Impact Factor (SJIF): 3.632

International Journal of Advance Research in Engineering, Science & Technology

e-ISSN: 2393-9877, p-ISSN: 2394-2444

Volume 3, Issue 5, May-2016

DIAGNOSIS AND ANALYSIS OF AUTISM: A REVIEW

Gunjan Kapila[1] Dr. Parveen Kalra[2] Dr. Jagjit Singh Randhawa[3]

[1]PG Student [2]Professor [3]Assistant Professor

Production and Industrial Engg. Department, PEC University of Technology, Chandigarh

ABSTRACT

Autism hinders social interaction and communication of people. Experimental studies were conducted in the past to cover this communication gap as well as to cover the bridge of social interactions between autistic and normal people. These studies were focused in various field using electronic media, board games and others. This paper covers some of the studies based on sensors, games and various technologies to enhance emotional as well as expression knowledge of autistic children.

Keyword: Autism, social interaction, electronic media, board games, experimental studies.

INTRODUCTION

Autism is a developmental condition that affects behavior and social interaction in human beings (Willingham, 2008). It is a general term for a group of complex disorders of brain development .This condition falls under wider group known as Autism Spectrum Disorder (ASD). Characterization of autism is disorder of verbal and non-verbal communications, social interaction and repeated behaviors. All autism disorders were merged into one umbrella (Ayres, 2008). Previously, they were found as different subtypes, including autistic disorder, pervasive developmental disorder not otherwise specified (PDD-NOS), childhood disintegrative disorder and Asperger syndrome. Emotional recognition impairment, poor motor skills and memory recognition are the effects of autism. The condition can be due to environmental factor or can be present from birth or other medical causes. Key role elements in such conditions can be genetics, psychological and neurological development. There are some strategies that can be used to help an individual with autism to grow and achieve the most out of their lives, although there is no cure for autism spectrum disorder (Willingham, 2008).

The AAIDD (American Association on intellectual and developmental Disabilities) describes Intellectual Disability as disability characterize by significant limitations both intellectual functioning(reasoning learning or problem solving) and in adaptive behavior, which covers a range of everyday social and practical skills(American Psychiatric Association,2014)An individual is said to have an intellectual disability based on following three points:1)intellectual level is below 70-75 b) significant limitations exists in two or more adaptive skills areas(like communication, self-care, social skills, home living, leisure, self-direction) and the condition is presented from childhood (Corrigian,2004).

The use of educational games in scientific investigations has increased over the past years but their use for people with intellectual disabilities is still not explored (Shalock et al., 2010).Diagnosis of autism is generally led by various clusters of behavioral and physiological challenge (Bluestone,2005).

Student's interest can be raised in learning through educational games (Kuo,2013). If game is designed for specific skill or subject then student can learn easily in that friendly environment (Cano, 2015).

DIAGONOSIS AND ANALYSIS

These days much attention is being paid to autism. Although autism was discovered fifty years ago by scientist, people have just understood the meaning of autism. Even though lot of information is available about autism but still autism is largely misunderstood (Brown,2010). As a result, stigma and discriminations attached to this mental illness don't let people fully participate in care and cure the disease (Corrigan,2004).

The review of literature for this study will help to define the area of autism.

EMOTIONAL STATES ANALYSIS USING SOUNDS AND SENSORS

The International Affective Digitized Sounds (IADS-2) was developed by (Lang, 2007) [4] to provide a set of emotional stimuli for experimental investigations of emotion and Attention. IADS was introduced in order to standardize sound stimuli emotions that can be accessed internationally, which contains broad range of semantic categories. NIMH Center for Emotion and Attention (CSEA) has developed and distributed IADS-2 to provide standardize material that are available to scientist researchers.

System Supporting Behavioral Therapy For Autistic child was developed by (Małgorzata J et al. , 2015).The system has sensors network, brooch that indicates person's emotional states, base station. The changes in emotional states are measured by this system. The below figure shows sensors network which exist of the following:(1) Respiration sensors; (2) SC sensors; (3) electromyography sensors; (4) temperature sensors; (5) BVP sensors; (6) electroencephalography electrodes.

