Antescofo: Project Title

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First, introduce project and how to create motivation to learn. Second, derive objectives and tasks Third, cover material to enable learning what it takes to achieve the objectives Finally, wrap up, and thats it

1. Foreword

Writing this report is part of the requirements of [CLASSNAME] intended to make students think about combining different topics of education through a single common property: the use of computers.

Say here, that this is important because...

The goal is to propose a hypothetical project. (to learn this and that)

The cool thing here: this project has actually happened. The drawback: it is no longer a hypothetical project and therefore, kind of, contradicts the goal of thinking about: "How would I plan and lead that project?" Nevertheless, we did plan the project in advance as much as possible and clearly state any changes we have applied to *the plan* during the project. Still, we have improvised a lot, e.g., making up on-demand mini lectures on the fly. The interested reader might wonder if improvisation further contradicts the idea of planning and describing a hypothetical project. We don't think so! A teachers ability to adapt to individual student's knowledge, needs, and interests is, in our opinion, a key quality to have in the educational business.

Our goal with this report is simple. We want to enable others to repeat the project under similar circumstances. The goal of the project itself is to enable students to perform similar tasks in the future on their own. The students achieved a great result which can be viewed at `https://youtu.be/a_AVsBpvBVo`

2. Background of the Project

The Computational Systems Group Salzburg is involved in a research project on Antescofo, a real-time multimedia system, developed by IRCAM, Paris. Antescofo is a complex piece of software used to accompany musicians and orchestras on the stage. It is used at various concert halls throughout the world, including the Festspielhaus in Salzburg. We have recently submitted a research proposal with IRCAM on advancing the real-time aspects of Antescofo for embedded devices.

Internship: The task of the students within this internship is to setup, use, and so performance analysis of Antescofo. Some of the challenges of Antescofo are scalability, as well as proper modeling of time, topics that our research group has expertise on. The students are expected to get Antescofo running in a lab environment, demonstrate simple use with an actual instrument, and isolate performance issues that motivate our research). This internship project will be a valuable kick-off for our research on enhancing the real-time aspects of Antescofo.

Assets for the students: experience working on a highly sophisticated software system; get acquainted with technical issues of setting up a system; experience with performance analysis and with research on real-time aspects of computing; fun with music and complex software.

3. An Interdisciplinary Project

The goal of this report is to describe an interdisciplinary project and introduce software that aids the education in each discipline. We believe that, in fact, every project is interdisciplinary in one way or another, even if it is

not obvious on first sight. In our case, however, it is very easy to map certain parts of the project to three school subjects. First of all we have computer science. Working with Antescofo requires programming a computer. The students even have to learn a distinct programming language, called Pure Data. Secondly, there is music education. The students need to understand what they write in their programs so reading and writing a musical score is a requirement for this project. There are plenty of software tools that aid musician in working with musical scores. We choose MuseScore, an open-source musical score editor. Thirdly and finally we have media art. One project goal is presenting the result of project, a piece of music, to an audience and since *video killed the radio star* we produce a music video with iMovie that ships with OSX. There was, in fact, more software involved in the final result but we skip detailed descriptions of all tools for brevity.

Did you do anything related already? What? How? Any Problems? Anything you want to know? How can it be useful for you? What were your motives?

From that we hope to cause an initial motivation of the students. During the class we did THIS AND THAT to keep them motivated.

3.1 Motivation of the Students

Making music with computers. Make them curious in the project! Facilitate learning.

The initial goal of the project was evaluating real-time constraints of Antescofo. However, in an early stage of preparing the project it became clear that this goal was way too challenging for high-school students without the required background in real-time systems. Therefore, we changed the scope from a technical evaluation of the software to an exploration of its artistic capabilities. We set a new objective: Having fun in the creative process of making music with computers.

It is important to motivate the students to spend a lot of time learning to handle a complex piece of software. Antescofo is designed to be used by professionals in either (or both) computer science and composition. The technical documentation of Antescofo is hard to read and understand for non computer scientists and therefore it is important to make the students understand that it is possible to achieve the project goal. Fortunately, there exist a number of examples of the application of Antescofo in an artistic context on youtube.

3.2 Take four teenagers and make them a Team

This project is a group project. So the first thing we need to successfully realize that project is making a team out of four students from different educational backgrounds. Usually, in the context of a class room, the students already know each other and, in the best case, teachers know the students as well. In our project, this was not the case. The students did not know each other beforehand and the instructor did not know them either so we had to spend some time on getting the initial shyness out of the way. In such a case it is necessary to getting to know each other up to a level where communicating about project related topics is no longer negatively effected by personal insecurities. The instructor is responsible for setting up a safe environment where thoughts can be shared without judgment and stereotypes related to the students background, gender, personal interests, etc.

We managed to build an effective Team with 4 students from three different schools. It should be even simpler with students from the same school or even the same class. Still, as we shall learn from actually doing the project, we could exploit the differences among the students by assigning different tasks according to individual strengths and interests. A challenging but rewarding effort! This is how we planned it, and also how we did it in the end.

