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IoT for Autism

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ABSTRACT: *In this paper, we will discuss how IOT can improve the life quality of people with Autism. How technologies like Wearable's, Machine Learning, Artificial Intelligence can make the lives of autistic people better. Making decisions is very hard for autistic people, they cannot detect the danger and analyze people's intentions that's where Artificial intelligence helps them by indication the danger through signs and emoji's, security of autistic people is a major concern for their caretakers or parents which can be solved using real time location tracking system. Many children with Autism are highly interested and motivated by smart devices such as computers and touch tablets. These types of assistive technology devices get children with Autism to interact, make choices, respond, and tell parents what they are interested, need, think, and may be even fell by creating communication between children, caregivers, and therapists. Different visual systems, such as objects, photographs, realistic drawings and written words, can be used with assorted modes of technology, as long as the child can readily comprehend the visual representation. Autistic people get excited and stressed very suddenly, with the help of wearable devices we can monitor the body continuously time to time and can understand how an autistic person is feeling in each situation which will help in better understanding about them and give appropriate treatment.*

Keywords: IOT Technology, Wearable's, Machine Learning, Artificial Intelligence, Smart devices.

I. INTRODUCTION TO AUTISM

Autism spectrum disorder (ASD) is a lifelong brain development disability in which the people are facing the problems like social communication challenges, restricted repetitive behaviors, unusual interests, and activities etc.

Generally, Autism people have the difficulty to learn new things, they can't understand and analyze the situations, and they can't express their feelings properly compared to normal people. We can easily identify this type of disability in autistic people within 2 to 3 years from the birth based on their behavior. Autism spectrum disorder can occur almost five times more among boys than girls.

II. TYPE'S OF AUTISM

Autism is classified into four categories based on their social communication, behaviors, and interests. They are

A. Autistic Disorder (classic Autism)

In this type, the autistic people will face the problems with social interaction, communications challenges, unusual behaviors and interests they also have the intellectual disability.

B. Asperger's Syndrome

The people with this type of Autism have no problem with language and the intellectual disability. In fact, they can score average or above average marks in the tests. But they have some milder symptoms of autistic disorders.

C. Pervasive Developmental Disorder (PDD)

It is also called as typical Autism. People belong to these categories that are on the Autism spectrum but not have all the symptoms of the Autism like classic Autism.

D. Childhood Disintegrative Disorder

This is an extremely rare condition in which the children grow normally for at least 24 months and then lose some or entire communication and social skills.

III. SYMPTOMS OF AUTISM

We can identify the Autism in people by observing the following symptoms.

- Have unusual behaviors like rocking, flapping hands or walking on the tip toys and spin in circles.
- They will play alone with few toys only.
- Display unusual reaction to sounds, movements, smell, taste, look or feel.
- Not able to express what they want or need.
- Have sensory difficulties.
- Have a difficulty to understanding what is happening in the environment.
- Little or no eye contact.
- Get upset by minor changes.
- Have low concentration.

IV. TREATMENT FOR AUTISM

We don't have a particular medicine for Autism. This can be cured only by using behavioral therapies. It includes teaching everything from the beginning in a slow process. It may require some advanced technologies for learning. For this reason, we are proposing a technology that is **Internet of things** which includes Artificial Intelligence and Machine Learning concepts.

V. INTERNET OF THINGS

Internet of things (IoT) is a concept where the network devices have the ability to sense and collect information from the environment around us, and then share that information to the other Internet based devices where it can be processed and utilized for various other interesting reasons.

A. *Artificial Intelligence*

Artificial intelligence is a branch of computer science. Its main aim is to create an intelligent machine that work, think and react/behave just same as humans.

.Some of the major activities computers can do by using artificial intelligence are listed below.

- Speech recognition
- Learning
- Planning
- Problem solving
- Knowledge
- Reasoning

B. *Machine Learning*

Machine Learning is a sub branch of AI that facilitates a software application to predict the most accurate results without being explicitly programmed. In simple words, ML is a concept in that the computers can learn the things based on its previous experience on its own. The main role of the machine learning (ML) is to create an algorithm for solving the problems. These algorithms will take the input data and use the Big Data to predict the future results.

C. *Wearables Technologies*

The term Wearable Technology refers to an electronic device that can be worn on the body as gadgets. The advantage of wearable technology is its ability to connect to the internet and possibility of exchanging the data between the device and the network. Generally, wearable devices are often used for health and fitness reasons etc.

VI. IOT DEVICES FOR AUTISM

The list of IOT devices is shown below in the category wise.

A. *IOT for Learning*

Problem:

Autistic people are very much slower than normal people. So they can't learn and understand the things normally.

Solution:

Teaching with traditional methods is not a correct system in this scenario. The following IOT devices are may be useful for them.

- **Computers and Smart phones:** By using these devices they can learn and understand the topics quickly and effectively due to its graphical interface. Learning everything visually will increase the interest and creates the better interaction.

B. *IOT for Security*

Problem:

Maintaining the Autism people is a very risky task to caretakers. They don't have any idea about the roots and roads in the cities. There may be a chance to missing at anywhere on the roads.

Solutions:

The Autistic people must wear the (Global Positioning System) GPS-tracker on the body. It can send the location information to the caretakers through the Internet. By this way, we can reduce the missing cases. The following are the list of useful GPS-tracking devices.

- AngelSense
- HereO GPS Watch
- AmbyGear Smartwatch
- Weenect kids GPS
- Tinitell
- My Buddy Tag
- Pocket Finder
- Lineable
- Amber Alert GPS Locater
- TraxPlay

C. *IOT for Health Caring*

Problem:

Autism people can't maintain their health and it is the responsibility of their parents. It is not possible to check the autistic person every time.

Solution:

The following IOT devices are helpful in this case.

- **AliveCor Heart Monitor:** It is a wearable device and it is connected to your android mobile phone through the Bluetooth. It will automatically count the heartbeat rate and sends this information to the caretaker's mobile phone in the form of graphs.
- **Withings Blood Pressure Monitor:** This wearable device counts the heart rate, blood pressure and also the no of steps you walk daily and sends the reports to caretakers continuously.
- **Viatom Checkme for checking body temperature:** This device is used to check the body temperature. It takes only a few seconds to tell whether the person got a fever or not. If the person got a fever it informs the caretaker.
- **Pebble Time Android sleep app:** This device will calculate the sleeping time of the person and sends the daily reports to caregivers.

D. *Future IOT Devices*

- Devices for explaining the facial expressions of other persons.
- Devices for displaying the inner feelings of the disabled person by reading their brain signals.

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During the process of writing this paper, We have tried to be updated with the technology and also started exploring the new possible areas for implementation of technology.

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