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## A Novel wearable therapeutic aid with intelligent information processing systems

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# A Novel wearable therapeutic aid with intelligent information processing systems

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**Abstract.** This paper usually starts in primary childhood and its cruelty is associated with outcomes and cruelty of autism in teens and adulthood. Management is frequently behavioural. However, capable new concepts and indication are developing from neurobiology and development psychology that recognize neural adaptation, lack of environmental stimulation, arousal, and adaptive functions as key factors for the beginning and maintenance of Restricted and Repetitive Behaviours (RRBs). This paper consists of accelerometer sensor, tilt sensor, heart beat sensor, PIC microcontroller, motor with help of driver relays and IoT module. The accelerometer and tilt sensor are used to detect the child activity continuously. The sensor is fed to PIC (16F877A) microcontroller. If the sensor value crosses the threshold value, the vibration triggers the child and voice (music) will be played while in autism spectrum disorder. The IoT is used to monitor the child activity continuously.

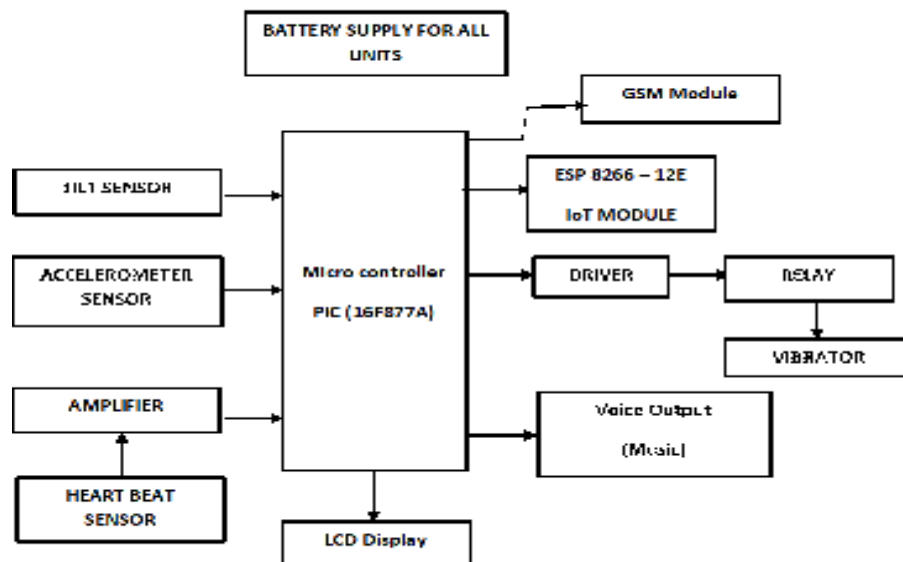
## 1. Introduction

AUTISM spectrum disorders (ASD), characterized by debits in communication and social interaction organized with constrained, tedious, and labelled patterns of behaviour, represent a series of neurodevelopmental incapacities. The growing of technologies such as abundant computing and ambient intelligence are enlightening the eminence of health care and medicine treatments. Today the concept of patient in-the-loop effects the development of new system health oriented, for this reason, new difficulties and challenges are coming out. One comes out in those situations where the recognizing and the logging of patients' gestures are significantly important in the direction of improve the quality of healthcare provided.

## 2. Disadvantages of existing systems.

This allows two children to play a series of interactive games in a virtual reality environment by using simple and hard gestures in order to demonstrate the potential for fostering their communication & collaboration skills. [2,3] These only develop the skills of autism children and improve their interaction with others. Till now there is no first aid for epilepsy (ASD) in previous papers.[1]





**Figure 1.**Block Diagram of proposed system

This proposed is mainly based on providing a first aid kit for rectifying epilepsy of an autism disorder people. This paper consists of accelerometer sensor, tilt sensor, heart beat sensor, PIC microcontroller, motor with the help of driver relays and Iot module. The accelerometer and tilt sensors are used to detect the child activity continuously. [3] The sensors values are fed to the microcontroller. If sensor values cross the threshold value, the vibration trigger the child and voice (music) will be played for autistic spectrum disorder. The Iot is used to monitor the child activity continuously. [4]

