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Analysis on Behavioural Changes in the Intellectual Disability of the Individuals

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***Abstract*—The Intellectual disability (ID) is the major problem of many individuals in this century. The Intellectual disability will be determined as per the individuals Intelligent Quotient (IQ). The subjects with ID may not able to lead their life own. They are in need to have the dependence of the surrogate till the end of their life. In this project, the recommending of some activities will help to identify the likes and dislikes of the subject and also it helps to improve the activity of brain. By using MATrix LABoratory (MATLAB), with the recommending activities the EEG signals of the subject are taken non-invasively with the help of the headband and monitored. By the Hardware setup of ATMEGA 8 controller, the activities which the peak values of the likes obtained will be displayed in the monitor. So, the repeating of this process will helps the subjects to identify their basic needs and also helps them to have an independent life.**

Keywords—Behavioural Change, EEG, Intellectual Disability (ID), Non- invasive

I. INTRODUCTION

Therapeutic healings are inaccessible for most types of neural, muscular and intellectual disability. Intellectual disability is a disability characterized by significant limitation in both intellectual functioning and in adaptive behaviour. The main causes are Genetic conditions, Problems during pregnancy, Problems during childbirth, Illness and accidents. Due to these disabilities, the person lags the ability to learn, think, solve problems, and make sense of the world, which in otherwise called as intellectual functioning. The world makes the people whether they have adaptive behaviour or adaptive functioning, makes them to live independently. Although many rehabilitation centres are available for these differently abled peoples, they can't provide them time to time effective support for the people throughout their lifetime.

With scientific breakthrough in brain computer interfacing (BCI), acquiesce a intellectually disabled people to do their things on the their own. The principle of operation behind the BCI is that with intact brain function, brain signals are generated. The signals are interpreted and processed by computer. The processed signals are translated into trigger inputs for a mechanical system to get activated. It provides a surrogate pathway for the individuals with disability to cater their own needs and hence improving their lifestyle.

The brains of intellectually disabled people can able to foresee their likes and dislikes. But the problem faced by them is that they can't communicate effectively their ambience. This problem motivates us to do a project which couldsense their brain waves and identify their likes and dislikes. Hence, improving their brain activity.

II. METHODOLOGY

An IQ, or intelligence quotient, is a score you receive on a test that assesses intelligence of the people. For ID people the scores may vary based on the impairment. Mild Mental Retardation: IQ level 50-55 to approximately 70. Moderate Mental Retardation: IQ level 35-40 to 50-55. Severe Mental Retardation: IQ level 20-25 to 35-40. Profound Mental Retardation: IQ level below 20 or 25. Mental Retardation, Severity Unspecified: when there is strong presumption of Mental Retardation but the person's intelligence is untestable by standard tests. This paper concentrates on IQ level less than 40. Because these kind of people are unable to do their things on their own. In order to improve their brain activity, the brain waves of intellectually disabled people are sensed using head band. The headband values are processed using MATLAB to identify their likes and dislikes. This triggers a mechanical setup to gets their liked things in front of them, hence improving their brain activity.

This work can be realized using the following setup consisting of the headband, interfacing unit and the hardware setup consisting of rotating chamber.

Whenever the mentally retarded people see their favourite things a maximum brain values are obtained, which means that person likes that particular thing. Once the favourite things are identified, by providing them with their favourites and keeping their surroundings with their favourites it is possible to improve their brain level and make them to lead a life by meeting their own needs.

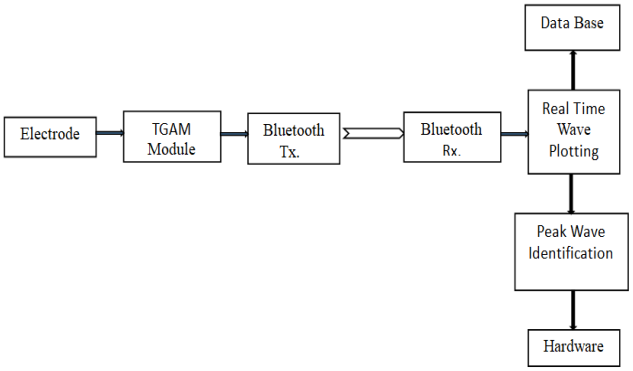

Fig. 1. Block Diagram of proposed Method

A. *Working of Headband*

The brain sense headband is used to acquire the brain signals. The headband consists of a single channel electrode, Think Gear ASIC Module (TGAM), a Bluetooth transmitter section. A dry silver chloride (Agcl) is chosen for precise measurement of weak or low bio-potentials such as EEG, EOG, ENG, EMG and evoked potentials. The electrode is to be placed on frontal lobe of brain to measure the concentration of person. These signals will be varied from people to people. Hence these measurements has to be taken repeatedly to obtain the correct values. This signals are filtered, amplified and sampled at the rate of 512 samples using TGAM. The processed signals are transmitted to the computer using near-field (Bluetooth) communication.

