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Learning Tool for Dyslexia Affected Children

Ashwin K.[1], Shubhangi Maheshwari[2] and Abhishek Mundra[3]

[1]B.tech 20, 2nd Cross St. Venkatraman NGR, Hastinnapuram,Chennai-64
[2]B.tech 308, F-Block, SRM Hostels, Kattankulathur, Chennai-03.
[3]B.tech C301, Kakkan St., Kattankulathur,Chennai-03
E-mail: 1ashwinstringed@gmail.com, 2shubhangi.mahi19@gmail.com, 3mundra95abhi@gmail.com

Abstract—*Dyslexia is a neurological condition that is characterized by difficulties that mainly affect the ability of a child to read and write. In India almost 15% of children are affected by dyslexia . Children are the society of tomorrow and considering that the number is alarming . This special case children are children of normal caliber but due to their limitation to learn and read, due to difference in perception are thus viewed abnormal . This condition is completely curable if treated with proper psychological guidance. The instrument has been engineered to help these special children and help in their learning process. This instrument uses a imaging device that records the stroke pattern performed by the user and verifies with the alphabet or the word that the user pronounces which will be taken in by the microphone . As the verification is done the indication device shows us the correctness of the user's word or spelling. This product can be upgraded with a Bluetooth and connected to a tablet or a smart phone to analyze the results for monitoring.*

1. INTRODUCTION

Dyslexia is a condition which reduces the grasping power in children and thus result in inability to read and write. This condition although is a curable disorder is mostly ignored by the parents and the children are forced to take the burden of inefficiency. This also makes children weak in ordering, sequencing, audio receptive memory, inability to do standards like indicating time, identifying direction and also motor skills. Dyslexia is frequently accompanied by dysgraphia, This makes the child to get hold on writing language and use written language to express thoughts. Children affected by dysgraphia often are found with shabby handwriting. Even if children are diagnosed with dyslexia there are cases of under perfomace because of lack of constant care.

To help the children with the inability to precept alphabets, shapes, numbers and direction this product was developed. As practice makes a man perfect , this embedded tool will help children to practice anywhere. This is kept in mind and the product has been proposed. This is a simple looking instrument which can be carried around .It has the structure of a pen with all the system arranged.

2. LEARNING TOOL

The Learning Tool consists of four main parts namely the audio signal detection system, flow detection section , analyzing section and the display section. The audio sensor receives the input from user. The tool is structured like a pen with a sensor that detects the flow and sends us a feedback. The text processor encodes the stroke and detects the character if the entry is proper. The display unit returns us with a signal corresponding to the correctness of the writing. Now let us look into the hardware in detail.

1. The audio sensing section

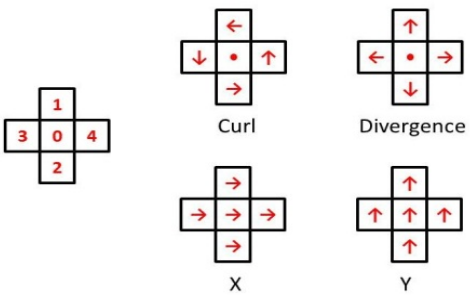
This section uses a (Electet) microphone which is used for receiving data from the user. The response from this sensor is an analog value corresponding to the input and that is converted into Digital signal and observed in the microcontroller. This is stored as the audio input into the memory.

The sensor was selected, since it is compact and gives us very prcice signal for each syllable and is capable of differentiating similar phonics.

2. The flow detection system

This part of the module has a optical flow sensor which essentially records the flow of the body it is integrated with. Its hardware contains a 2-D array arrangement of camera which has an integrated IC inside which gives us the drift in each of the pixel group and hence we can record the waving through the shift in x and y directions which the controller can record it as an alphabet after processing. The below diagrams shows us the recording features of various degrees of freedom.

Once these patterns are combined and the corresponding alphabet is decoded by the controller. This is then sent to the analyzing section of our tool.



3. Analyzing section

The analyzing section matches the audio and optical input and checks for the correctness. The tool uses at mega 2560 microcontroller a 8 bit microcontroller with 256 Kb of memory. This has been previously stirred with all stroke pattern and equivalent audio values. Once the inputs are recorded the values are compared with the database. This requires loading the EEPROM of the controller with required data. Since the chip has 256Kb of memory the data can be stored within the chip and requires no extra memory component. The audio sensor output being analog can be directly read from an analog pin on the controller. This value recorded is again compared with the database data and verified for correctness.

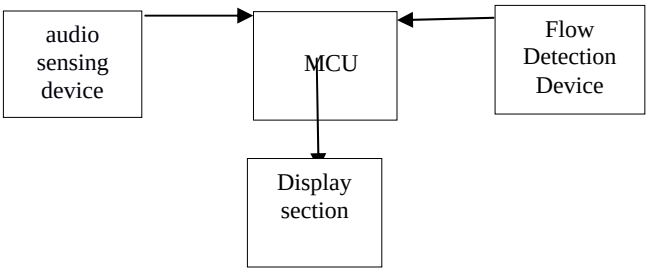
Due to the compact size this controller can be put into small modular design.

4. The display section

The display is an led system that depicts the answer's correctness. Green and red LEDs are connected on the tool for this purpose. Also an UART port output is given through a FTDI chip for serial reading and using it with any IDE. This modular system due to its independent functioning and low power functioning can be used at any place with ease.

3. POWER SYSTEM

This system uses N7000 Battery which provides 5v with a current supply capacity of 1A. Since rechargeable batteries are used the system can be recharged and can be used for the entire battery life without replacing.



4. ACKNOWLEDGEMENTS

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