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Attention Deficit Hyperactivity Disorder (ADHD) Detection and Providing Therapeutic Treatment Using IOT

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ABSTRACT:

ADHD is one of the neurological disorders among children, adolescents and even in adults. ADHD arises due to brain anatomy and function, genes and heredity, head injury, exposure to alcohol, toxins etc., The symptom includes limited attention, hyperactivity, irritability and persistent repetition of words or actions. The children with ADHD have poor academic performance and less parent- child relationship. ADHD is normally treated by using stimulants, cognition enhancing medications and counselling. The objective of our project is to provide non-invasive therapeutic treatment using a portable device. The portable device consists of pulse sensor, sweat sensor, and accelerometer sensor, the outputs of which will be displayed on the LCD Display. Then the therapy is carried out with the help of vibration motors which will improve blood circulation in body and makes them feel relaxed. Thus our device acts as a supportive therapy which helps in the speedy recovery of ADHD patients with minimum cost and minimum technical knowledge.

KEYWORDS: ADHD, non-invasive therapeutic treatment, pulse sensor, sweat sensor, accelerometer sensor.

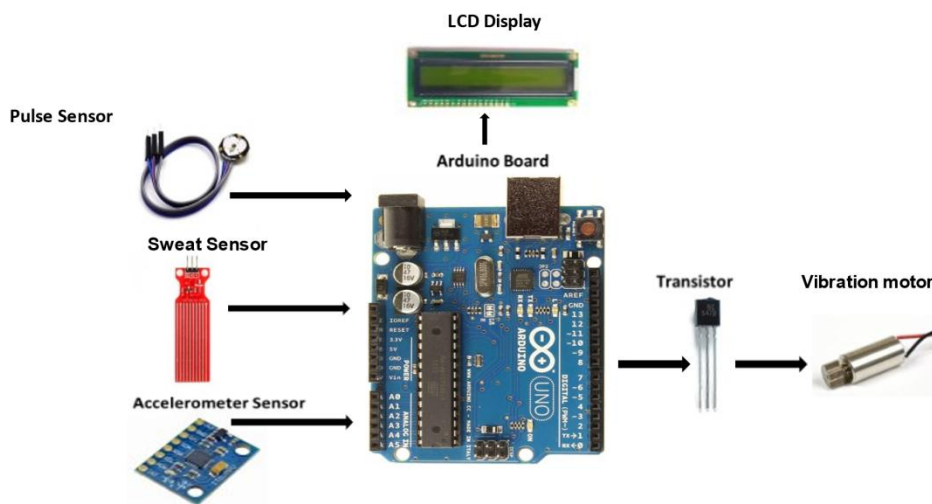
I. INTRODUCTION

ADHD means Attention Deficit Hyperactivity Disorder. ADHD refers to lack of attention and easily distractable. The term “attention deficit” in ADHD refers to inattention or difficulty in focusing for long periods [1-3]. The ADHD people will be restless, agitated and difficult to resist. Almost there will be constant motion and frequently making excessive noises. The Impulsive behavior often will be rude, dangerous and sometimes resulting in accidents [4]. ADHD patients symptoms are long-term and severe enough to impair someone's everyday functions [5]. Some experts consider that ADHD to be a chronic condition that has no cure. However, patients with this disorder should not give up hope. There are many useful treatment that can help people to manage ADHD symptoms. ADHD affects almost 4% to 12% of school students [6]. The behavior will be inattention, hyperactivity, impulsivity, difficult to pay attention, don't listen, easily distracted, doing some careless mistakes, don't follow any instructions, loses some important things, can't be stay seated, talks too much and can't wait for things [7]. The side effects caused are decreased appetite and weight loss. The problems will be like sleep problems, headache and stomachache etc. [8-9]. The treatments will be like keeping our children on a daily schedule, by caring them without any distractions, keeping them in a positive way and by keeping them calm [10]. ADHD will continue to adulthood in most of the cases. About 10 million Indian children are diagnosed with ADHD annually. Though the treatment for ADHD lasts for many years, its symptoms can be managed therapeutically. The parents with the help of therapists play an important role in treating ADHD children [11-13].

II. PROPOSED METHODOLOGY

In our Proposed System, we use non-invasive techniques to overcome hypertension, restlessness and provide a therapeutic solution which gradually helps the patients to come out of the trauma state. The device proposed in our system is portable and can be used daily irrespective of their age. Our device acts as a supportive therapy which helps in the speedy recovery of ADHD patients [14-16]. Our proposed system consist of a LCD display, pulse sensor, sweat sensor and accelerometer sensor which are connected to the Arduino UNO. It has both analog and digital ports. We use a step-down transformer which convert a power supply from 12 volt to 5 volt. We use a pulse sensor which is used to detect the pulse rate of the patient [17-19]. When a patient tends to a state of hypertension or anxiety the person's pulse rate gradually increases [20]. A sweat sensor is used to detect the sweat consumption of the patient, when the patient tends to the state of hypertension or fear, the sweat consumption increases in an abnormal way [21]. The nervousness detection sensor is used to detect the nervousness of the patient. We also use a LCD Display of size 16*2 on which the output of the 3 sensors will be displayed [22-24]. Once the sweat rate and the nervousness of the patient is detected, then the vibration motors will start functioning. The vibration motors improves the blood circulation of the patients and relaxes them to the normal state [41-42]. Thus a therapeutic treatment is provided to the ADHD patients. Our method is very cost efficient, easy to handle and can be used by the middle class people [43-45].