B. *Hardware*

The favourite value is given as input to the hardware setup using serial communication. The hardware setup consists of rotating chamber, which is controlled by ATMEGA 8 controller, stepper motor and an IR sensor to identify the initialposition of the rotating chamber.

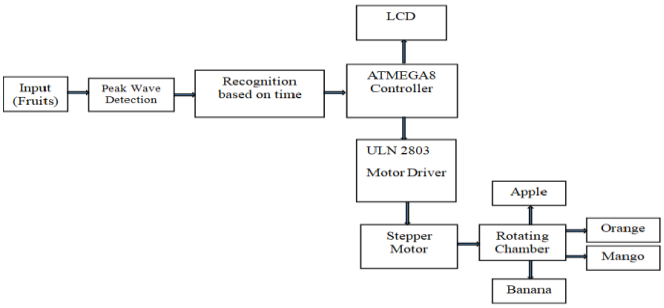

Fig. 2. Hardware setup

The controller is programmed for the given input database. The Hardware setup with ATMEGA 8 Controller and ULN2803 driver circuit is shown in fig. 2.

III. RESULTS AND DISCUSSION

Different kinds of colours, fruits, shapes were show before the intellectually disabled child to monitor the brain activity. To obtain their favourites of colour, shapes and fruits, the headband is wore on the fore head of the child. These values are processed using TGAM and sent to the computer via Bluetooth transmitter. The received values are viewed as a real time graph using Matlab platform. From the graph the peak values are consider as likes of the child. This process is repeated several times for the same child in order to ensure the accuracy of result.

The 4 input natural products (Apple, Orange, Mango and Banana) were taken and demonstrated one by one for like clockwork. At whatever point the waves achieves the limit esteem, the specific natural product name is displayed in MATLAB shown in fig. 3.

By utilizing serial correspondence, the information are transmitted to ATMEGA 8 controller. The natural product name gets showed on LCD. Presently the rotating chamber comprises of same 4 organic products on it. Once the controller perceives the natural product, the chamber was pivoted by utilizing a stepper engine which was controlled by ULN2803 driver circuit.

The chamber pivots and acquires the most loved natural product front of the subject. So they can pick the natural product effortlessly.

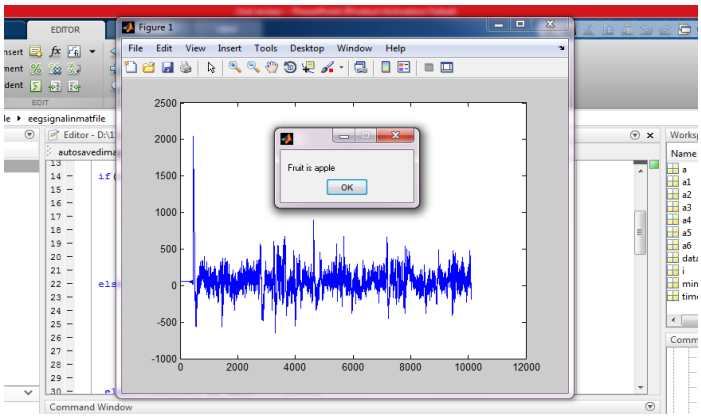

Fig. 3. Matlab output

The simulation is shown in fig. 4 by using Proteus.

