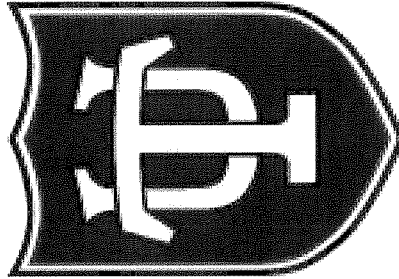


A Speech Therapy Device for Children with Autism.



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OBJECTIVE

We designed an instrument to assist teachers in helping autistic children control their voice level during class.

BACKGROUND

The Chartwell Center in New Orleans educates autistic children, aged 8-12, providing a normal teaching curriculum with the addition of social development due to the disorder.

Teachers had difficulty training the children to maintain a constant speech volume, and a decision for the use of assistive technology was made.

METHOD

Initial design involved a device that provided visual feedback to the student. A column of LEDs that guided the student to the proper voice level was decided upon. After some analysis, a voice activated book light was added to the setup to allow the student to read a book while getting visual feedback without moving his head. Column can be used by the teacher to analyze the student's voice level without looking over the child's shoulder to see the page.

SIGNAL CONVERSION

To provide feedback it is necessary for the device to first convert the audio signal to a visual output. The device must analyze the voice volume after it is picked up by a microphone, remove any background noise, and light up the proper set of LEDs.

Voice level was picked up through a Nady SPC-25 Condenser Microphone, which is in front of the child while he/she is reading a book out loud.

The microphone signal then attached to a circuit made of parts comprised in this order: voltage follower, rectifier, potentiometer, and an LED driver.

Signal is sent to a rectifier to convert from AC to DC, allowing only one set of LEDs to light up for a single voice level.

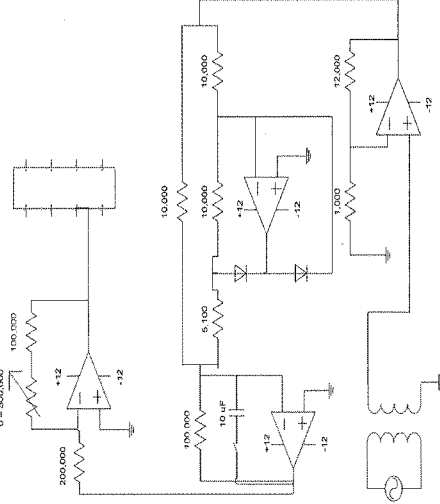


Figure: Circuit Schematic

A potentiometer is put into the circuit to allow the teachers to adjust the resistance in the circuit, allowing control of the desired voice level. This will allow the students to be taught not only a reading volume voice, but anything from whispering to shouting.

The LEDs are controlled by a LM3915 LED Driver, which lights up a certain set of LEDs based upon the decibel level of the voice.

FEEDBACK METHODS

The color of the light that is illuminated on the page will tell the children their speech volume in relation to the desired level, with red and blue being above and below the level, respectively. The children will be able to understand the simple feedback design and adjust their voice to fit in a desired range by a teacher.

DEVICE DESIGN

The book light is a box with a mirror coming out of it that will reflect the light of LEDs coming out of it onto a page. This allows the light to be spread out and cover the page.

The column is a series of LEDs that are arranged in order of the voice level, with higher levels being at the top of the box and lower ones at the bottom. The middle level will be the ideal range at which the child should speak.

The black box, holding the circuit itself, provides two female inputs, a wire connected to the power supply to plug into walls, an on/off switch, and a knob for adjusting the reading level. The teacher can adjust the range by adjusting a knob that is set to a 1-5 scale (1 being the lowest). This will enable the children to learn anything from whisper volume to shouting volume.

The female inputs are 25 pin printer cable inputs, allowing the removal of the book light or the column. The printer cables were bought and then cut in order to access each individual wire so that they could be hooked up to LEDs. The female inputs are connected to the circuit itself.

EVALUTION STRATEGY

The device was tested on Tulane students. Tulane Faculty member input was also given to the designers, after which we will change any small issues that the teachers might find.

ACKNOWLEDGEMENTS

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