

Aharon Sebtton

Dr. Ferat Sahin

Principals of Robotics

27 October 2021

Final Project Proposal

Problem Statement

I would like to modify a hexapod (preferably with three degrees of freedom per leg instead of two) to listen for music being played. The hexapod will turn to face the source of the music being played, move towards it if it is more than a few yards away, determine the tempo of the music in BPM (beats per minute), and then dance to the music.

Hardware Solution

The only additional hardware I will need is four Adafruit ID 1063 electret microphones (one to mount on each side of the hexapod's main body frame), four 100 uF capacitors for the case of AC coupled audio, a spool of wire, and a small breadboard or protoboard. For the hardware to be mounted to the hexapod properly, some simple casings/mounting brackets can be designed and 3D printed to attach to the hexapod.

Software Solution

The entire software solution can be implemented in one C++ file. I already have written code to control the movement of a mobile robot based on the volume of the audio being played. This code was written for the MABL Bot in Robotic Systems, so it will need to be updated for a hexapod rather than a wheeled robot, but the general structure is there. Data from the ultrasonic sensor, combined with data from the microphones, can determine whether audio is being played quietly from a nearby object, or being played louder from an object that is further away. The robot will be instructed to move closer to the audio source in the latter case. Open source software solutions are also available online for following audio sources and for calculating the tempo of a song in beats per minute (BPM), which can be used to dictate the rate at which the hexapod performs its dancing routine.