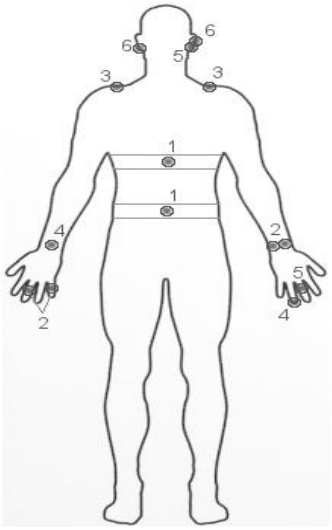

Figure 1:Sensors for System Supporting Behavioral Therapy(Małgorzata J et al. 2015)

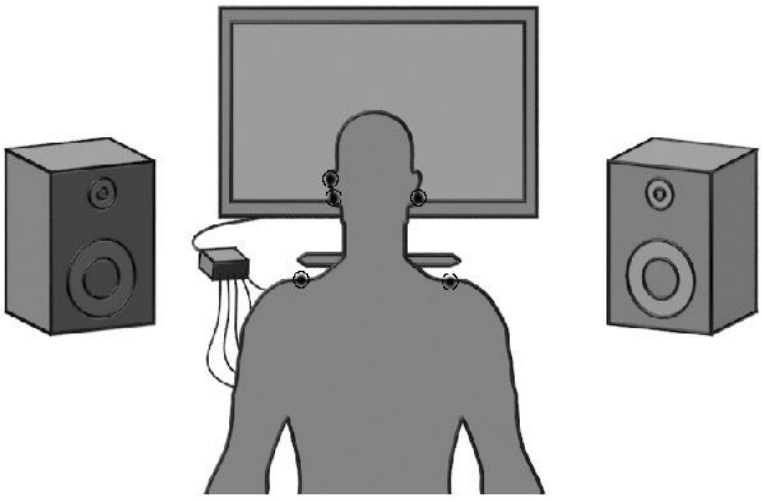

Figure 2 Experimental setup of System Supporting Behavioral Therapy(Małgorzata J et al. 2015)

The authors conducted and designed the physiology parameters during the experiment. A group of volunteers were exposed to stressful condition caused by picture or sound. For each volunteer various physiological parameters, was recorded which are: temperature, skin conductance, respiration rate, heart rate, peripheral, and electromyography.

SC and respiration shall be measured in the system supporting behavioral therapy of autistic children was shown in bio-statistical analysis. This resulted in electronic sensor network for autistic children system supporting behavioral therapy.

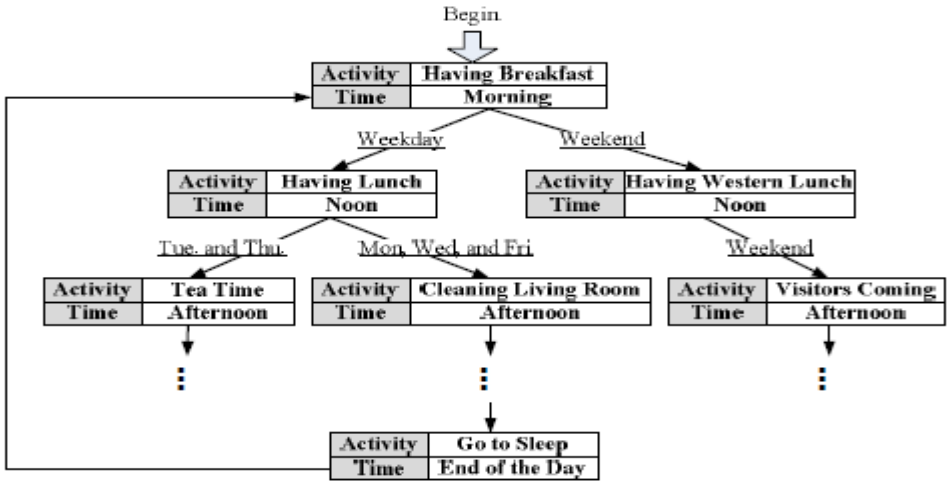

Figure 3: Example of physiological parameters of volunteers(Małgorzata J et al. 2015).

