ATHENS UNIVERSITY OF ECONOMICS AND BUSINESS
DEPARTMENT OF INFORMATICS

Multimedia Technology

7th Semester Undergraduate Option
Fall Semester, 2024-2025

Project Topics

Topic Selection Deadline: October 29, 2024, via e-class. But, the sooner, the better.

Delivery Deadline: January 10, 2025, via eclass. There will be no extension, as the projects need to be presented in class during the final week of classes.

Suggested Topics: The following topics are suggested, grouped based on the technologies and tools used. You can suggest your own topic, but you must explain how it relates to multimedia technology and get it approved by the instructor.

A. Analog synthesizer using Jsyn

You will implement an application that will generate sound waves from oscillators and apply filters to them; this is called subtractive audio synthesis. User interaction will take place via a graphical interface with the appropriate controls for the oscillators (e.g. square wave, sine wave, saw tooth wave) and filters (e.g. VCF, VCO, LFO, ADSR envelope) supported by your synthesizer. You can emphasize either performance, in which case it makes sense to implement some form of musical input (on-screen keyboard or MIDI connection to external keyboards) and some form of memory (sequencer), or sound creation, in which case it makes sense to allow modifying the controls (and even the sequence of components) while a fixed note is being generated. Jsyn is an audio synthesis library for Java that provides all the tools you need for synthesis, but you need to create most of the rest yourself, using Java.

Resources

- Subtractive Synthesis
    - https://en.wikipedia.org/wiki/Synthesizer
    - https://en.wikipedia.org/wiki/Subtractive_synthesis
- Jsyn
    - http://www.softsynth.com/jsyn/
    - http://www.softsynth.com/jsyn/examples/index.php

B. Drum machine using Web Audio

You will implement an application that will enable the user to create and play beats using percussion/drum sounds. User interaction will take place through a graphical interface that will contain the appropriate control functions for selecting the sounds, arranging them in a sequence and playing them back, possibly adjusting the tempo. You can follow either the classic drum machine of the TR - 808 that adds one sound at a time, or take Shiny Drum Machine's approach (see resources) that exploits the entire application window. You can create your own sounds or use ready-made samples. WebAudio is a browser based API, so it is suitable for programming in JavaScript. The demo (see resources) is quite complete, so you need to consider what you can do differently or how to extend it.

Resources

- http://www.w3.org/TR/webaudio/
- https://googlechromelabs.github.io/web-audio-samples/demos/shiny-drum-machine/
- https://en.wikipedia.org/wiki/Roland_TR-808

C. Game using p5.js

You will implement a game using the features of the p5.js library for image, sound and graphics. One approach is to implement a platform game with a user-controlled character (see demo below), as it will give you the opportunity to learn several game development techniques. A platform game can include either multiple levels of one screen each, or screen scrolling as the character moves, movement of the character and screen scrolling, control of collisions between the character and the objects, autonomously moving enemies, sound effects on collisions and background music. p5.js is a variant of Processing (a Java library) for use with JavaScript in a browser or in node.js.

Resources

- https://p5js.org/
- https://workshops.hackclub.com/platformer/

D. Game using Godot

You will implement a game using the capabilities of the Godot game engine. In the getting started tutorial (see below) there are two simple examples to get you started (2D and 3D). Godot is extremely powerful, allowing you to create very different types of games, but it is also quite complex and takes some time to master. Godot is an open-source project, rather than a commercial product, but it has excellent documentation and tutorials. Godot can be programmed in GDScript (a language built specifically for Godot) or in C#.

Πηγές

- https://docs.godotengine.org/en/stable/index.html
- https://docs.godotengine.org/en/stable/getting_started/first_2d_game/index.html
- https://docs.godotengine.org/en/stable/getting_started/first_3d_game/index.html

Topic Selection Procedure: Project groups should consist of 1 to 4 people, depending on the complexity and objectives of the project. Each group must upload a file with its members (name and student registration number) and a description of its project plan via eclass (in the Topic Selection 2024-2025 Assignment) before the deadline. You can refine the topics mentioned above (including the tools used), or even propose your own topic, as long as it is within the context of Multimedia Technology. After you upload the topic, we will send you feedback (e.g., the topic is too hard for 3 people, or too easy for 4 people, or unrelated to Multimedia Technology) so that you may settle on a project that is ambitious but manageable.

Deliverables

- Your project files in source format, allowing it to be compiled by us (if they are too large, you can provide a link to OneDrive or GoogleDrive). Do NOT just upload a binary.
- A project report in PDF, including:
  ◦ Installation instructions for your development environment and your runtime environment (what is needed to compile and run the project).
  ◦ A list of all the external packages, libraries or assets used by your project and why they are needed (for example, node.js packages, Godot Assets, etc.).
  ◦ User instructions (brief usage scenarios) and compatibility restrictions (e.g., browser or server required).
  ◦ Each team member's contribution to the project.
  ◦ High-level documentation of your software.
  ◦ A list of existing software resources used (libraries, browser, etc.)
  ◦ A list of other resources used (books, articles, magazines, or links to websites).
  ◦ A brief description of the problems that you encountered and how they were resolved.

Your project and report will be contained in a zip file, named with the registration number of all team members, e.g., 3210xxx_3200yyy_3220zzz.zip which you upload before the deadline to eclass, using the assignments tool. All projects will be presented and examined as part of the course, in the last week of the lectures/tutorials, so no deadline extensions can be provided.