Conference Proceedings
New Friends 2015

The 1st international conference on social robots in therapy and education
Introduction

The proceedings of the international conference New Friends 2015 reflect the multidisciplinary nature of the conference theme, addressing the demand for expertise in both practice and research with expertise from a wide range of disciplines, like psychology, nursing, occupational therapy, physiotherapy, AI, robotics and education.

The event featured keynotes by Vanessa Evers and Matthias Scheutz, oral and poster presentations (based on 48 accepted submissions), product and business demonstrations, competitions and practice oriented workshops, covering:

- practitioners’ perspective of end users’ needs,
- good examples of trials, practice and intervention guidelines,
- interdisciplinary collaboration,
- innovations in robotics, therapy and education
- theoretical studies and empirical research,
- legal, ethical, philosophical and social issues.

We welcomed 118 registered attendees, not including representatives from sponsoring companies and institutions, local co-organizers and student volunteers. This is quite respectable for a 1st conference and demonstrates the relevance of the conference theme and profile.

In recognition of this, we are proud to announce that this will be the first in a series: next year we hope to see you again at New Friends 2016 in Barcelona!

We thank the following people for making this possible with their contribution to this conference: Sytse Dugour, Wytse Miedema, Adam Hagman, Cristina Abad Moya, Adri Acero Montes, Atina Hrakc, Tom Ederveen, Vanessa Evers, Miquel Aranaz

And we explicitly like to express our gratitude to our sponsors: Robotdalen, Aisoy Robotics, Robin Robotics, OMFL, Gemeente Almere, Cinnovate, GWIA, M&I/Partners

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ABSTRACT

We propose a novel interaction method based on a type of wearable interfaces called transitional wearables (TW). TW allow gathering physiological data from children with autism and can be used to facilitate their communication and interaction with parents and caregivers during daily life activities. Communication plays a key role for the children's mental and social development [1]. The variable symptoms of autism are generally grouped under the name of autism spectrum disorder (ASD) [2]. ASD patients are characterized as having difficulties in social interaction [3], communication [4], tendency to fixate on limited interests and repetitive behaviors [2]. They show less interaction in free play situations and rarely initiate social interaction [5].

In several medical fields there is an increasing need for ecological monitoring of physiology variables to support medical interventions and therapies outside the clinical setting [6]: wearables with biosensors could contribute to meet this need. The application areas are numerous, for example there is an increasing interest in early-age detection of ASD as well as for exploiting the gathered knowledge to create better therapies [7]. Indeed, a main problem involving ASD's diagnosis, evaluation and treatment is the internal emotional state of the patient [9]. Canonical biosensors, however, do not have access to physiological data in real time in daily life or during therapeutic training, thus losing important information. Moreover, they are often expensive and difficult to use on certain types of patients, e.g. on ASD patients who refuse contact or low motion [8].

Our project aims to develop and test a novel wearable which is capable of real-time and long-term physiological monitoring by recording Galvanic Skin Response (GSR), Skin Temperature (SKT), and heartbeat, and also to use an accelerometer embedded on a wristband. These devices are low cost, low power, and non-intrusive [8]. While most studies done in this field (e.g., [10]–[12]) are restricted to measurements in laboratories, they have demonstrated that there is significant emotion-related information that can be recognized through physiological activity [13].

Our aim is to use this information to identify and translate physiological output into information on basic emotions understood by the caregiver. Real world’s expectations and judgments involved in social contexts might appear “unsafe” to children with autism and this makes social interactions problematic [4]. Many children with ASD develop an attachment to a “transitional object”, e.g. a teddy bear. This is used as a reliable source of soothing and confidence during the exploration of the world independently of parents and caregivers [14]. It is known that computer technologies have the potential to support children during interactions to facilitate their life. For instance: (1) interactive toys controlled by the child provide predictability through cause and effect functions and this reassures the child [15]; (2) form a safe bridge to the less predictable world formed by other objects and people; (3) accompany them in the daily world's learning and interactions (e.g., cleaning teeth, travelling in a car); (4) help learning to interact socially [16]. Wearable devices with biosensors can systematically collect information about actions and emotional states of children and communicate them wirelessly to an external computer (e.g., a mobile phone or a tablet). The information so gathered can be automatically processed based on pattern-recognition and other machine-learning algorithms and provide information usable at real-time to guide interventions, e.g. in the form of alert messages or text messages for the caregivers [17].

TW could gather bio-signals from children with autism during their social and collaborative activities in a friendly and comfortable way as they can be integrated easily in different types of objects, such as toys and clothing, without the child noticing the sensors. This would also provide a novel means through which multi-sensory feedbacks and cause-effect object behaviors could be used to motivate and reinforce social interaction while engaging in life and therapy activities [15]. The cause-effect nature of such type of interaction would give the child a higher sense of control and hence mitigate fearful and avoidance reactions [18].

Computers and other similar electronic devices tend to promote a non-social use and this could drive the child to further isolate from the outside world or become hyper focused, falling trapped in obsessive-compulsive behaviors. Instead, if suitably designed TW for children with autism can be used in daily life
contexts and thus can possibly have a positive impact on children’s social life [19]. For this purpose, positive/rewarding sensorial feedbacks from the wearables (e.g., colored LEDs, sounds) can be made dependent on the performance of communication actions with the caregivers. For their richness and programmable nature, TW could thus be used to facilitate exploration and development of divergent behaviors leading to “accommodate” to novel contexts, experiences, and social interactions [20]. By collaborating with therapists, psychologists, biomedical engineers, psychomotor therapists we are now prototyping design solutions of TW that are non-intrusive and allow the collection of data in children with ASD. We are also defining an experimental protocol to empirically test the TW with children with autism. The main objective of the test will be to verify the effectiveness of this approach by analyzing the recorded data related to emotional reactions of children to TW.

**Keywords:** Autism, transitional object, wearables based on biosensors, stable-reassuring interactions.

**REFERENCES**


