A Gaming Model for Teaching Autistic Children Basic Traffic Rules

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***Abstract*—Autism is a disorder of neural development which affects about one in every 150 kids on average. Autism deals with major complexities regarding social communication and retention power. Now days, due to the increased use of the computer, the technology is being used to assist the treatment and to interact with an autistic child. To make the learning environment more attractive, the animated pictures are used in the applications. In this paper a gaming model is proposed which will first teach basic traffic rules to Autistic children with the help of some animated videos and then help them decide what action must be taken in certain situations thus increasing their intelligibility. The use of tangible objects is introduced so as to keep the sessions more interesting for autistic children.**

***Index Terms*—Autism, autism spectrum disorders, game based approach and traffic rules for autistic children.**

I. Introduction

The first description of autism was given by Leo Kanner in 1943. Autism is a spectrum disorder, so it is impossible to say that people with autism should or should not be allowed to drive. Some people with autism may find this skill extremely difficult to grasp, while others will be highly competent drivers. Besides the driving skills the Autistic children should be aware of the basic traffic rules that are to be followed. The autism disorder is characterized by the lack of social interaction, the limit of behaviours, stereotypical conducts to some extent, repetitive, and communication problems-verbal and non verbal. The proposed model focuses on the understanding ability of the autistic children. Learning the basic traffic rules allow the autistic children to become independent up to some extent. Through this idea we can think about building a certain degree of confidence in autistic children so that they can survive in the social environment.

Using the images of real objects or videos, software platforms encourage people with autism to distinguish objects based on their size, colour, type, etc. Such an interactive learning platform motivates the children to identify the objects with sounds, pattern and words [1]. To make the learning environment more attractive, the animated pictures are used in the platform.

The model can be proposed in two different ways:

- Visual interface
- Tangible interface

For teaching children with impairments in skills related to social disorders (ASD) [2], researchers are employing technology to develop accessible, quantifiable, intensive and individualized interventions for core deficit areas related to ASD [3]. Now a days, due to the increased use of the computer many researchers are using this technology to assist the treatment and to interact with an autistic child, thus the use of animation is introduced for giving them a classroom training session which is required for both the above models, depicting what action must be taken on encountering different traffic symbols. For example on seeing a red light it will be shown that the person stops walking if he/she is about to cross the road.

Both applications work under the same basic training program and processing algorithms. The main difference between them is that the one is only visual and the other is operative. Also, both the models target different age groups of users based on their retention power and intelligence level.

II. Related Work

A small amount of work has been done in the area of designing e-learning solutions which specifically deals with the improvement of the retention power in autistic children; though a number of efforts have been made for teaching autistic children which are available in the research literature. An intelligent classroom software, named "A-Class" is implemented [4], which takes into account, the diversity of interests among the autistic children in a classroom and helps the teacher to teach in a class having both autistic and neurotypical children. Authors have provided an environment for autistic children to learn according to their interest, if the autistic child does not like the environment offered by the software, teaching becomes difficult.

Various interactive computer games for the autistic children for improving the fluency in their speech are developed [5]. Various computer games and software have been developed to enhance the pattern, color recognition power of autistic children, to improve the speaking skills and understanding of what others say to them etc[6], [7].

Some frameworks have been proposed which employ both real world objects and virtual environments equipped with the ability to provide emotional feedback and to demonstrate empathy. Potential examples and usage for such environments are also described [8].

III. Proposed Application

Our proposed system is focused on giving a solution to the

Manuscript received April 12, 2012; revised July 22, 2012.

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DOI: 10.7763/IJIET.2012.V2.191

weak retention power, which can give the users a useful way of understanding and learning the basic traffic rules by making use of certain animated clips and an interactive questionnaire to test their intelligence. We are also using a Shape Detector Software to test the learning power of a kid.

