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Abstract. This paper presents a way to perform playback (speech simulation). The robot will imitate a person speaking. Taking the sounds from the speaker is done using a microphone or from a player device who has a recorded speech. A microcontroller circuit will analyze the sound level and command, through an amplifier circuit, the motor that acts on the robot's mouth

Keywords: speech simulation, microphone, analyze, sound level, robot, mouth..

1. Introduction

In the last decades, robotics have developed a lot, with one of the most dynamic evolutions. Now robotics play an important role in our lives. New types of robots have been created and existing types have developed.

Thus, robotics has entered into all fields and is active in everyday life. There is virtually no area in which robotics, elements or knowledge about robotics are not used. The following areas of use of robots are listed:

• Industry (to achieve various technological functions: assembly, painting, welding, drilling, etc.)

• Services (used as aids in educating or raising children, for the disabled, as help for the elderly or the locomotor problems)

• Agriculture (used for preparation, maintenance and harvesting of agricultural crops)

• Medicine (used for surgery for their precision, treating patients with certain conditions, in nanomedicine and monitoring patients)

• Culture (to provide information about artworks in museums, vernisies, exhibitions, teach people to sing or dance)

• Music (robots can be used as sound processing equipment)

• Entertainment (the robots can participate with people at different games).

• Education (robots can be used to their study or to do study / research with their help).

2. Problem Formulation

Virtually any robot can be considered a study object, to be analyzed, studied, and improved. Therefore, in this paper, we study the following structure that can be considered a biomimetic robotic structure. It's Scary Terry Talking Skull [1]. This structure was bought as a kit, which contains the following elements, as in figure 1 [2]:

• A skull with a mobile jaw to simulate speech (hence the name of the speaking skull)

• A servo motor that acts on the jaw to facilitate closing and opening the mouth

• A board development with the simple and inexpensive circuits that does not require programming like a microcontroller

• Two LEDs
• An audio cable between the board and a player audio device.

Fig. 1.

The development board type ST 400 [3] is shown schematically in figure 2 and has the following features:
• a line audio input
• a line audio output
• an output for connecting the actuator acting on the jaw
• the possibility of the adjusts the sound level and sensitivity of the jaw movement.
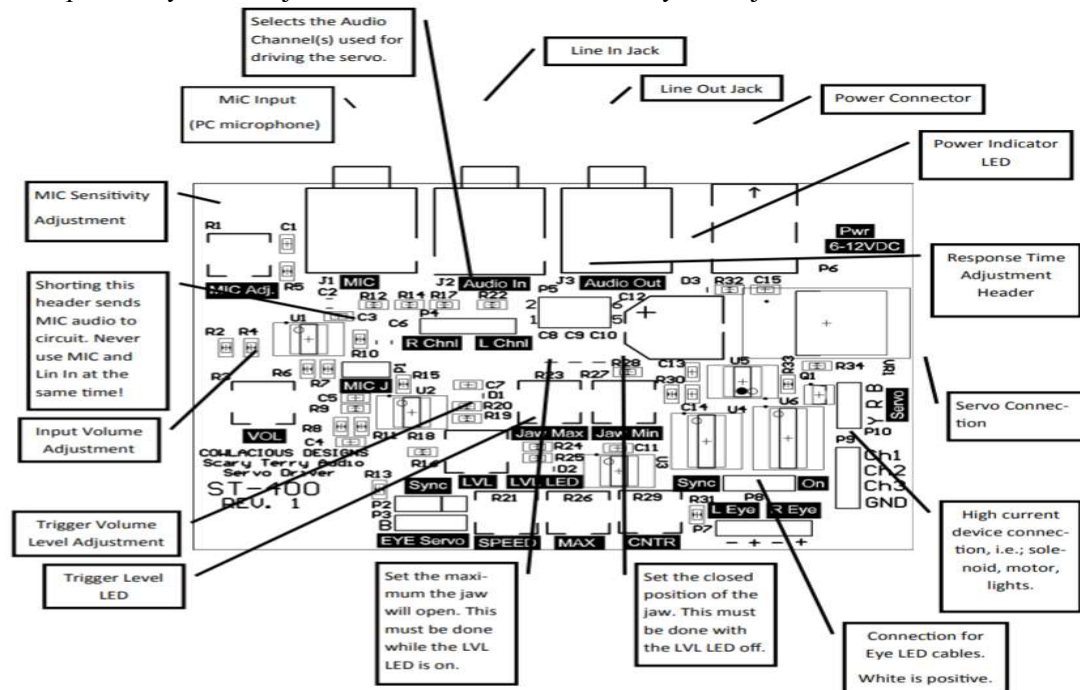

Fig. 2.

