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Autism Interactive System

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Abstract: ***Autism is a complex developmental disorder appears in the first three years of a child's life as a result of a malfunction in the brain. We can't say that autism is a hereditary disease because it is also associated with environmental factor. So that the child may be pregnant the gene that causes the disease and the environment play a role in the emergence of symptoms of the disease. Therefore it's resulting from genetic and environmental workers, which is seems as behavioral disorder and malfunction in the form of social interaction and communication skills and repetitive movements. The subject of autistic children is one of important issues that interesting the world that the proportion of this group of children increased to a sizeable enough in the society. Autism diagnoses done during checking up on a child by a multidisciplinary team including a psychiatrist (who had the authority to request medical tests and medical treatment) and usually he's a specialist pediatric psychological children and specialist children, especially in the endocrine and genetic diseases to help the team in separation of similarity symptoms of autism diseases, psychological specialist (specialist in science Psychology and doing intelligence tests) , a conversational specialist (which evaluate a child linguistic and determined whether linguistic level is associated with his age) and specialist occupational therapy or educational specialist (who resides child educationally and gives him his proper tutorial as educational program). It is not easy having that team in same place and time and the early diagnosis is very importance, so that applying educational programs early give positive results in the future. Therefore autism interactive system constructed and designed in this paper which can be available in every dispensary and educational center as well as any parents whose wanted it to fulfill them requests of determine being disease or not and what's the last step. The proposed system cares with autistic child from diagnosis autism degree and treatment suitable to each degree in diet therapy side and behavioral therapy side. It can pursue and follow-up to the degree of response to treatment and the developments of the situation of children through database be available to a multidisciplinary team. A proposed system provides some learning manner which it's suitable to autistic children.***

Keywords: Autism, behavioral disorder, communication skills, social interaction, diet therapy and behavioral therapy.

1. Introduction

Regardless of the distinction in gravity and side effects of autism from case to case, however all a autism issue influence the ability of a child's to connect and interactive with people around him and create valuable associations with them. Evaluations demonstrate that 6 out of each 1,000 youngsters in the United States suffer from autism and this disorder quantity is growth [1]. Although there is no cure for autism, so far, but the intense and early treatment, as much as possible, it can be helps autism children living and communicating in social with this disorder. Autism diagnoses has been done by checking up on a child by a multidisciplinary team, which including a psychiatrist, psychological specialist, a conversational specialist and specialist occupational therapy or educational specialist [2]. It is not easy having that team in same place and time and the early diagnosis is very importance to recuperation. Construct an Autism system that's deals with different sides of these parts from social is the feasible solution. This system needs to input the information from user (The person responsible for system administration)and follow up the diagnoses questions and answering on it from parent or supervisor on the child then treatments dependence on the output of diagnoses. These treatments have been in two Interventions: Bio medical and food treatment and behavioral treatment. That's mean this system is an interaction between human and computer therefore the system constructed must been interactive system.

Interactive System methodology relies primarily on modeling and simulation technology using computer. It's a sophisticated technique and one significant and relatively fewer costs tools especially in the case of the establishment of mega-projects, where it can be mainly depend on these tools for the construction of the general model of the project before starting it within initial feasibility study and then feeds this model in all imagine factors and variables that may be influential in it [3]. Interactive simulation is a special type of physical simulation which human acts a big role in their interactions such that his ability to operate and interact with them [4]. In general the interaction is divided into four main components: System, user, input, output, and are linked together to form the interaction cycle, each component own special way and the interaction interface is the input and output [2]. Events that occur between each item and the next, there are four stages occur in this session, each of these stages reflect what is happening between the before item and the next item are:[5]

1) Clarify requirements or values.
2) Represent these values into the computer.
3) Implementation of the task according to the requirements.
4) Monitoring and evaluating results according to specific objectives.