The proposed model can be seen in the form of two different ways:

1) Visual interface

2) Tangible interface

A. *Visual interface*

This particular model is designed for autistic adolescents who have better understanding and retention power as compared to the autistic kids. In this model after the classroom training sessions are over, a questionnaire is conducted in which some figures (Figure1) are shown to the kids and they are asked to choose from a number of options about what necessary actions should be taken on seeing the traffic scenario depicted by the shown figure.

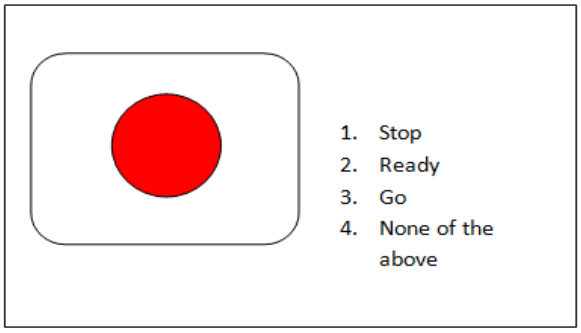

Fig. 1. Autistic child needs to select the appropriate action to be taken on encountering a red light

If the kid selects the correct option he/she can be awarded some bonus points and if the answer is incorrect then the alternate scenarios can be shown, like if the kid chooses the option 3 that is "go" then another video can be displayed showing that the person crosses the road at red light and met with an accident. This way the child will not only come to know that his/her answer is incorrect but will also get to know the consequence of taking the wrong decision, hence increasing their knowledge.

B. *Tangible interface*

This is a more interactive approach which takes into account the sign recognition technique and also this method is appropriate for the kids from the age of 3 to 6. In this approach first a classroom session is conducted and after that the autistic kid is shown a random video from among the clips they were shown in class during the training session. The kid has to recognize what sign it is depicting by choosing a block from among the shapes which are present in front of him. The shapes will be made in such a way that each symbol will be given a different shape and the shape recognition algorithm is applied to detect the symbol.

The proposed model (as shown in figure 2) will work in following way:

- It consists of some basic components which are projector, digital camera, computer, wooden shapes (the shape will indicate various traffic symbols e.g. red circle or a U-turn symbol).
- When the video is shown to the kid, he is asked to place an appropriate symbol on the table depicting the corresponding action shown in the video.
- That symbol will be detected with the help of the shape detection software.
- Once the sign is recognized the result can be announced whether it is the correct sign or not. If it is the correct symbol then a prize can be awarded to the kid in form of applauding sound and music.

This is a more efficient method of learning because the child will deal with tangible objects rather than theoretical concept which will help in increasing his/her retention power.

IV. Conclusion and Future Scope

This paper proposes the idea of teaching autistic children some basic traffic rules applied in day to day life with the help of animated videos and tangible objects. In the proposed model communication system is being integrated with the physiological aspect of the child, which will help them giving a positive response towards the application.

An interactive approach like this helps the children to have a good retention power as this is one of the major issues they usually suffer from and traffic rules are very important part of everyone's life from the security point of view. In future this system can be implemented and can be tested with the help of certain autistic children and the accuracy can be checked.

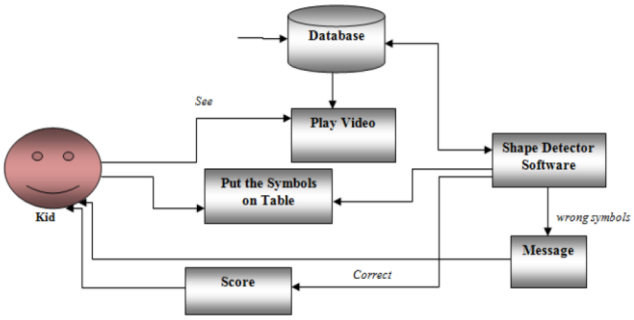

Fig. 2. Flow Diagram for the proposed model.

Acknowledgment

The authors would like to thank Dr. Ankush Mittal for introducing them to this area of research and for his motivation and support throughout the work.

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