Fall 2022

COSC 4P98 Computer Media and Digital Audio: Project

Due: TBA (end of term in December).

Hand in...

- Electronic copy of report, source code, compiled application, data. It can be submitted online.
- Signed department cover page.
- For group projects (maximum 2 per group): Group cover page, and a listing that indicates the project tasks completed by each group member. It is expected that group projects should be complex enough to require two people's efforts.
- When necessary, I may require demonstrations of some projects.

Description

- The course project involves a topic from computer media and digital audio.
- Audio and music is an intrinsic and central focus of the project. Graphics-themed projects are not appropriate, unless it supports the audio/music application.
- It can be done by yourself or in a group of two, depending on project topic.
- Projects require a programmed implementation, as well as a written report.
- You should pass your project idea by me beforehand.
- Do not leave it too late!

Possible ideas

There is a huge range of different projects that can be done for this course. Computer media and digital audio are extremely active areas these days. It is a Golden Age for making highly sophisticated and creative applications on a variety of cutting-edge hardware and software platforms. In past years, students have done many unique and interesting projects, and a selection of them can be viewed on the 4P98 web site.

Audio or music must be a primary focus of the system. A project may take ideas given during the lectures, and pursue them further. Here are some examples of potential topics. Please talk to me if you want more ideas, need more information, or have your own ideas that you'd like to run by me.

1. **VST plug-in:** It might be a MIDI-enabled instrument or audio effect. It should include its own GUI skin. It should be programmed. Note that JUCE is a popular programming environment for music and audio applications. VST editors like Flowstone are discouraged (talk to me first!).

2. **Music player visualization**: Some music applications (Windows Media Player, and others) support visualization plug-ins. These produce graphical animations that react in real-time to the music. You can implement a visualization plug-in for such an application. However, please do not use any high-level scripting. Please talk to me to confirm that your plug-in idea will be suitable.

3. **Processing application**: Write a computer media application in Processing and Beads. This may be a visualization app, a composition tool, or an audio processing app.

4. **Arduino or Raspberry pi application**: Make a stand-alone application on the Arduino (or Rasp pi) platform. This could be a computer media installation, that may involve audio, graphics, and interaction with the outside world (physical sensors, camera, video, internet, Wii controllers, Kinect, robotics...). If you choose this kind of application, you will need to purchase your own hardware. Arduino and Raspberry pi are cheap!

5. **AI Application**: Derive an AI-based application, using a GA, PSO, ANN, or others. You might analyze audio, compose music, or generate sound.

6. **Hardware**: Create a hardware controller for music and audio. This should interface with a host computer/application. This could be similar to the Arduino topic above, but implemented on Windows, Linux, or Mac OS.

7. **Misc app:** Some other application in music or audio written in C, C++, Java, Python, etc.. It could be for Windows, Mac OS, Linux, iOS, or Android.

Topic selection: Although graphics may also be involved in your project, it should not be a "graphics project" (ie. computer game engine, rendering algorithm, image processing, computer animation, etc.). Music compositions (Csound or other system) are not considered appropriate project topics, unless they involve some fundamental technology that you have created (synthesis algorithm, audio processing tool, ...). Feel free to talk to me if you have any questions about your ideas for a project.

Report

A portion of your grade will be based on your project report. It is important that you discuss your system, and document the sources of all your ideas. This includes algorithms, formulas, techniques, inspiration for your own ideas, borrowed libraries, etc. All these documented ideas should include a citation to the source (journal, conference, book, web site, …).

The report will describe all the technical aspects of your project, including the following:

- Description of the application.
- Background information of the technical foundations for the application, for example, mathematical and theoretical basis, algorithm details, efficiency, etc.
- Implementation details: architecture, design decisions, etc.
- Experiment details as appropriate, say for an AI-themed application.
- User manual: how to use your application.
- Bibliography: You should include a **complete** list of references to all the resources used during the course of your project. This may include web sites, support libraries, journals, books, SDK tutorials, and other systems.