2. Aim of Research

The prevalence of autism in recent times and a misunderstanding of this disease by a lot, having to deal with autistic children appeared an attempt to alleviate the pain of family that has autism child by the fact that this work considered a window which family overlooking to the world of autism, the mysterious, through the diagnosis of the degree of autism and methods that the family can be followed for treatment. This research aims to design and implemented

interactive system care with autistic children problem. The proposed system block diagram illustrates in figure-1. The main activities, can be done using the proposed system, are:

a) Determining autism degree (small, medium, or severe).
b) Provide treatments appropriate to each autism degree. The treatments presented including medical therapy and behavioral therapy.
   - Medical therapy provides medical treatment by taking medicine and Diet treatment by scheduling permissible and impermissible foodstuffs.
   - Behavioral therapy provides condensed education using computer, which considered optimal way than human educational, because proposed system allows Autistic Children to learn according to their own speed, repeat use and display information and stop as needed, help them to correct the errors and confirm interest and discovery.
c) Built autistic children database which saved children registration and other information during treatment process.
d) Determine child response degree and any development in child behavior dependent on autistic children database information management.

The Autism Interactive System scope is builds a reliable interactive system that leads to provides perfect significant improvement care to autistic children and helps them to communicate with social, provides the interaction between autistic children and the system components.

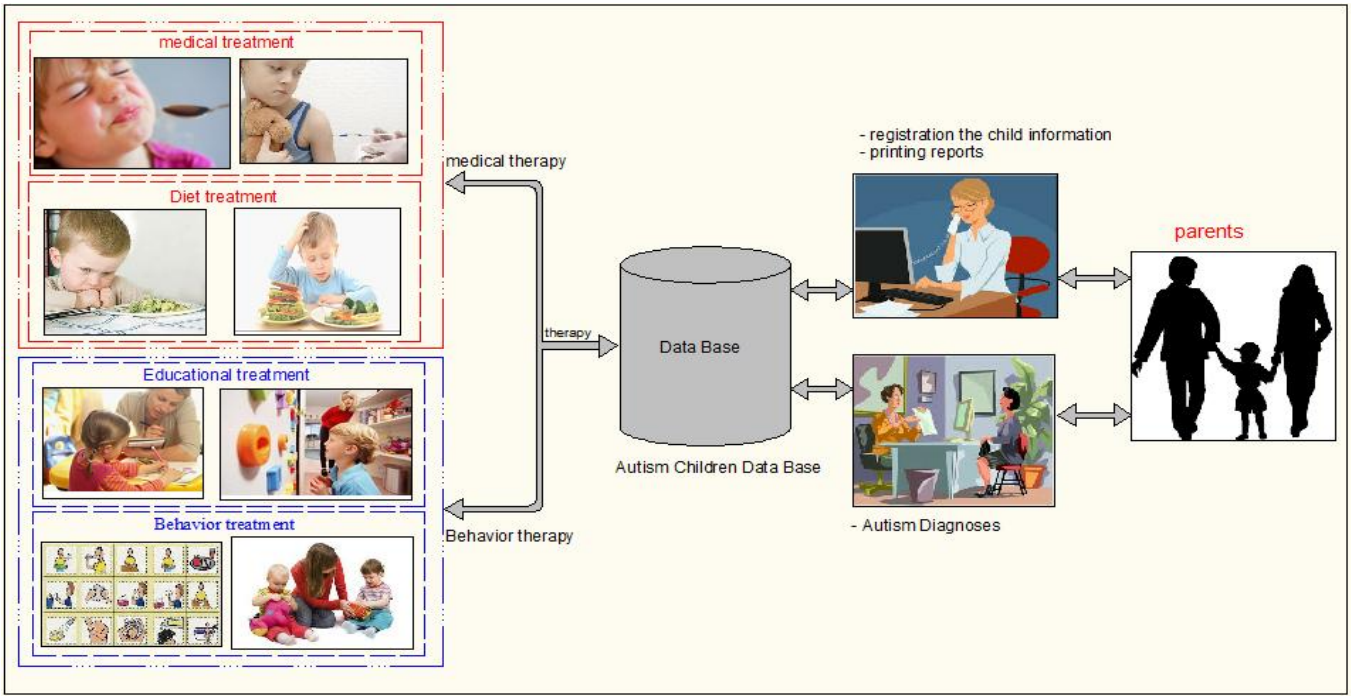

Figure 1: Autism Interactive System Block Diagram

3. Literature Survey

Autism was first identified in 1943 by Kanner who emphasized that this congenital condition was characterized by an inability to relate to other people from the first days of life. Over the past 6 decades considerable work has been done to refine the concept and identify important aspects of the condition [7]. A few interactive situations as learning and showing apparatuses for the restoration of youngsters with a mental imbalance have been produced. In this connection an assortment of diverse mechanical and programming frameworks can effectively associate with people. Among the interactive system as robotic are the KISMET framework and the ROBOTA dolls. KISMET is a humanoid confront that can create expressive social collaborations with human overseers'. Such important collaborations can be viewed as a tool for advancement of social connections between a robot and a human [10,11].