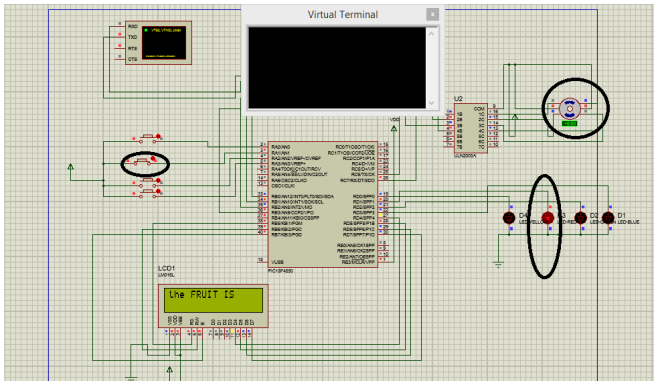

Fig. 4. Proteus output of proposed method

If there should arise an occurrence of in excess of one most loved was recognized, the primary natural product gets shows on LCD and chamber gets turned and organic product is accessible before subject for 4 seconds length. At that point the chamber returns back to starting position and sit tight for 2 seconds and now the second organic product name gets shows on LCD and chambergets turned and natural product is accessible before subject for 4 seconds length and returns back to beginning position. So it's simple for the subjects to pick their top picks. For distinguishing the underlying position, an IR sensor is set and the back part of first opening gets shaded with dark. The IR was seen by dark shading, which recognizes the underlying position. Additionally like organic products, alternate data sources are appeared and their top choices are recognized effortlessly. Figure 5 shows the hardware setup.

Subsequently this task distinguishes the top choices of rationally impeded individuals. By furnishing their surroundings with their top choices it's conceivable to raise their mind's capacity proportional to typical people, so they can lead their life all alone. The Graph is drawn with the

various activities and values of the brain waves are shown in fig. 6.

The above graph explains the liked and disliked activities performed by a single subject with the help of their brain waves acquired. When the subject in a normal state the brain waves value will be crosses over 550, the peak values were obtained during the activities of picture shown, reading, drawing, dropping of stones, shape matching is 2047 and it shows that these activities were liked by the subject.

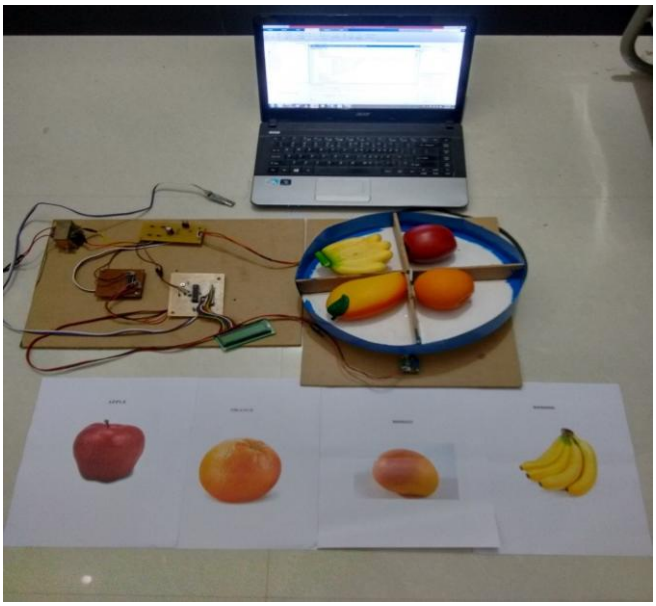

Fig. 5. Entire setup of the project

While writing activity is performed the value will be cross over 1130 and while identifying the staff name it will be more than 1259 and these activities shows that the subject was in a disliked condition

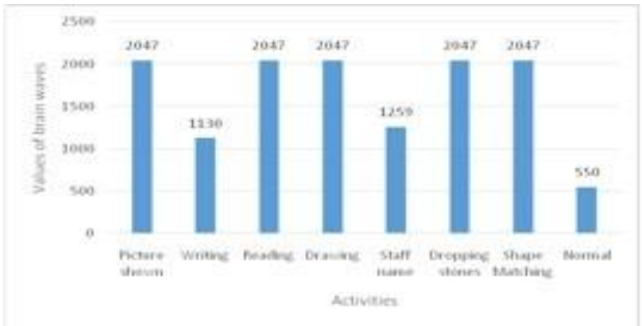

Fig. 6. Comparison Graph between value of the brain waves and the various activities

IV. CONCLUSION

By viewing the results obtained and the graphs plotted it clearly explains the likes and dislike activities of the subject. When the subject supposedto have their liked activitiescontinuously it helps them to overcome their cause partly and to lead their life in an independent manner. The samples have been taken for 14 subjects and this project achieves the result of 78.57%accuracy. In figure 6 the activities performed by a single subject is explained. The obtained result was verified with the caretakers of the subjects. The obtained result was matched with results from the caretaker.

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