We started by having the students introduce themselves, effectively becoming part of the group. They had to answer to four questions: What's your name? Tell us about your school? What would you like to learn in this project? Anything you like to do besides music, like, hobbies? Note that the instructor answered to the same questions as well. We planned to take particular interest in the answers to question 3. However, the students could not really come up with specific things they wanted to take out of the project. This led us to the conclusion that the initial description of the project's objectives was either too technical, too abstract, or simply not interesting enough. However, after the project was finished, we gladly realized that boredom was not the

case. While writing this report, we figure that we should have asked the students for their reason to not having any specific questions in the beginning.

After the initial introduction and a more detailed description of the project objectives, we left the students on their own to discuss any ideas they might have in mind. We asked them to discuss, if they wanted to, their musical socialization, what they like to listen to, how they did come to playing and making music, and so on. The result of the student's brainstorming session was included in our project goals described in Section 4. The interested reader will notice quite significant changes to the initial project goals highlighted in Section 2.

3.3 Environment

Enabling the students to learn on their own requires putting them in a proper environment. Building a group creates a social environment but it is also important to create the right spacial environment. For this project the requirements for the teaching and learning space are obvious. We need to be able to listen to and play music without disturbing others. We need basic equipment to record music and to shoot video scenes. We need computers running the required software and Internet access for research purposes. In other words: we need a studio. So we built one! We exclusively reserved a seminar room and provided very basic, yet functioning audio and video equipment, i.e., a mixing console, microphones, a video camera, Apple laptops (may be adapted when using different software products). The students provided their own instruments.

4. Objectives

This section describes the tasks we assign to the students.

4.1 Setting the project goals

We decided to let the students decide on their own what music they wanted to use for the project. c.f. Hubwieser: Entscheidungssituationen schaffen

4.2 Refinement of Objectives

Refine from abstract vision to concrete manageable tasks.

5. Course Material

Teaching Art [1]

The tools and how to use them.

We want to enable the students to find their own answers in the materials we provide. Therefore, selecting the material is done with one thought in mind: "Does the material fit the students?"

This section gives a high level introduction to the software products used in this projects.

Each subsection gives a high level overview of the software tool and also introduces teaching material required in class.

Additional sources. We encourage the students to find their own answers. "Did you google it?" The students then explain their findings to the instructor and apply their new knowledge under supervision.

5.1 Teaching style

group based, individual, democratic. Cite the proper classifications [2]

5.2 Pure Data

"Pure Data (aka Pd) is an open source visual programming language. Pd enables musicians, visual artists, performers, researchers, and developers to create software graphically, without writing lines of code. Pd is used to process and generate sound, video, 2D/3D graphics, and interface sensors, input devices, and MIDI. Pd can easily work over local and remote networks to integrate wearable technology, motor systems, lighting rigs, and other equipment. Pd is suitable for learning basic multimedia processing and visual programming methods as well as for realizing complex systems for large-scale projects." [3]