virtual environment is presented as a autism children systems use for determining the emotional expressions. This system aims to developing the interaction with the children by cryptanalysis the emotional expressions to enhance or subdue interaction signals [8]. As far as anyone is concerned, there is no model that proposes a versatile methodology that considers the specialists orders in an instructive setting. The displaying of this methodology obliges demonstrating of the learning of specialists, the clients profile and the elements of their associations.

4. Interactive System

The concept of interaction with the computer refers to any contact occurs between the user and the computer, and this contact either directly or indirectly ways. Direct contact is through dialogue with the reception of information and full control when the performance of a specific task, and indirect contact might be the appearance or set of operations. The most important goal in the user's contact with the system is to achieve or accomplish a certain thing.

There are several ways which the user communicates with the machine started by set of entries, from which the user enters the information as block into the machine, then the machine

performed the completion of the task according to the information entered, but this method does not support a lot of tasks as required and does not provide meaningful interaction enough.

There is another method of this interaction. it is a high interaction input medias such as direct processing applications or real time applications or practical life. In this manner the user giving instructions to the machine and receives information from them and permanently

4.1 Interaction Structure

Interaction structure means explanations in more realistic to the interaction by containment the system in details manner. The structure of interaction consists of four main components as shown in figure-2. These component are system, user, input and output and these components connected together to form the so-called cycle of interaction. Each component has won behaviour and the inputs and outputs represent the interface. The events accurse between two followed elements represent by four states:

- Requirements illustration by values
- Represent these values to computer.
- Run the task according to the requirements.
- Noticeable and evaluate the results according to the determined aim.

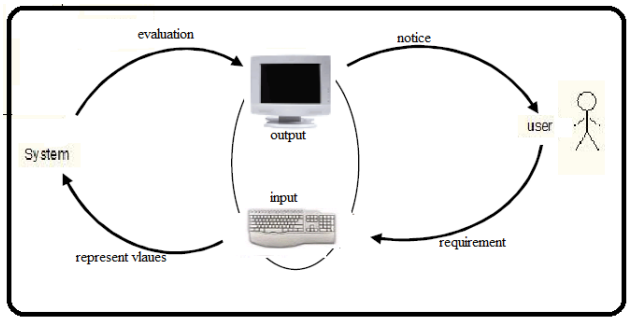

Figure 2: Interactive between user and system

Two interactive methods are used in this project: the Interactive part which presented the diagnoses and learning. These activities led the user to build the application by himself step-by-step until the application is finished. And Enumeration part which provide by learning. the user in this activity plays a video file containing the alphabetic learning while the user is educations.

4.2 Interaction Mode

There are many ways can be presented the interaction system. Some important are:

1. Interaction by writing instructions.
2. Interaction by menus.
3. Interaction by nature language.
4. Interaction by questions and answers and inquiry dialogue.
5. Interaction by fill the blanks and patterns.
6. Interaction by select- click.
7. Interaction by 3-Dimantion interface.
8. Interaction by WIMP, which means Windows, Icons, Menus, and Pointers.

In this system we presented some of these modes. The proposed system used 1, 2, 4, 5, and 6 interaction modes. The interaction by writing instructions is widely and firstly interaction in computer systems. This mode depending on inters instruction to computer directly using keyboard or special symbol. Menus interaction modes presented by choosing the prepare choice which define the choice kind. Choosing process done by using mouse or numbers or alphabetic letters or graphics. The third mode used in this project is questions and answers and inquiry dialogue interaction which considered a simple mechanics to supply inputs for application in specific field. Its some consecutive questions to user and choices answer. The user done this interaction step by step. Diagnosis Autism degree is depending on this mode of interaction. Interaction by fill the blanks and patterns used also in proposed system during entering the data to the system and retrieval data also such as during

5. Autism System

Autism is defined as the growth obstruction usually appear during the first three years of a child's life and is caused by a disorder of the nervous system which affects the brain functions and affects autism on the natural growth of the brain in the social life and communication skills where usually Misbrand children and people with autism have been difficulties in the field of verbal communication and social interaction, as well as difficulties in recreational activities where autism lead to difficulty in communicating with others and link to the outside world [5].

