LASER HARP AID IN AUDITORY DISCRIMINATION

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Abstract: This work aims to assist in the interaction between patient and therapist in sound discrimination using a sound object without strings, which is instigating, through optical light beams in the shape of a 3D printed harp, which when played each beam will emit a musical note, already programmed and inserted into the Arduino, so that the child does not perceive it visually, but their fingers will produce the sound as they pass. This innovative instrument will be able to help in day care centers and schools in the future as a new resource allied to teaching and skills, easy to handle and for children with other disabilities can be stimulated in terms of motor coordination, auditory and tactile perception.

Keywords: Invisible, Light beams, Perception.

INTRODUCTION

We started a research on the use of Robotics as a supporting tool in therapies and its use in children with hearing loss, autism and other disabilities, that is, robotics that help in child development and rehabilitation, in our research we found a Portuguese Laser Harp (Figure 1), created by Nuno Santos and Rui Antunes, based on this great innovation, we realized that it would be very useful. Auditory discrimination consists in discriminating two or more stimuli, saying whether they are the same or not. In other words, it is the ability to perceive the similarity or difference between sounds.

Among the initiatives that reinforce the interaction proposal is the Robotics-Autism project, from Portugal. Since 2008, the technique has been studied by the group formed between the University of Minho and the Portuguese Association of Parents and Friends of Mentally Deficient Citizens. With the help of several robot models, the researchers created activities that

they develop social skills and help with learning. While some children showed visible learning, others showed progress in keeping eye contact with the therapists or just in the time spent in the proposed activity.
Auditory perception refers to the process of constructing the mental representation caused by a sound stimulus, from mere noise to music and speech complexity. The term hearing refers to the sense, that is, the physiological ability to receive sound from the environment to our nervous system as input.

The project goal

The project seeks to provide a very specific view of educational robotics (Figure 2) as a tool to assist the teacher and/or therapist who will use it in the classroom or in service offices: – identify and discriminate the sounds of the Laser Harp – identify the sound by touching the invisible beam

MATERIALS AND METHODS

The material used was selected for the programming using Tinkercad necessary for the use of invisible beams activated by touch, promoting the sound of a musical note (Figure 3).
o 08 laser diodes
the 08 LDR
the 01 Arduino One
the 01 Buzzer
o 01 Foam Board board (feather paper) white color
the Jumpers
o Pieces made in 3D printing: corners of the harp structure. Consumption: 50g PLA filament. Time: 60 minutes.

The parts of the Harp were elaborated using the 3D printer, they were printed in the printer model ENDER3 - CREALITY manufacturer, using 1.75mm thick PLA filaments.

Figura 1 Harpa Laser Portuguesa criada por Nuno Santos e Rui Antunes

Laser harp aiding in auditory discrimination. One of the benefits of Tinkercad The program offers video tutorials and support, however, all in English.

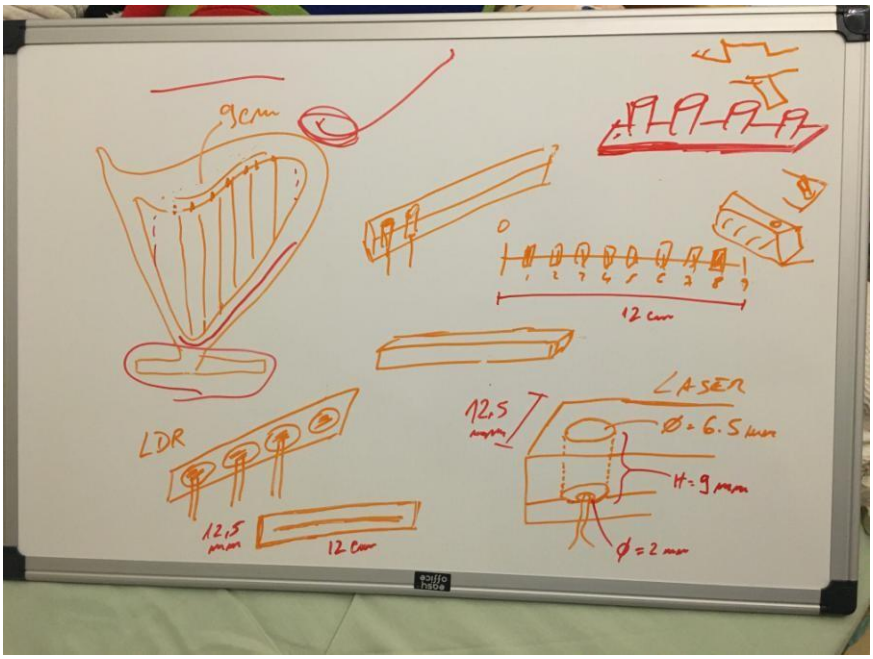

Figura 2- Estruturação, análise e criação da Harpa para ser impressa

Figura 3 - Peças impressas e um tubo de papel reciclando

RESULTS AND DISCUSSION

The first 5-year-old patient, diagnosed with hyperactivity, it was observed that the patient was more perceptive, calm and smiling, curious, interacted and was surprised because the light beam was invisible, but the sound was produced by touch. A unique opportunity. In this case some musical notes were higher and this didn't bother him.

The second 7-year-old patient, diagnosed with Autism and Severe Hearing Loss, using a hearing aid, was observed that the sound attracted more attention, had great difficulty in performing the movements, his coordination is still under development and he was curious about the empty space that produced sound when touched, performed the movements with all fingers and produced a different sound, arousing interest, comparing the sound when using a finger when sliding.

In general, it can be considered that the activities carried out during the development of this robotics project enabled a great learning experience for everyone, the interaction with the Harp and the desire to always improve, overcoming major challenges. Hearing impaired children require more sound stimuli and this instrument was very important showing that Robotics with this project is an inclusive way.

CONCLUSIONS

There were many difficulties encountered, such as errors in programming for the buzzer, adequacy of musical notes and timbres that could not exceed decebels. However, with great creativity and determination Felipe always tried to find solutions to our problems.

We hope that we can interact with other professionals to exchange experiences, thus obtaining greater learning and improvement in the use of robotics in the area of rehabilitation, inclusion of children and adolescents with intellectual and hearing disabilities.

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