Material: online help browser

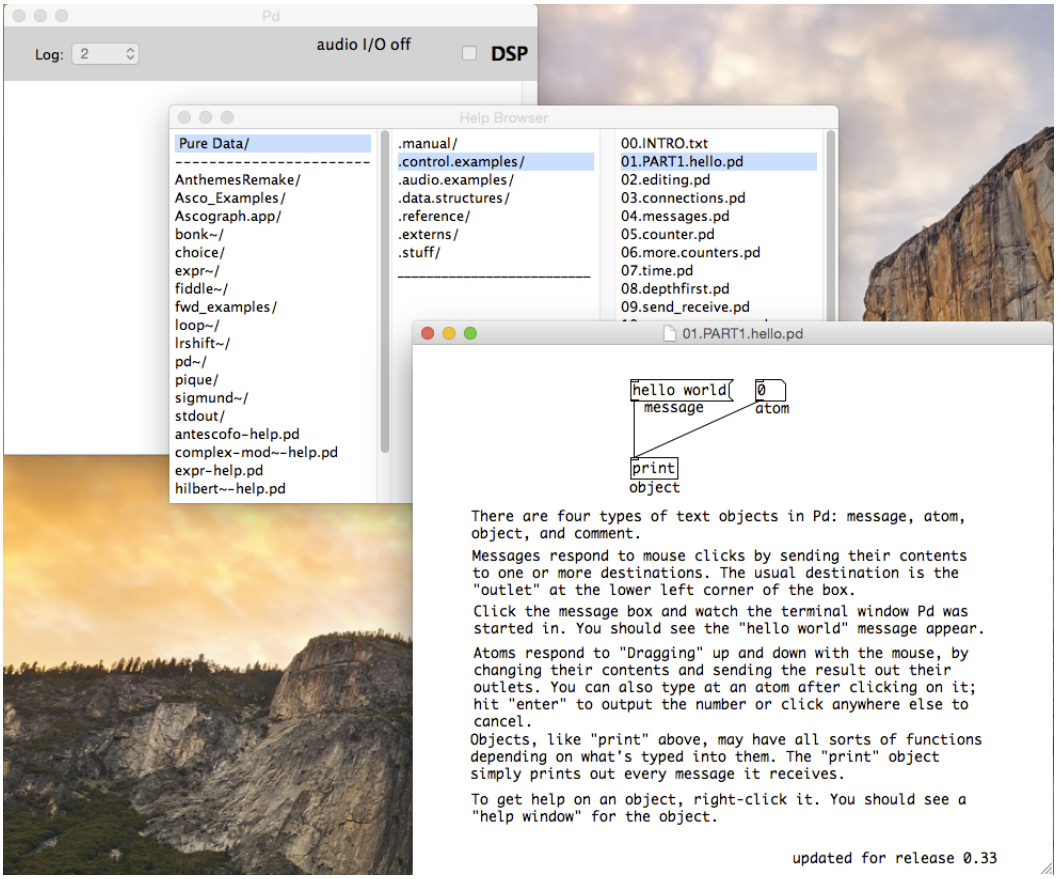

Figure 1: Pure Data Help Browser

5.3 Antescofo

"Antescofo is a modular polyphonic Score Following system as well as a Synchronous Programming language for musical composition. The module allows for automatic recognition of music score position and tempo from a realtime audio Stream coming from performer(s), making it possible to synchronize an instrumental performance with computer realized elements. The synchronous language within Antescofo allows flexible writing of time and interaction in computer music." [4]

Material: technical documentation, demo patch, alle meine events Source for specific answers: the web, Antescofo user group

5.4 Logic Pro

Logic Pro [5] is a professional MIDI and audio recoding software for OSX. It supports all features required for the project, i.e., processing multiple audio tracks together with real-time MIDI instruments for synthesizing sounds while playing with Antescofo and recording the piece in high quality. Note that there are many similar tools, including free and open source software, that would do the trick. Nevertheless, we choose Logic Pro for one reason. One of the students had prior knowledge with Logic Pro.

Material: examples of multi-track multi-instrument projects showing the non-linear production process of software sequencers. Once you know the work flow of multi-track audio production, all tools suddenly look similar. Source for specific answers: the web

5.5 iMovie

Material: Source for specific answers: the web

Note that similar to Logic Pro, there are plenty of alternative software tools to do the job. Again, one student had prior knowledge in working with iMovie.

6. Description of the Tasks

6.1 Setting up the team

Making the students getting to know each other. First Task: “Talk about music!”

6.2 Getting started with Pure Data

Antescofo is implemented in - and controlled through - Pure Data. Installing Pure Data is as simple as installing any OSX application. Details can be found on the Pure Data website and are not repeated here[1].

A Pure Data application is called a patch. A patch has a graphical Pure Data window

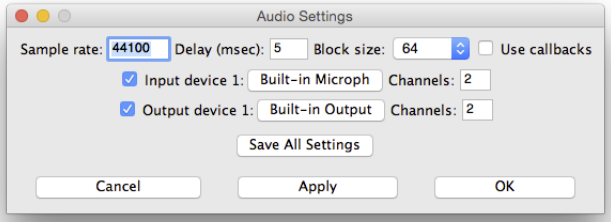

Figure 2: Pure Data Audio Settings

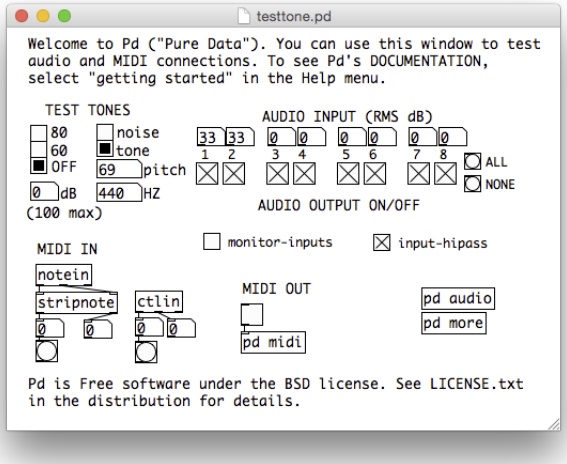

Figure 3: Pure Data Audio Test Patch

[1] https://puredata.info/downloads

6.3 Implement your first Pure Data Patch

Do something nice with Pure Data

6.4 Getting started with Antescofo

Hand out the manual.

Understand events and actions.

7. Time Table

The time frame for the project is approximately 2 weeks, 6 hours per day, or 60 hours. Note that the time table is heavily affected by the students' prior knowledge in programming. Table REFERENCE gives a brief overview of the suggested time required for each individual project task.

4 weeks, preparation classes, prerequisites

8. Acknowledgments

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References

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