In 1943 Kanner was identified Autism firstly. Kanner is “emphasized that this congenital condition was characterized by an inability to relate to other people from the first days of life” [7]. Figure-3 represents the celebrities autism as referring to the presence of high capabilities and skills of some autism disorder and this in turn increases the interesting in this disorder and the possibility of providing the attention and interesting to nutrition these skills.

Figure 3: Celebrities’ autism

5.1 Symptoms of Autism

In Early Childhood parents seem that their child is not communicating with them in view, smile and cheerful and it seems he lives in his own world. Natural child smiling to his mother in the second month and then exchange it looks, especially during lactation, rejoice at the sight of his mother's face crying shunning him and rejoice in the appearance of the face or an autistic child is not smiling does not look for his mother's face and looks like seen through or to the ceiling, do not get excited when you go mother or when she returns [9].
Three main Symptoms that must be found in the child's diagnosis of autism, including:

1) Deficiency in language and verbal and non-verbal reached and deficiency the ability to express a functional way or understand the language. Also the delay in speech and sometimes use strange words written by a child and more reputation or re-last word of the sentence that he had heard[2].
2) Deficiencies in the growth of social skills and social relations. He cannot know the feelings of others nor participate others in the play, nor like mixing with other children [4].
3) Deficiency in the growth of imaginative play and imitation skills and indulge in individual and frequently activity, and attachment to a specific game and always carried with him and loves routine and does not like change and may be has repetitive movements of the hand and fingers [6,9].

5.2 Diagnoses of Autism

One of our objective is to definitely affect the diagnosis of autism by giving innovation that can deliver quantitative, target estimations of social reaction. We accept that this can be finished through two systems:

- Through inactive perception of the child at play or in communications with parental figures and clinicians.
- Through organized connections with training interactive system that have the capacity to make institutionalized social "presses" intended to inspire specific social reactions.

Participate in the evaluation of autism disorder and determine its degree number of disciplines. These are:

First: Medically; by a psychiatrist and a psychologist children or pediatrician specializing in growth and development or a doctor nerves children.

Second: Evaluate the mental capacity; by psychologist (clinical psychology).

Third: Linguistic evaluation; Using Specialist Speech.

But the first and direct responsible is doctor who done this job. This a doctor is studying the symptoms of autism in the child intensively by applying a custom or Clinical monitoring criteria's as well as a doctor request the laboratory tests to the exclusion of any other diseases. After that a doctor needs to evaluate the child's mental capabilities and the level of intelligence. These tests are carried out by psychologist. And lastly evaluate the linguistic side of the child by a specialist communication. now the diagnoses finished and then determine the autism degree and the propriety treatment, medicine and remedy for the individual child and his plan to education.

5.3 Treatment of Autism

To achieve to the successful treatment, some guidelines must take in to account for treatments, such as [2]:

- •early treatment is done.
- minimizing the gap between diagnosis and treatment.
- Treatment lesson must be 3/4 hours each day.
- participate the family in the treatment.
- choosing among behavioural/developmental treatment depending on the child's response.
- encouraging spontaneous communication.
- promoting the skills through play with peers.
- gearing towards the acquisition of new skills and to their generalization and maintenance in natural contexts.

6. Proposed System Description

From the illustration to the interactive system above, the only way that the user followed to enters to the interaction cycle is by input elements. These inputs explain the requirements which taken from user and represented in the system by set of operations which runs from the system according to input description.

After the implementation process, the interactive evaluation process must been done. The system must been connected to the user and the system value presented as outputs. The user notices these outputs and determines the results from this interaction. When the evaluation process ended the interaction cycle finished also [5].