DIAGNOSIS OF AUTISM USING GAMES AND TECHNOLOGY

A situated game which is capable of generating personalized and non-repeated daily living activities. Below figure 3 shows daily activities with respect to the time activities are performed Rita Kuo et al. (2013).

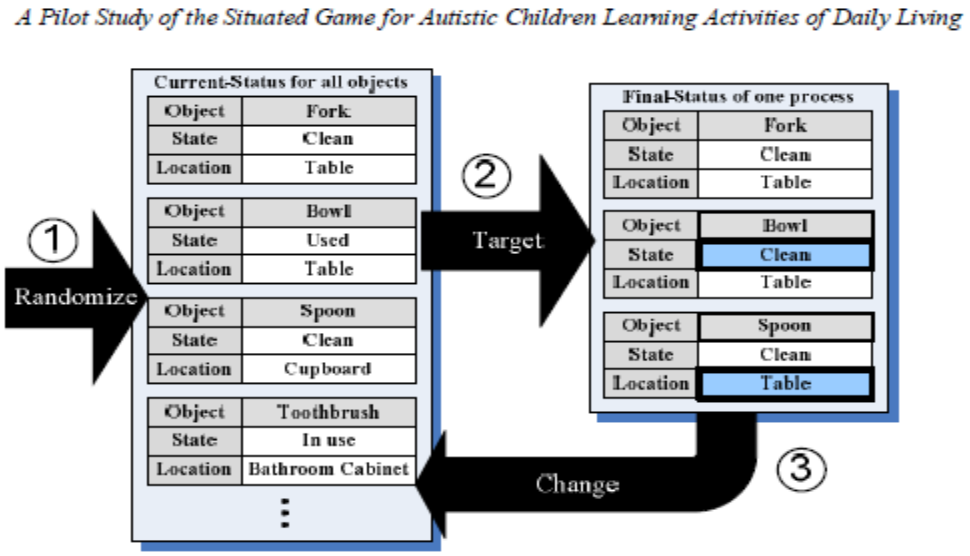

Figure 4

The interactive educational games for Autistic children was developed by Karim Sehaba (2005) with Agent-Based System. It helps to design computer games for training and diagnosis of children with autism and other mental disorder. User adaption is the effective feature in this approach.

Consideration on modern ways and how advancement in technology could help children and their families done by Jessi Lynn Kane (2011). Inability to respond to gaze referencing is one of the shortfall of ASD (Autism Spectrum Disorder). This affects their social development, communication skills, play skills as well as the way they appear in society. There was development of design guidelines, design framework regarding technology and ASD intervention. The game prototype was analyzed in three different parts. The first part showed which parts need to be redesigned. In second part prototype group was formed which were assigned with guidelines. Third part of study was the evaluation part.

Students with and without disabilities were helped by Kevin M. Ayres (2010). It helps to provide teachers with high quality video based materials. The research shows that video based technology hold incredible potential for children with disabilities.

Various technologies were studied by Philipp Michel (2004). Various treatment methods like video, biological and genetic methods, imaging, assistive technology, multimedia toys were used. Video modeling or videotapes can easily teach conversations to autistic children. Other technologies such as gene analysis technology have mapped autism genes. Studies show that autism could be inherited from genes. Other researches showed that some peptides were increased in children from birth. To analyze brain of autistic patients imaging such as magnetic resonance imaging (MRI) and PET Positron emission tomography were used. Below figure shows MRI scan.

