, Luca Bonamico†, Fabio Salice‡,
Sara Comai‡, Marco Bianchi‡, Marina Buzzi§, Maria Claudia Buzzi§
*Dipartimento di Informatica, Università di Pisa, Pisa, Italy
†Dipartimento di Informatica, Università di Torino, Torino, Italy
‡Dipartimento di Elettronica, Informazione e Bioingegneria, Politecnico di Milano, Milano, Italy
§Istituto di Informatica e Telematica, CNR, Pisa, Italy

Abstract—People with Autism Spectrum Disorder (ASD) often face various barriers to accessing healthcare due to anxiety and fear. The ACCESS project aims to develop a system that supports people with ASD before and during medical examinations. By applying a multidisciplinary approach, the project integrates technologies and methods to create a holistic solution. The system consists of three components: a mobile application, an anxiety assessment module and a personalization component. This paper describes the architecture and features of the ACCESS system in detail and highlights its potential to improve medical care for patients with ASD.

Index Terms—Autism Spectrum Disorder, Tools for anxiety management, Real time personalization, ASD, Sensors for stress and anxiety detection, Autism behavioural strategies

I. INTRODUCTION

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder that manifests itself very differently from case to case, but is generally characterized by impairments in communication and social interaction as well as the presence of restricted and repetitive interests and behaviors. The prevalence of people with ASD has steadily increased, with a growing number of diagnoses occurring in adulthood as awareness and understanding of the condition continues to grow [1] [2]. Individuals with ASD may experience increased negative emotions, especially in unfamiliar environments or when exposed to factors such as bright lights, loud noises or chaotic situations. These factors can strongly influence their behavior, leading to non-cooperative responses and making experiences such as doctor visits challenging as they hinder the communication and interaction needed for a successful outcome. Individuals with autism face a higher prevalence of health challenges and tend to have a reduced life expectancy compared to the general population [3]. ICT can serve as valuable tools to support people with ASD in managing daily life and healthcare by facilitating access to treatment and tailoring interventions to their needs [4] [5]. In this context, the ACCESS project aims to overcome the barriers that prevent people with ASD from accessing healthcare.

II. THE ACCESS PROJECT

ACCESS is a project launched in December 2023 and supported by the National Research Program and Projects of National Interest (PRIN-PNRR). Based on a multidisciplinary approach, the ACCESS project focuses on helping patients to familiarize themselves with the environment and the medical procedure and on adapting the clinical environment to make it more comfortable and welcoming. The effectiveness of our solution will be demonstrated in two scenarios, namely dental and Ear Nose Throat (ENT) care. The ACCESS system consists of three components:

- a mobile application developed by the University of Pisa (UNIPI) and available in two versions, (*WithMe: Clinica*) and (*WithMe: Paziente*); the clinic operators use the first one to create personalized activities tailored to the patient's needs and preferences; the patients uses the second one to play the activities assigned to them by the clinic and access videos, photos and documentation of the environment and medical procedures. A more detailed description of the application was presented at the Doctoral Colloquium of [6].
- a module for anxiety assessment, developed by the Politecnico di Milano (POLIMI); it is made up of a camera and a set of strain gauges placed in the chair of the patient. By analyzing macro movements, the module aims to identify signs of agitation and measure physiological parameters, such as respiratory and heart rates.
- a personalization component helping the patient to face anxiety before and during a medical treatment. The app, developed by the University of Turin (UNITO), is a web application that recommends and plays personalized multimedia content based on the patient's preferences [7].

The project team also includes the National Research Council (CNR) that develops the participatory methodology for the design, development and assessment. The architecture of all the components was discussed in [8].

III. THE INTEGRATED SYSTEM

The project is now entering its final phase. In view of the experimental evaluations planned for summer 2025, we have completed the integration of all components. A general description of the integrated architecture can be found in Figure 1. Integration was achieved by identifying the various use cases of the application in the different phases of user interaction: registering the patient, sharing their profile with the clinic, using the application at home and in the clinic, and deleting the account. To ensure compliance with the GDPR, we previously conducted a detailed analysis, which was presented in [9]. This analysis formed the foundation for the design choices, including the adoption of a token as a unifying element within the system. Therefore, at the end of the registration phase, *WithMe: Paziente* generates the token hashing the public key of the patient. The token ensures the pseudo-anonymization of the data and allows the components to be integrated together. Specifically, the token is transferred from *WithMe: Clinica* to the module for anxiety assessment via QR code; from *WithMe: Paziente* to the personalization component via HTTPS; from the module for anxiety assessment to the personalization component via MQTT. Additionally, the token enables us to collect data related to the use of the application to generate statistics on user experience.

IV. CONCLUSIONS

The ACCESS project aims to address the challenges faced by individuals with ASD in accessing medical care. By integrating three core components — a mobile application for patients and clinicians, an anxiety assessment module and a personalization module — the project aims to provide effective support in managing anxiety and stress before and during medical visits. Experimental assessments is planned in summer 2025 in two specific contexts: dental care and ENT care, to evaluate the system's effectiveness. Although the initial applications focus on these fields, the solution has the potential to serve as a model for broader clinical use.

Fig. 1. The integrated architecture of the ACCESS functionalities

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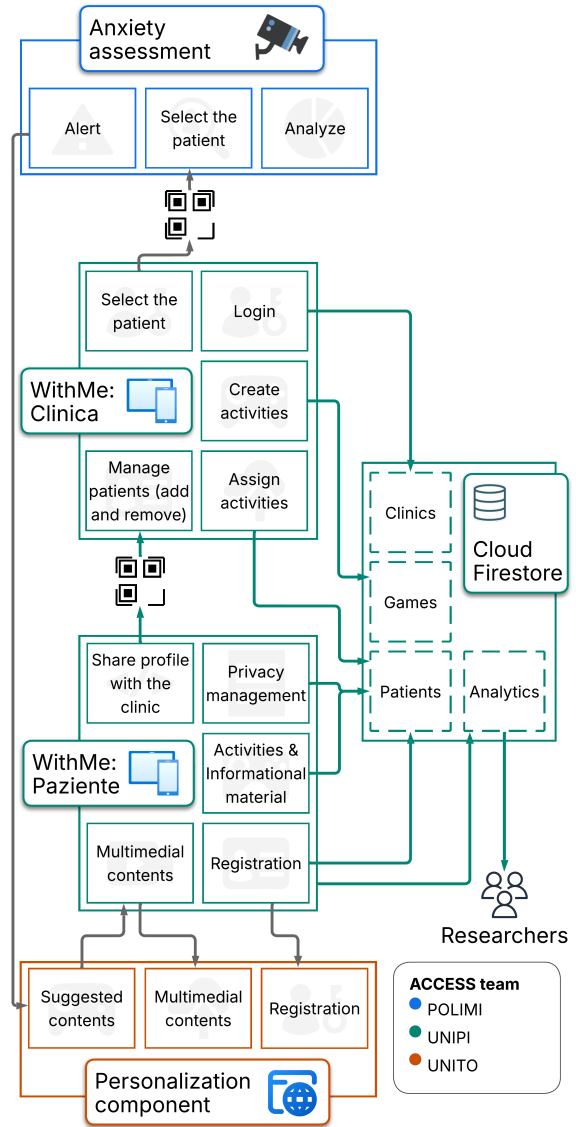
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