6.1 Proposed System Algorithm

By the prevalence of autism in recent times and a misunderstanding of this disease from many people, the necessity to presented this kind of projects these deal with autistic children as an attempt to alleviate the suffering and pain of the family that has an autistic child. This work considered the family window to overlook on the ambiguous autism world by diagnosing the degree of autism and plan that the family can be followed for treatment and educations.
The general steps of interactive proposed system algorithm can be presented by:

The first step: Dealing with the data base by processing the data and information of the child in the database system, for easily adjustment, update and follow-up to the status of the child by:

- **Add:** child registration and insert child data.
- **Save:** save the data in database system (create record).
- **Display:** To preview the complete data of the child for their follow-up.
- **Search:** in case of reporting the specific child.
- **Modify:** in case of changed on child status.

The second step: The process of diagnoses the situation of children through a series of questions answered from child family in collaboration with the social worker. These questions concerning with the child and his behavior which used to determine the degree of autism in the child. These degrees are slight, medium, or hard according to the weights to each answer. The questions presented as interactive manner by selected answer and the system saves the weight to each answer. The total weight determines the Autism degree.

The third step: this step represent the treatment process. These process consisting on the following kind of treatment:

- Medical treatment: Determine the diet treatment and medicine giving treatement of the child according to the degree of autism. By listing of the permitted and the inclusion of prohibited foods for the child autism degree.
- Therapy treatment which done to provide the behavior treatment by the therapy.

The fourth step: educations step which provide the learn ways that are suitable to the basic behaviors of the autistic child according to the degree of autism. The proposed system presented two style to learning such as using graphic style and video style.

Figure-4 bellow illustrates the proposed system block diagram which represents the system step by step.

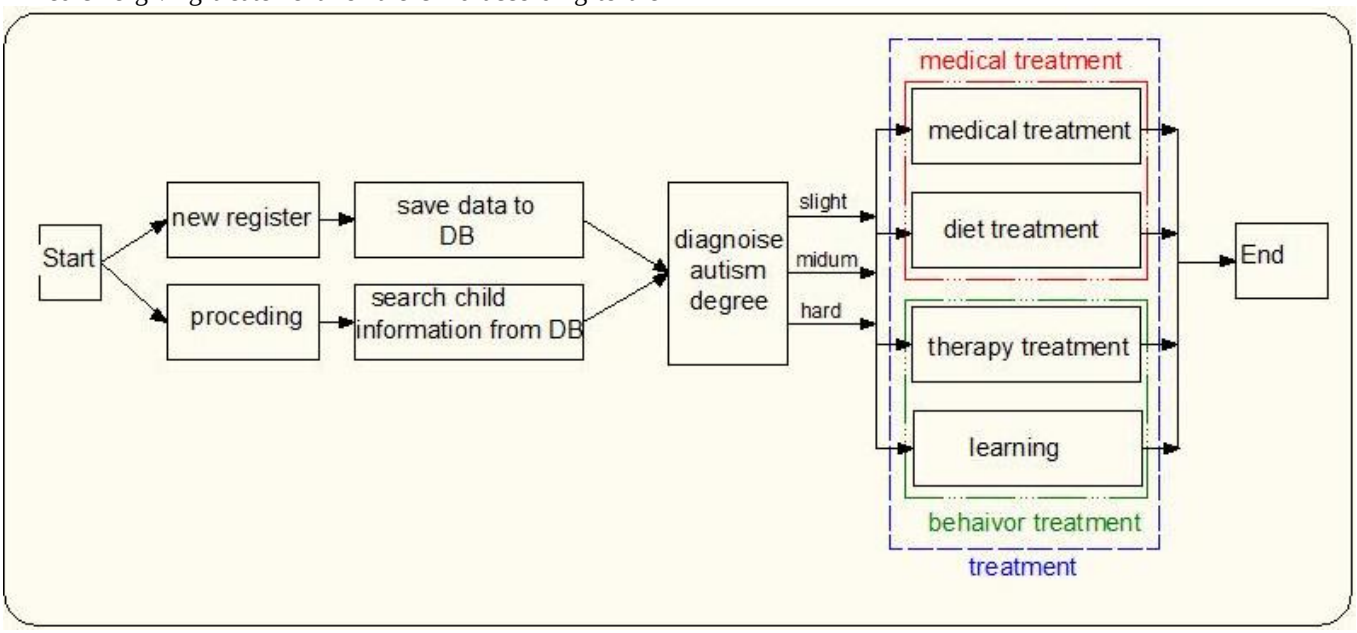

Figure 4: The proposed system block diagram

6.2 System implementation and Interface

The proposed system gool is to present interactive system that care on many important issues of autism children such as methods of diagnosis, treatment and education of autism. This system presented to all personal that has interest to autism and parents which have autism child to decrement the provided the alternate of competent organization.