III. SYSTEM ARCHITECTURE

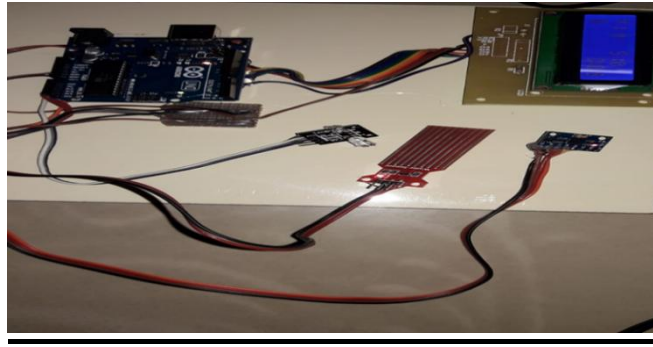


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III. DESIGN MODULES

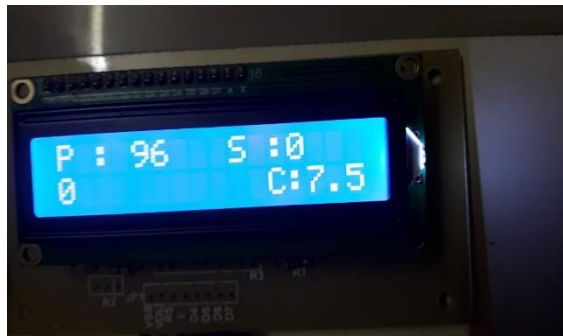
1 Integration of sweat sensor, pulse sensor and accelerometer sensor with microcontroller

The first module of this project is to integrate the sweat sensor, pulse sensor, and accelerometer sensor to the Arduino board which is used to detect the sweat rate [25], pulse rate and nervousness of the ADHD patient.



2 Testing the output of the sensors in the LCD Display.

The pulse rate is given here as 'P'. The pulse rate of normal person is displayed here as a sample. (ie) P:96. In the same way the pulse rate of the ADHD patient is detected and displayed on the LCD [26-27].



The sweat rate is given here as 'S'. The sweat rate of normal person is displayed here. (ie) S:34.

Similarly the sweat rate of the ADHD patient is detected. For ADHD patient, the sweat rate is estimated to be above 600 due to anxiety [28].

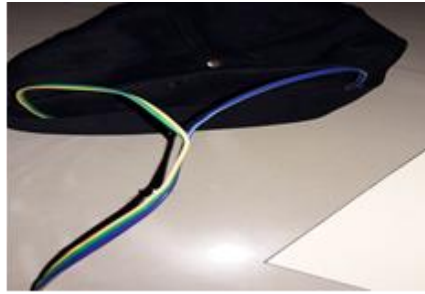


Once the sweat rate crosses 600, then we will get an 'Alert' signal in LCD Display. Then the vibration motors start functioning. In this way the patient is given the therapy for relaxation [29-31].

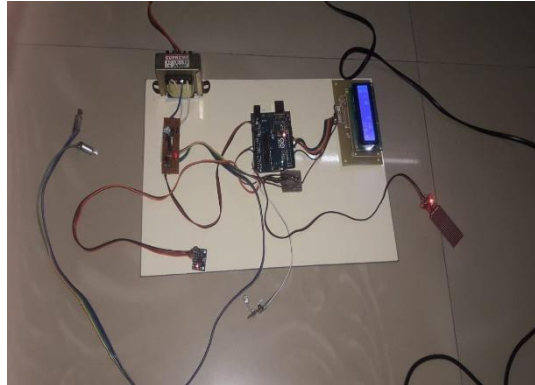


3 Providing therapeutic treatment using vibration motors

Vibration motor is interfaced with the Arduino board using transistor. The vibration motor will work depending upon the program given in the Arduino board [32]. Vibration motor will improve the blood circulation of the patient and make them feel relaxed. Here the vibration motors are placed inside a cap for easy handling which will be worn by the ADHD patients [33].



4 Description of the module implemented



IV. RESULT

Our project focuses on the therapeutic treatment for the ADHD patient when they have high pulse rate, sweat rate, nervousness using vibration motors which improve blood circulation and make them feel relaxed. This device is simple and cost effective [34-40].

V. CONCLUSION

This project focuses on the detection of hyperactivity of the ADHD patient with help of sensors and provide a therapeutic treatment to control the symptoms with the help of vibration motors. The device suggested in our project is portable and can be handled by anyone with minimum technical knowledge. Since this project involves only minimum cost it is affordable even for middle class people.

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