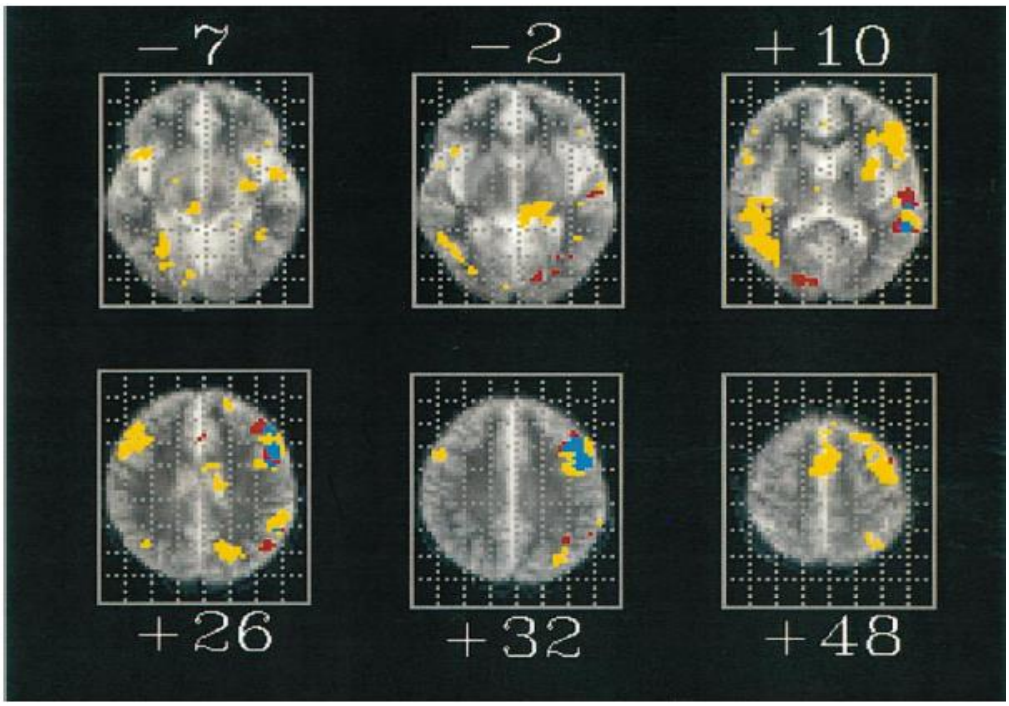

Figure 5: imaging layout

Imaging has contributed a lot in early analyzing and determining the autism. Furthermore technologies like assistive technology, which is defined as any piece, product or equipment which has improved person with disabilities.

CONCLUSIONS AND FUTURE SCOPE

In case of diagnosis, graphical user interfaced games acted to be the best method for enhancing emotions and expressions of autistic children. For analysis of autism, Use of sensors happened to be the best way to find autistic symptoms, out of which Skin Conductance sensor is significant. With the help of advanced technologies, a board game as well as application can be developed, majorly focused on emotions and expressions.

REFERENCES

Ayres, Kevin M., and John Langone. "Video supports for teaching students with developmental disabilities and autism: Twenty-five years of research and development." Journal of Special Education Technology 23.3 (2008): 1.

Bluestone, Judith. The fabric of autism: Weaving the threads into a cogent theory. Book Publishing Company, 2005.

Bradley, Margaret M., and Peter J. Lang. "The International Affective Digitized Sounds (; IADS-2): Affective ratings of sounds and instruction manual." University of Florida, Gainesville, FL, Tech. Rep. B-3 (2007).

Corrigan, Patrick. "How stigma interferes with mental health care." American psychologist 59.7 (2004): 614.

Cano, Ana R., Álvaro J. García-Tejedor, and Baltasar Fernández-Manjón. "Highlights in the Literature Available in Serious Games for Intellectual Disabilities." Advances in Web-Based Learning--ICWL 2015. Springer International Publishing, 2015. 95-108.