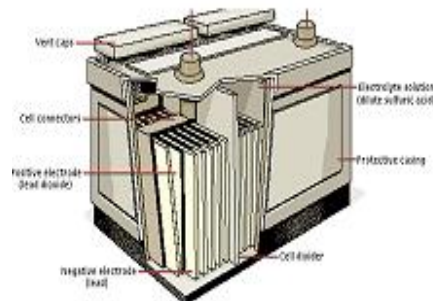
### 3. Advantages of Proposed system

According to literature survey they used the Iot module to improve the communication skill of autism people. But in our proposed system we use to Iot module to rectify the epilepsy problem of autism disorder people. [5] The new biomedical technology named as digital pill is added as an enhancing feature to detect the intake of the medicine for this problem. [6]

### 4. Component description

#### 4.1 LEAD ACID BATTERY

A lead-corrosive battery-operated is an electrical stockpiling gadget that uses a reversible chemical reaction to store energy. It utilizes a blend of lead plates or frameworks and an electrolyte comprising of a weakened sulphuric corrosive to change over electrical vitality into potential compound vitality and back once more. [7,8] The electrolyte of lead-corrosive batteries is risky to your security and may produce consumes and other perpetual destruction in the event.



**Figure 2.**Lead Acid battery

#### 4.2 TRIPLE AXIS ACCELEROMETER ADXL 335

Breakout board for the 3 hub ADXL335 from Analog Devices. This is the furthest recent in a long, established line of simple sensors - The ADXL335 is a triple pivot MEMS accelerometer with very truncated clamour and power utilization - just 320uA. The included 0.1uF capacitors set the transfer speed of every pivot to 50Hz. also, locally available controller 3.3volts.[9]

An accelerometer is a device that estimate appropriate cumulative speed, legitimate quickening is not equivalent to organize increasing speed. For instance, an accelerometer very still on the outside of the Earth will gauge a speeding up because of Earth's gravity, straight upwards (by definition) of  $g \approx 9.81 \text{ m/s}^2$ . [10]

#### 4.3 HEART RATE SENSOR

This paper is based on the principle of photoplethysmography (PPG) which is a non-aggressive method of determining the distinction in blood volume in tissues using a light source and a sensor. Since the modification in blood volume is synchronous to the heart beat, this approach can be used to employed to figure the pulse. Transmittance and reflectance are two undeveloped types of photoplethysmography. As a result of the inhibited infiltration understanding of the light through organ tissue, the transmittance PPG is applicable to a limited body part, for example, the finger or the ear flap. As the light doesn't requirement to intrude the body, the reflectance PPG can be associated to any pieces of human body. In either case, the detected light replicated from or transmitted through the body part will vary as per the pulsatile blood stream brought about by the thumping of the heart.[11]



**Figure 3** Heart Rate Sensors

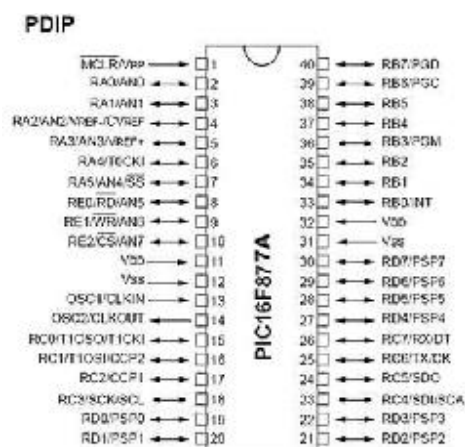
#### 4.4 MICROCONTROLLER

The microcontroller PIC16f877a is standout between the most famous microcontrollers in the industry. This regulator is exceptionally beneficial to operate, the coding or user interface design of this controller is as well simpler. [12] One of the primary points of the interest is that it very well may be combine eradicate whatever number occasions as could reasonably be expected on the grounds that it utilizes FLASH memory innovation. It has an absolute number of 40 pins and there are 33 pins for information also yield.