Many interfaces provided with the implementation of the system. These interface variation with the user that is deals with the system such as parent or supervisor of child, child, system administration the most important interface can be shown in figure-5 below.

Figure 5: Some system important interface

6.3 System Results and Evaluation

The proposed system provides the ability to present the education program to the autism child and the behavior plan which be able to enhance the child status. Most children with autism find it difficult to communicate with others, but this difficulty may cringe with interactive technology. This system is applying as test on sample of children and teachers in some schools to children with special needs and Simple mental disability. After using the system, the questionnaire is presented to evaluate the extent of benefit from the system according to the questionnaire model presented in table-1 below

Table 1: Questionnaire Model

no	*Question*	*Strongly agree*	*agree*	*not agree*
1	Easy to use the system			
2	The system helps to develops the child states			
3	The childe response to the system			
4	The system provided easy and useful following up to the childe states.			
5	The system works to raise motivation and discovery			
6	The use of multimedia and graphics in the system helps to understanding the scientific subjects			
7	The interactive learning recorder more useful			
8	The system able to Development the Child Skills			
9	The system interfaces suitable			

After gathering the results the following histogram is done independent to each question as shown in figure 6 below:

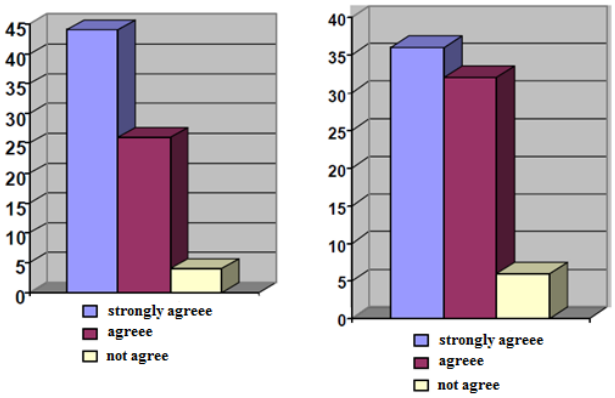

Figure 6: Histogram to questions 2 and 6

7. Conclusion

When the proposed system implemented, we determine the following conclusion:

1) The luck in atomistic organization and this community segment marginalized and there is little knowledge about this disorder and the ignorance of parents and the community to it. We thought of this system to help parents and professionals for ease of dealing with autism patients by providing a measure of disorder degree and methods of treatment. Using proposed interactive system, we have underestimated the effort that will be the responsibility of family where make the child psychological state best and the outcome will be the response of the child.
2) We have provided the time it takes to assess and treat the child because we collected in our system among three institutions require the need for the use in the treatment of the child.
3) Proposed system underestimated the cost of which was possible that the family will be on it. By make it available for parent which has autism child. The system provides the many several disciplines in addition to the learning manner which provides the voltage on the family.
4) The basic features of autism is the isolation and the inability to communicate with the social makes this solitary learning more appropriate in addition to the system provides redundancy in lectures which the autistic child needs taking in to consideration the autism degree in the level and periodic of lessons
5) By proposed interactive learning autism child can influence the experience to hold a particular event and then see and feel directly respond to this effect.
6) Experience entrenched in the mind of the child more than other technology because of the effects on it and direct response to him.
7) Provide a data base which saved all information about the child and the management to these information as well as the follow up the development curve to the child.
8) The work in this area forced the researcher to deal with more than one task kind, such that using multimedia in learning process as well as Graphics.
9) This system is ideal for autism schools and the organization.

8. Future Works

Autism is one of important and sensitive subject and the luck in atomistic organization makes research continuously is very feasible. Some development works can illustrates as:

1) development the system so that simulates the behavior of the child such as development the sportive skills to the child by example teach him the sports movements.
2) The development of the system to teach him a smile and movements reflect the needs.
3) The development of the Graphic side in the system. Where invent on the drawing so (if he has tendencies art drawing).
4) The development of the system to have a Web page to be accessible to all.

9. Acknowledgment

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