It is desirable to replace the ST 400 control board with a circuit that offers, besides the jaw movement, a number of features, for example controlling the left-right movement of the skull, as well as controlling the up-down movement by mounting additional of some mechanisms and servomotors (if it mounting yet a mechanism and a servomotor can move and the eyes, which in turn must be added).

3. Problem Solution

In order to achieve the above, an ARDUINO UNO development board is used, to which an Audio Shield for Arduino UNO (compatible with ARDUINO UNO) which allows connection an audio input (fig.3) [4] [5].

To the ARDUINO UNO board also connects 3 potentiometers for:
• PotVol to adjust the volume of the audio signal
• PotJaw for adjusting jaw movements (servomotor)
• PotServo for adjusting the positioning / positioning of the servomotor.
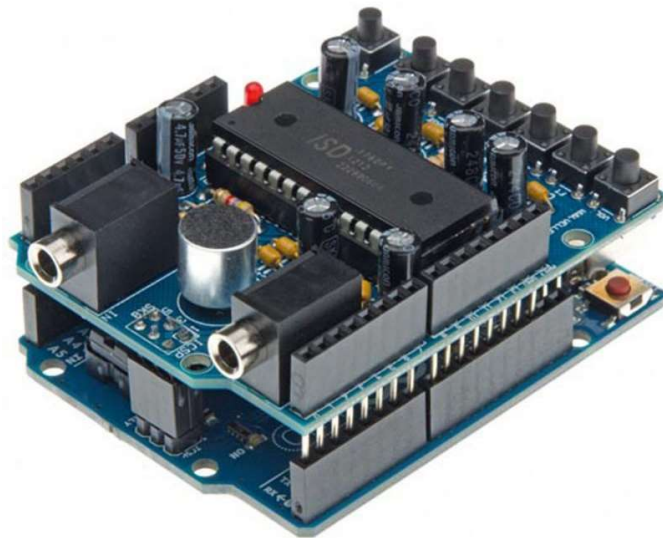

Fig. 3.

With PotVol, the audio signal level is changed, depending on listening preferences. The signal obtained after the change with PotVol is compared to a reference value established by PotJaw. The jaw moves proportionally to the difference between the audio signal and the reference value. PotServ allows for presetting on the positioning of the servomotor (in the resting position, the jaw can be preset to be closed or in an intermediate position - half-open). Positioning and obtaining the optimum potentiometers value requires some experience. If not properly adjusted, the jaw may always be closed or open all the time.

In addition, to ARDUINO it connects three servomotors (one for jaw movement, the other for left-right skull movement and third for up-and-down movement), outputs assigned as PWM outputs, and two LEDs that signify the eyes (these LEDs can be programmed to quench for a short time, to give the blinking sensation).

The ARDUINO compatible audio board has the following features:
- has an audio input line and audio output line
- has microphone and speaker output
- has several function buttons to play, scroll, record, volume, erase: FWD, PLAY, REC, VOL, and RESET.
- It can record for 60 seconds an audio signal.

The Talking Skull structure has the ability to play after a recorded audio file or a sound file received from another audio player device.

There is also another sound board that can be used, for example SoundDuino, Arduino compatible. This audio board can record or play larger audio files on or from a memory card [6], [7], [8].

Conclusions

This structure, which can also be called biomimetic structure because it mimics how to do playback. It is an object of teaching, which can be used for amusement also, for example of Halloween. Even if the structure looks simple, the possibilities of study and control can be extended by commanding several servomotors that provide the movements close human movements during playback, such as: jaw movement, left-right and downward movements of the skull, or the command of the LEDs, attached to the eyes, which are quenched for a few seconds, giving a blinking sensation.

References

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