**Figure 4** Microcontroller

PIC16F877A finds its applications in a massive number of devices. It is utilized in remote sensors, security and well-being gadgets, home mechanization and in numerous modern instruments. An EEPROM is additionally contained within in it which makes it imaginable to store a portion of the data for all time like transmitter codes and receiver frequencies and some other related information. The expenditure of this controller is short and its dealing with additionally simple. Its adjustable and can be operated in regions where microcontrollers have never been operated as in coprocessor applications and clock capacities so on.[13]



#### 4.5 VIBRATOR

A vibrator is a mechanical gadget to create vibrations. The vibration is often generated by an electric motor with an unbalanced mass unit's driveshaft.

#### 4.6 GSM

GSM, which represents global system for mobile exchanges, rules as the world's greatest broadly utilized phone innovation. Mobile phones apply a PDA administration transporter's GSM establish via scanning for PDA towers in the adjacent territory.

For functional and regular purposes, GSM offers clients more extensive global meandering abilities than different U.S. arrange innovations and can empower a wireless to be a "world phone". Future developed GSM consolidates the before TDMA standard.

### 5. Software Requirement

#### 5.1 PROTEUS

The controller can understand a program inscribed in low level computing concept, it must be accumulated into a language of zeros and ones. The initial unique alludes in the direction of arrangement of standards utilized intended for constituting program for the microcontroller, while the later alludes in the direction of a program. accumulated program is similarly called Machine Code.[6]

In machine code, a similar order is spoken to through a 14-bit exhibit of ones justifiable by the microcontroller. All low-level computing construct directions are also arranged into the comparing cluster of ones. An information document utilized for putting away gathered program is called "official record, that is "HEX data file". The name comes from the hexadecimal exhibition of a data file and has a suffix of "hex" as well, for illustration "probe.hex". [8]

#### 5.2 Embedded C

Glancing around, we wind up to be encompassed by different kinds of implanted frame work. Be it an advanced camera or a cell phone or a clothes washer, every one of them has sort of processor working inside it. Related with every processor is the installed programming. On the off chance that equipment shapes the body of an implanted framework, installed processor goes about as the mind, and inserted programming shapes its spirit. It is the installed programming which fundamentally oversees the working of implanted frameworks.[14]

During earliest stage long periods of microchip-based frameworks, programs were created utilizing constructing agents and melted into the EPROMs. There used to be no component to discover what the program was doing. LEDs, switches, and so forth were utilized to check right execution of the program. Some 'blessed' engineers had In-circuit Simulators (ICEs), yet they were excessively exorbitant and were not exactly solid also.[10]

