Politecnico di Milano
School of Industrial and Information Engineering

Computer Music – Languages and Systems

Homework #3

Hollow Hearts

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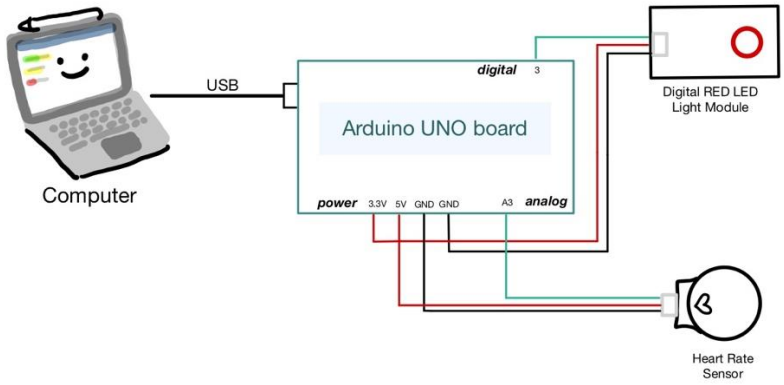
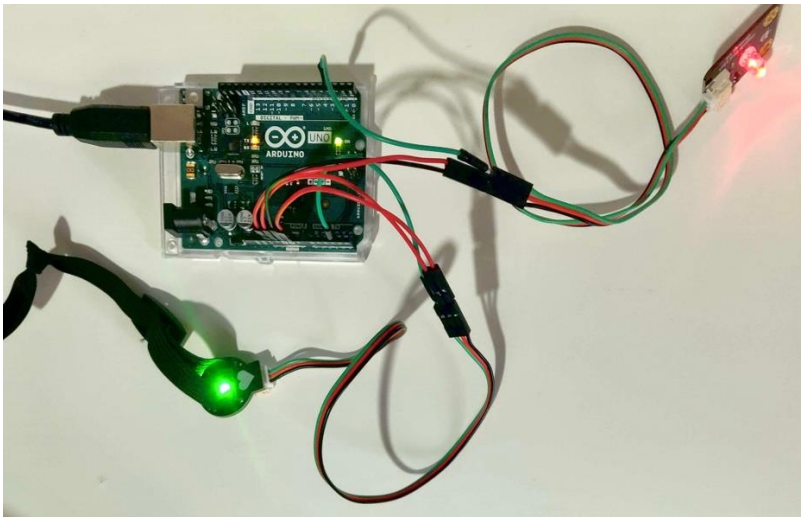
Introduction

Hollow Hearts is an interactive horror experience generator. The application reads your heartbeat and generates ambient music accordingly. The heartbeat is read through the DFRobot Heart Rate Sensor with Gravity Interface, and it is sent to Arduino UNO. Through the Arduino IDE we upload the script that reads the heartbeat, flashes the Gravity Digital RED LED Light Module and sends signals through serial communication.

Sensors and connections

The sensors are connected to Arduino board with physical cables, the Heart Rate Sensor is connected to Analog Port 3 and the Digital RED LED to Digital Port 3. Arduino is connected to the computer through USB, and through serial communication the signals are sent to Super Collider.





Implementation
The application has three possible scenarios: Haunted House, Scary Forest and Abandoned Church. Each scenario has some characterizing sounds that are played on a tempo based on the heartbeat. Independently from the scenarios heartbeat plays constantly.

The program at every heartbeat checks whether a specific sound is supposed to play based on the time instant, the scenario and some randomization. The frequency is chosen from notes that belong to the A Harmonic minor scale, and after some time it modulates to another harmonic minor scale.
The chosen amplitude is meant to keep a balanced mix. There is also some randomization on the pan.

Haunted House

The characterizing sounds chosen are:
- flute and violin, instruments commonly found in houses but used to create unnerving drone sounds;
- glass-like synth, a sharp almost percussive synth to which we added a delay based on the heartbeat bpm;
- carillon, the most common creepy house ambience sound.

Scary Forest

The characterizing sounds chosen are:

- wind/watery pad, creating a strong underlying ambience;
- sub bass, based on the Moog bass, but with a delay controlled by the bpm, it cements the tribal pulse;
- tribal percussion, creating a more suggestive ambience.

Abandoned Church

The characterizing sounds chosen are:

- bells, with a strike harmonic controlled by the bpm;
- organ, modulated with a pulse whose width is controlled by the bpm;
- harpsichord, to give the feeling of an ancient church.

Samples
For each scenario we chose a few samples that are played sparsely and randomly.
For the Haunted House we added a door and steps samples.
For the Scary Forest we added a wolf howl, a rising wind and two different steps samples.
For the Abandoned Church we added the sound of chains sliding on the floor and a deep choir. We added a lot of reverb in both of those samples to maintain the cathedral ambience.

GUI

The user is able to follow their heartbeat thanks to the red halo on the GUI that pulses on beat with the received signal.

The GUI is characterized by some buttons that allow the user to choose the scenario and a "*Run Away*" button to go back to the intro scene. In each scenario there are also three volume sliders that allow to change the volume of the characterizing sounds.

Conclusions and possible uses

The idea of this application can be used to enhance the experience in several different fields: the most immediate one is in horror videogames; with a market that pushes an immersive tool such as VR, a heart rate sensor and its possible real time use is not a farfetched idea. And can surely be used positively. A bit more unlikely but still an interesting possibility is the use in movie and audio books audio design.

All these ideas are made more interesting by the properties of human perception: we naturally tend to gravitate towards a heartbeat that matches the experience we are having. Adapting the experience to the heartbeat is a natural step in following the user's emotions.