**A REVIEW ON ROBOTS AND AUTISTIC CHILDREN.**

**Purpose/aim of this paper.**

The goal/aim of the paper is to understand the use of robots as a social mediator to help individuals with Autism spectrum disorder in therapy and education and behavioral development

**Introduction**

The emergence of robotics is transforming industries around the world. Robot technologies are evolving exponentially, particularly as they converge with other technologies such as artificial intelligence to learn from their environment, from each other, and from humans. Robotics in health care is a fast-growing area. This paper propose the ways in which robots were exploited for ASD children in different aspects namely; modelling, teaching, and skills practicing; testing, highlighting and evaluating; providing feedback or encouragement; join Attention; eliciting social behaviors; emotion recognition and expression; imitation; vocalization; turn-taking; and diagnostic.

**What is Autism spectrum disorder?**

Autism spectrum disorder or ASD is a  neurodevelopmental disorder caused by the difference in the brain. Some of the common difficulties faced by autistic children are social phobia,difficulty with change such that they have rigid routine,phobias, difficulty in making eye contact, Impaired communication skills etc.

# Social robots used for helping children with autism.

1. NAO : Nao is a small humanoid robot designed to interact with people. Nao is packed with sensors. it can walk, dance, speak, and recognize faces and objects.
2. Moxie : In a study, researchers found out that Moxie improved eye contact, self-esteem and emotional regulations for school-aged children with autism after regularly interacting with the robot.
3. Milo : Milo an advanced robot designed to teach behavioral and social skills to students with autism.
4. EMO :EMO  is a cool desktop AI robot pet with characters that can self-explore the world and react to you with 1000+ faces and movements

**Classification of robots based on studies**

1. Elicit Autistic Children Behaviors : In many studies, the robots are used in rehabilitation and therapy treatment for children with special needs. Humanoid robots are most widely used

* Social Behaviors Elicitation
* Imitation
* Emotion Recognition and Expression
* Spoken Ability

1. Modeling, Teaching, and Skill's Practicing: Six robots were used (NAO, Ifbot, Puffy, ACTRO ID-F, Iromec, and Lego NXT)to improving the social skills in children with ASD. All studies reported that the robots improve the communication skills of the children, decrease the stress during the playing sessions, improve the educational experiences for autistic children by increasing the engagement and social interaction time span in all playing and education scenarios
2. Promoter : The utilization of robots as a promoter to improve interaction and communication skills in an individual showed that the robot can assist in practicing specific skills, unlike one study there is no pattern which predicted either the robot will be used as promoter or it will not give significant changes to children with ASD.

**Conclusion**

Yet robotic therapy has brought positive outcomes for individuals with ASD. Robots were used according to their features either as promoter, mediator, analyzer or monitor tool. More studies and efforts in this field are required. It is required to conduct other researches to determine the feasibility and validity of the robots used in autism treatment .

**Limitations**

Being a relatively new field of study [the first robot for the treatment of autism was used in 1976 by Weir & Emanuel], although in literature there are a large number of articles (initial sample 998), longitudinal experimental trials are few, thus the quality of results has also negative outcome and therefore many of the questions that arose this review were left without an answer. Another limitation is that most of the studies taken into account do not have a control group. This is a limitation in understanding whether the robots are useful in treating autistic subjects more than they could be in the treatment of other diseases or in general with TD children. Finally, the variability of intervention techniques does not allow a statistical generalization and this could be considered a further limitation. Conclusions At the current state of the art, it seems that robotic therapy has brought so far positive results. The robots were used as mediators, or simply as measurement tools; in all fields, however, investigators have declared their enthusiasm for this new promising aid for research and therapy. Saying that robotic therapy works, obviously does not mean that it solves autism, but it provides therapists and researchers a means to connect with the autistic subject in a easier way.

**Literature survey**

1. P. Pennisi et al., “Autism and social robotics: A systematic review,” Autism Res., vol. 9, no. 2, pp. 165–183, 2016, doi: 10.1002/aur.1527.
2. Periodicals of Engineering and Natural Sciences., “ Robots and autistic children: a review”, Vol. 8, No. 3, September 2020, pp.1247-1262.
3. Saga Journal , “Effects of a Robot-Enhanced Intervention for Children With ASD on Teaching Turn-Taking Skills”,[Volume: 58 issue: 1,](https://journals.sagepub.com/toc/jec/58/1)page(s): 29-62

Article first published online: February 22, 2019; Issue published: March 1, 2020.