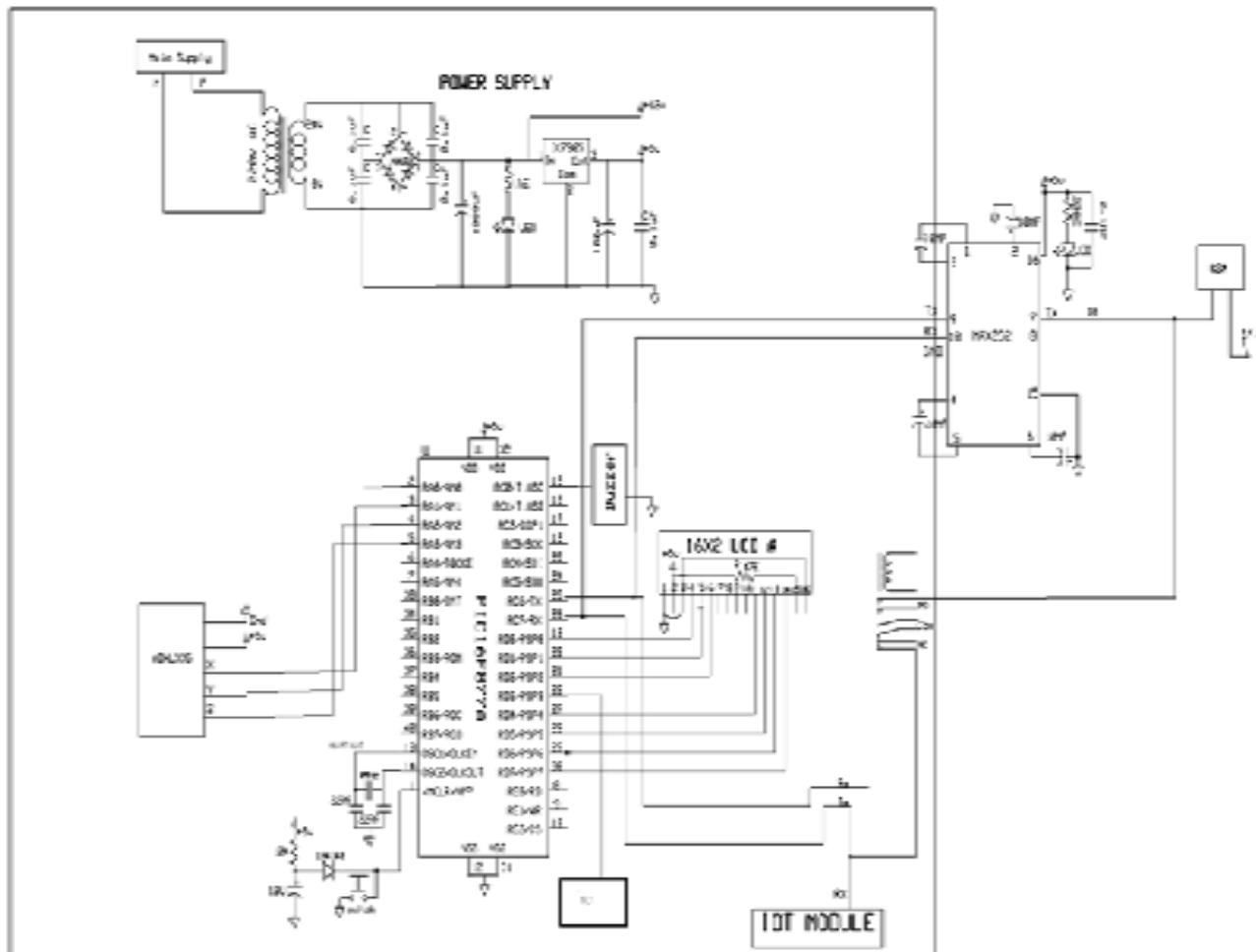
#### 5.3 MPLAB

Integrated tool set for the development of embedded application. It provides single integrated to develop code for embedded microcontrollers.

#### 5.4 ISIS(Proteus)

It has wide range of components in its library. It is embedded with the foot prints of different category of components like ICs, transistor, connectors and other discrete components. It offers auto routing and manual options to the PCB designer.