Ekman, Paul. Darwin and facial expression: A century of research in review. Ishk, 2006.

Freed-Brown, Elise A. "A Different Mind: Developing Museum Programs for Children with Autism." (2010).

Farr, W., & Jacklin, A. (2005). The computer in the classroom: a medium for enhancing social interaction with young people with autistic spectrum disorders? British Journal of Special Education, 32(4), 202-10.

Franklin, A., Pilling, M., & Davies, I. R. L. (2005). The nature of infant color categorization: Evidence from eye-movements on a target detection task. Journal of Experimental Child Psychology, 91, 227–248. Gilberg, C., Nelson, K., Tjus, T., & Heimann, M. (1995). Increasing reading and 63 communication skills in children with autism through an interactive multimedia computer program. Journal of Autism and Developmental Disorders, 25, 459-480.

Farr, Yuill & Raffle 2010; Khandaker, 2009 Khandaker, M. (2009). Designing affective video games to support the social-emotional development of teenagers with autism spectrum disorders. Annual Review of Cybertherapy and Telemedicine, 7, 37-39.

Gee, J. P. (2003). What video game have to teach use about learning and literacy. New York:Palgrave Macmillan.

Haque, Mainul, and Seraj Z. Haque. "ART THERAPY AND AUTISM." Asian Journal of Pharmaceutical and Clinical Research 8.6 (2015).

Jędrzejewska-Szczerska, Małgorzata, Katarzyna Karpienko, and Agnieszka Landowska. "System supporting behavioral therapy for children with autism."Journal of Innovative Optical Health Sciences (2014): 1541008.

Kane, Jessi Lynn. "Exploration of Computer Game Interventions in Improving Gaze Following behavior in Children with Autism Spectrum Disorders." (2011).

Koppenhaver & Erickson, 2003 Koppenhaver, D., & Erickson, K. (2003). Natural emergent literacy supports for preschoolers with autism and severe communication impairments. Topics in Language Disorders, 23(4), 283-292.

KUO, RITA, et al. "A Pilot Study of The Situated Game For Autistic Children Learning Activities of Daily Living." Research & Practice in Technology En-hanced Learning 8.2 (2013).

Kluth, Paula, and Kelly Chandler-Olcott. A land we can share: Teaching literacy to students with autism. Brookes Pub, 2008.

Mahmood, Naureen. Designing Video Games and Interactive Applications to Enhance Learning in Children with Autism Spectrum Disorders. Diss. Texas A&M University, 2011.

Michel, Philipp. "The use of technology in the study, diagnosis and treatment of autism." Final term Paper for CSC350: Autism and Associated Developmental Disorders (2004).

NHS. Causes of autism spectrum disorder. Available from: http://www. nhs.uk/Conditions/Autistic-spectrum-disorder/Pages/Causes.aspx.

Osborne J. Art and the child with autism: Therapy or education? Early Child Dev Care 2003;173(4):411-23.Available from : http ://www.tandfonline.com /doi/pdf/ 10. 10 80 /0 300443032000079096#. VbxDGPOqqko. [Last accessed on 2015 Aug 01].

Russell, James A., and Geraldine Pratt. "A description of the affective quality attributed to environments." Journal of personality and social psychology 38.2 (1980): 311.

Sehaba, Karim, Pascal Estraillier, and Didier Lambert. "Interactive educational games for autistic children with agent-based system."Entertainment Computing-ICEC 2005. Springer Berlin Heidelberg, 2005. 422-432.

Shalock et al.: Intellectual disability: definition, classification and systems of supports (11thedn.). AAIDD (American Association on Intellectual and Development Disabilities) (2010)APA American Psychiatric Association: DSM-5 2014. http://www.dsm5.org/.

Wheeler H. The triad of Impairments. Available from: http://www. additionalneeds.net/ASD/triadofimpairments.htm.

Willingham, 2008 Willingham, V. (2008). Autism's mysteries remain as numbers grow.