

The Therapeutic Use of Humanoid Robots for ADHD

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ABSTRACT

In this work, we illustrate an innovative treatment for patients affected by Attention Disorders, that relies on the use of Pepper humanoid robot. This new therapeutic methodology was created to support and make the therapist's work more attractive. The work has been developed in collaboration with a diagnostic and therapeutic center.

KEYWORDS

Behavioral Disorder; Emotion recognition; Socially Assisted Robotics.

1 Introduction

One of the main fields of application of current Socially Assisted Robotics (SAR) research is in the clinical setting for children with behavioral disorders [1]. Behavioral disorders may include Attention/Hyperactivity Disorder (ADHD), Oppositional Disorder (OD), or Conduct Disorder (CD) [2]. The application of robotics in the treatment of children with behavioral disorders should aim to teach children basic social skills, communication, and interaction. Some individuals with behavioral disorders even prefer robots to humans [3]. The contextual analysis we performed in collaboration with a diagnostic and therapeutic center, led us to investigate the adoption of SAR solutions to improve the clinical contexts where children undergo a therapeutic path. The main goal of this work is to use humanoid robot technology together with the psychological and engineering sciences to improve the social skills of children with attention disorders. Besides the beneficial effects coming from the interaction with a humanoid robot, its use can be seen as a support for the therapist himself.

2 The Proposed System

The goal of our system is to assist the doctor and make therapy less boring to the patient. The humanoid robot used is Pepper. During the therapeutic session, the therapist starts the system via his PC so that the application is launched on Pepper's touchscreen, and the child can face the exercise. During the exercise, the child will (unknowingly) be supervised by the humanoid robot's video camera, which will periodically capture frames. The captured frames will be analyzed by a model of classification of emotions so that an estimate of the child's emotionality can be made. In addition, an eye tracker sensor will be integrated into the system in order to be able to calibrate and optimize attentional times. For each therapy session, data is collected that helps to characterize the patient's profile to monitor improvements or regressions; this helps the psychologist to identify the right therapeutic path and the right behavioral measures to be adopted. The therapist can

view the patient's progress on his PC and therefore understand in real-time how to continue the training session.

3 Prototype Evaluation

An initial experimental phase was performed through the observation of a group therapy session to evaluate the degree of acceptance. A group of children (N=5) was followed by the psychologist, who interacted with them through games and exercises. During the experimental session, the psychologist introduced Pepper to the children by explaining how to interact with the humanoid robot. The introduction of the humanoid robot in the therapeutic session was aimed at obtaining feedback regarding its acceptance in these contexts. After the session, we adopted a UTAUT questionnaire to measure their acceptance of the system. The participants could indicate their level of agreement on a five-point Likert scale including verbal anchors. The results obtained were encouraging, obtaining an average of about 4.3, confirming the acceptance and intention of using a humanoid robot for therapeutic use in children with behavioral disorders.



Figure 1: A child while experimenting with the system.

4 Conclusion

In conclusion, the addition of a humanoid in the therapeutic context has had a very satisfactory response, the psychologists are enthusiastic, and the children are more involved.

It may seem counterintuitive, but a robot could help children manage social and emotional relationships.

REFERENCES

- [1] Dickstein-Fischer, L. A., Crone-Todd, D. E., Chapman, I. M., Fathima, A. T., & Fischer, G. S. (2018). Socially assistive robots: current status and future prospects for autism interventions. *Innovation and Entrepreneurship in Health*, 5, 15-25.
- [2] Roughani, A., Madmoli, M., Raisifar, Z., Kikhavani, S., Yasemi, M., Azami, M., & Sharifi, Z. (2018). The prevalence of behavioral disorders and its related factors in elementary school children in Ilam City in 2011-2012. *Indian Journal of Forensic Medicine & Toxicology*, 12(4), 165-169.
- [3] Tleubayev, B., Zhexenova, Z., Zhakenova, A., & Sandygulova, A. (2019, March). Robot-assisted therapy for children with ADHD and ASD: a pilot study. *In Proceedings of the 2019 2nd International Conference on Service Robotics Technologies* (pp. 58-62).