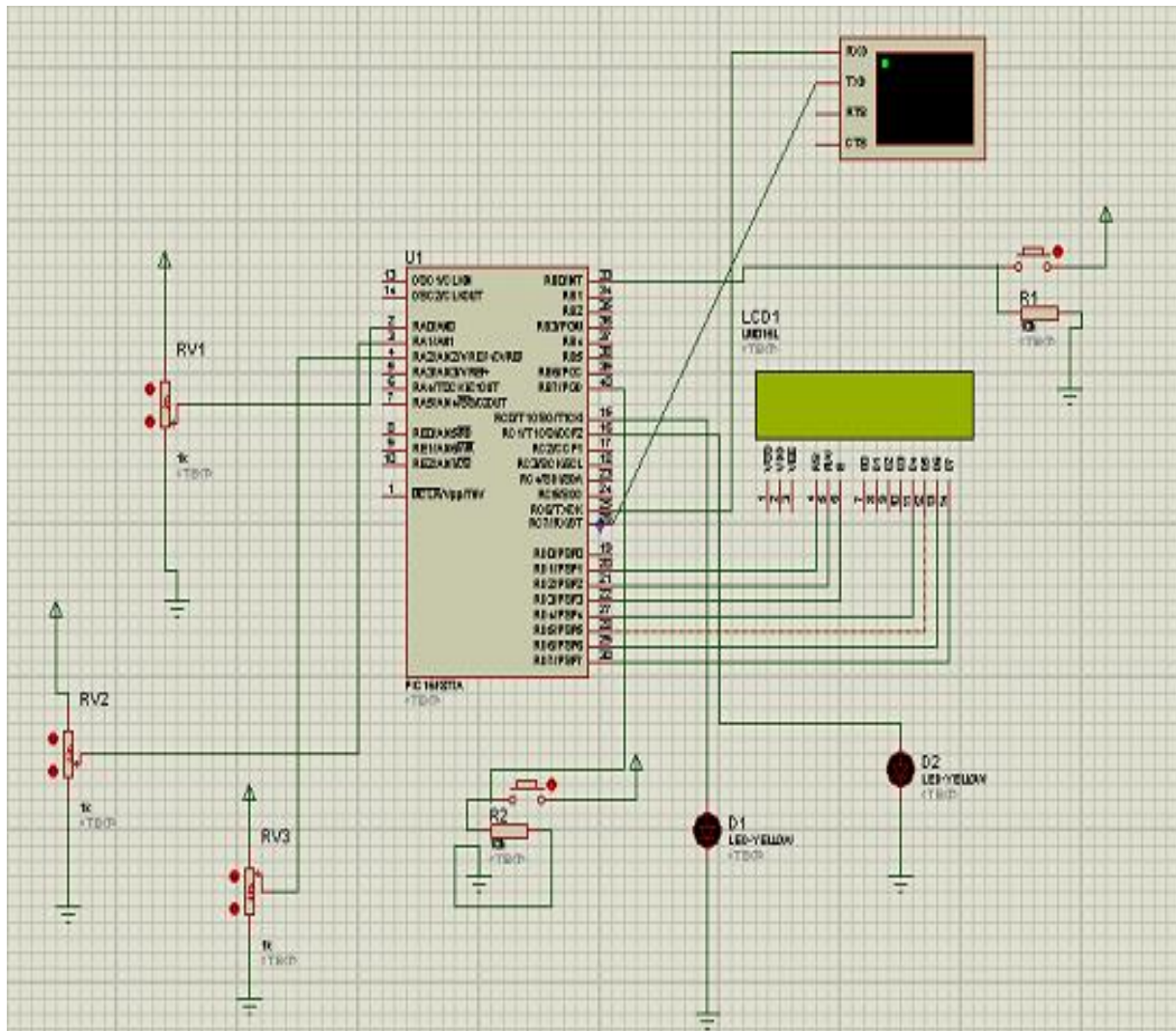
## 6. Circuit Diagram



## 7. Future Work

Autism spectrum disorders embarrassment system will be further enhanced to support more naturalistic combined game play platform. We are now working on scheming the ASD with the haptic edges that is able to produce physical feedback to the user. We expect the haptic ASD system could growth the sense of cooperation between partners. Additionally, extra participants are desired in the future for the user study to evaluate the practical value of the system for children with ASD. In order to determine the influence of the system on the communication capability of the participants, we plan to continue with the analysis of the participants' conversations in terms of the game-oriented content and the social content and perform a statistical investigation of the modification in the content of the conversation.

## 8. Simulation Results



## 9. Conclusion

Technology-assisted systems can provide a quantifiable, customized therapy platform. Directly available frameworks are planned fundamentally to chain learning by means of parts of one's exposition alone confining individualization. System signals that were developed with an acceptable level of precision and thereby confirm the possibility of an anxiety-sensitive system to be used as a social communication skill learning platform for children with autism. This paper presents the expansion and estimation of the Autism spectrum disorders prevention system, which can provide a naturalistic social interface platform for children with ASD and their peers, growth the chances for communication and cooperation within the combined games and collect quantifiable data regarding combined and communicative performance of the participants. The possibility study tested the appropriateness of the system among children with ASD and attained an opening assessment of the system.

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