Final Project

Handed out: Monday, 27 March 2023
Proposals Due: before midnight on Wednesday, 5 April 2023
Report and Video Due: Friday, 5 May 2023
Description:

The topic of the final project for Music and Audio Programming is up to you. Your general task is to create a real-time signal processing system, probably, but not necessarily, based on audio processing, using the Bela platform. The requirements are as follows:

1. A significant, original individual project written in C or C++ on Bela

2. The project must run in real time and involve some degree of signal processing (audio or other). A good test of whether your project involves suitable signal processing is whether you would be able to write a mathematical analysis of its operation, e.g. in the time or frequency domain. All features must be accessible without recompiling the code - use either hardware or command line functionality. You will submit only 1 project (i.e. only one render.cpp plus any additional files).

3. The final deliverables include your code, a 7-9 page report and a demonstration video.

You may want to incorporate hardware (sensors, LEDs, etc.) using the GPIO capabilities of the Bela board, but purely software-based projects are also fine. Please contact the teaching staff well in advance if you know you will have any special or extensive (i.e. expensive) hardware requirements; these will need to be approved in advance.

Proposal:

The proposal is a **required** part of the project. You should submit [via qmplus](#) a 2-3 paragraph summary of your intended project topic. State briefly what you want to create and what tools you will use to create it. Also identify any areas that you will need to explore further before you are able to implement your project.

The purpose of the proposal is to set a specific direction for the completion of the project, and to encourage you to anticipate any theoretical or technical challenges.

We expect the actual project may drift a bit from what was proposed, but unless you receive prior approval from the teaching staff, we will expect you to implement what you proposed. Therefore, please take the proposal process seriously and gave careful thought to what you want to do. On the other hand, marking will be based on the overall quality of the work, not on whether not you achieved every objective in your proposal, so don't deliberately hold back on your ideas. It's better to be more ambitious and detailed!

Your final submission should consist of the following:

1. Your **source code**. All .cpp and .h files that you edit or create for the project including render.cpp.
   - Don't forget to comment your code! Uncommented or illegible code will receive a reduced mark.
   - Please submit a zip file containing your source code and your report via QMPlus.

2. A **report (PDF format) of around 7-9 pages** (indicative length). Include the following information (though your report does not have to be structured in this way):
   - Describing your design process.
   - Details of your implementation.
   - Figures or diagrams as relevant: e.g. wiring diagrams, block diagrams of operation
   - Cite your sources! Any code or designs found to come from another source without attribution will be treated as a case of plagiarism, and may be referred to the university for further action. Use the Harvard Style for citations.
   - The following section headings are suggested, but not required:
     - Title & Abstract
     - Introduction and Background (including relevant previous work)
     - Design (description of what you have created, with figures)
     - Evaluation (demonstrate that your project works, and evaluate its performance)
     - Conclusion

3. **Demonstration video** of your project in action. Show the main features of your project, where possible with narration or text titles to explain what the video shows. Ideally, make this video of a form that you would be happy to share to publicise your project (although the teaching staff will not post any materials publicly). *You might need to connect a speaker to Bela to record the audio output. The Bela board can drive 8 ohm speakers directly if it is powered from the circular barrel jack, or you could use an external amplified speaker. Please contact Andrew or Adan if you have any trouble gaining access to a speaker.*

Marking Criteria:

The final project is worth 50% of your module mark. Marking will be based on the following considerations: