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Online lectures with the paella player

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Abstract

Online-Vorlesungen können in verschiedenen Arten angeboten werden. Dazu gehören das Echtzeit-Streaming, vertonte Powerpoints sowie einfache Videos. Alle diese Angebote haben Vor- und Nachteile. So ist bei großen Hörerzahlen das direkte Streaming häufig aus technischen Gründen unmöglich. Vertonte Powerpoints sind für den Studenten nur sehr unkomfortabel zu nutzen. Videos haben da eine Reihe von Vorteilen. Allerdings hat es sich gezeigt, dass es sehr sinnvoll ist, wenn gleichzeitig sowohl die Präsentation als auch der Dozent sichtbar sind. Dies ermöglicht der von der Universitat Politècnica de València entwickelte Paella-Player. Die Funktionalität sowie die Voraussetzungen der Nutzung dieses Players sollen im Beitrag vorgestellt werden.

Online lectures can be offered in different ways. These include real-time streaming, powerpoints set to music and simple videos. All of these offerings have advantages and disadvantages. For example, with large numbers of listeners, direct streaming is often impossible for technical reasons. Powerpoints with sound are very uncomfortable for students to use. Vi-deos have a number of advantages. However, it has been shown that it is very useful if both the presentation and the lecturer are visible at the same time. This is made possible by the Paella Player developed by the Universitat Politècnica de València. The functionality as well as the requirements for using this player will be presented in the article.

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This article was originally submitted in German.

1. Intention

I would like to report on the use of the paella player for the online lectures in engineering design and computer science.

After it became clear that the lectures in the large basic courses in the summer semester 2020 could only be implemented online, I had tried different formats.

An online lecture in real time was not considered further because of the large audience (>500 listeners).

The first attempt was lectures as videos of Powerpoint-Sequences. However, these were almost 100% deselected in the evaluations given to me. The biggest problems with this variant are:

- Free choice of certain passages is hardly possible
- Repetition of individual phrases is difficult
- Dropouts in the audio stream when changing slides; This is mainly due to the fact that one often does not pause when speaking when the slides move on. Since PowerPoint places the sound directly in the slides, these interruptions are inevitable.

In the second attempt, I then posted the lecture as complete videos on Youtube. The solution was generally described as very favourable, as many disadvantages of the Powerpoint variant are no longer relevant.

After the winter semester was also not possible in presence, a decision had to be made about the online offer.

I also had a few points about the simple Youtube videos that I didn't like:

- Still quite difficult to navigate between the individual slides or to select a specific slide.
- Cumbersome preparation of the Videos, if the lecturer is also to be visible
- and in this case missing navigation between these streams

Then, by chance, I became aware of the Paella Player.
This is an open source JavaScript video player that synchronises an unlimited number of audio and video streams and provides them in different forms (including live stream or ZOOM). It works with all HTML5 browsers (Chrome, Firefox, Safari and Edge) as well as iOS and Android. The player was mainly developed at the Universitat Politècnica de València and can be used free of charge for educational purposes. [1]

An enquiry at the media centre revealed that they know this player and like it, but want to develop something of their own first (?!).

So a first attempt was made with the original paella player on my own. With this, all the major lectures in the first semester (design theory, computer science) and the fifth semester (constructive development process) were implemented.

2. Appearance and functionality

The student starts as usual in OPAL. From there he is redirected via a link to a WEB page that contains the links to the lecture videos. This is necessary because the paella player cannot be started directly in OPAL.

The videos for the presentation (e.g. Powerpoint) as well as the lecturer can be stored locally or also e.g. (as in our case) on Youtube.

After the start, an interface with (at least) two video windows and various function buttons for controlling the videos is offered (Fig. 1).

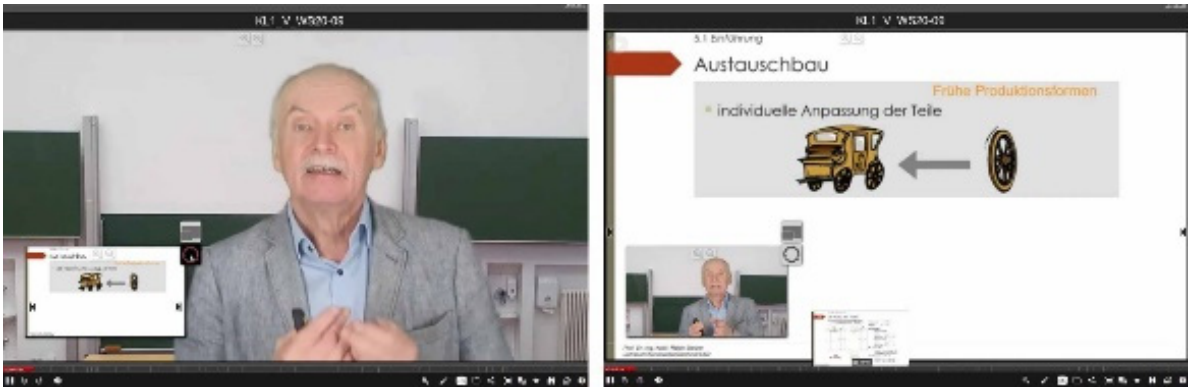

Fig. 1: Variants of the screen layout when working with the paella player

A variety of different functions are now available for practical use, including:

- The lecture can be interrupted at any point and continued later.
- It is possible to switch between the display of the videos in size and positioning (Fig. 1, left or right).
- The individual video windows can also be completely hidden.
- Return exactly to the beginning of the respective slide or to the beginning of the next or previous slide.
- Start any slide via the navigation bar in the lower area of the viewer. There, the red bar shows at any time how far the lecture has progressed as well as the length of each individual scene (slide).
- Small images of each slide can also be displayed at the bottom of the screen to facilitate targeting (Fig. 2).
- Switch to full screen
- Set the video quality depending on the speed of the WEB connection.

Already here, a problem should be pointed out which arised in the variant we had used in autumn.
As it turned out that a lot of students really watch the lecture simultaneously at the time scheduled in the syllabus, this results in a very high load for the streaming server.

Fig. 2: Navigation between the individual slides using thumbnails

This could not be secured internally at short notice. The videos were therefore placed on the YouTube platform. This also has the advantage that the videos can be accessed individually at any time later. However, it became apparent that at the moment when the lecture was paused (e.g. to transfer content from the presentation video to the script), YouTube overlaid the lower part of the presentation with advertising. Unfortunately, this unpleasant side effect could not be avoided in the short term, but it was very annoying.
To make it easier for students to work with this previously unfamiliar player, an introductory video has been provided:
[(https://www.youtube.com/watch?v=AxmJ2J0pWSk&t=334s)](https://www.youtube.com/watch?v=AxmJ2J0pWSk&t=334s)

3. Creating the presentation

Two videos are required, both of which must be provided on the server platform. These are

- The video of the PowerPoint presentation and
- The video of the lecturer

In addition, the following are needed:

- Thumbnail images for the individual slides to facilitate direct navigation.
- A structure file that contains the assignment of the thumbnails to the individual video sections and enables navigation in the videos.

The videos should be in mp4 format and must be synchronised with each other. The video of the lecturer is recorded by means of a camera (e.g. mobile phone). The presentation must be recorded on the screen. I used the tool *Movavi for* this. [2]
Since the videos are streamed by the student and not downloaded, they have to be stored on such a powerful server platform that allows simultaneous access by the users (i.e. over 500 people in the foundation lecture). For this reason, as already mentioned, we decided to store them on YouTube.
To enable targeted navigation in the viewer to the individual slides, a small preview image is required in each case. These should be available in jpeg format and can be created very easily by "Save as..." when working with PowerPoint.

Finally, the storage paths of the videos, the time stamps for the beginning of the individual sections (usually the slides) and the thumbnails assigned to each section must be specified in a structure file. This file has the json format commonly used on the Internet.

Although this format is readable, the structure is not readily comprehensible to the uninitiated and is also relatively complex to create.

For this reason, an addin is available for PowerPoint, which can be activated in the menu bar if required. (Fig. 3).

To do this, the user only has to set a flag at the marked point "Paella marks". PowerPoint then automatically generates the structure file during the presentation, including the time stamps for the slide changes, synchronised with the lecturer's video.

Independently of the use of the Paella Player, this add-in provides a variety of other functions to support the work with PowerPoint in the lecture, including:

- Extensive drawing functions in vector and pixel graphics for working with the pen when making additions to the slides
- Dynamic setting of markers in slides for free navigation during the lecture
- Synchronisation of annotations and free sketches between individual slides
- Integrating a camera
- Fade in of a whiteboard
- Linking embedded objects

For more information you can contact me directly.
The video of the presentation must now be synchronised with the time stamps and the corresponding thumbnails for the slide transitions.
Another application is available for this purpose (Fig. 4).

Fig. 3: Interface of the extension add-in for PowerPoint

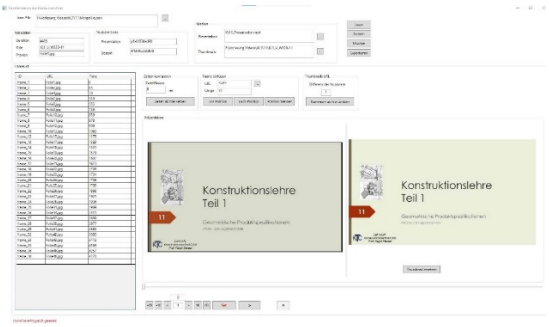

Fig. 4: Editing the navigation elements for the lecture

To do this, the presentation video is loaded and the json structure and the path of the thumbnails are specified. The transitions between the slides can now be manually fine-tuned with the displayed thumbnails. Alternatively, additional placeholders can be inserted. This is useful, for example, if further videos are to be included in the presentation (e.g. a demonstration of an external tool recorded later, such as work in a CAD system.
Finally, all generated files (two videos, thumbnails, structure file) are uploaded to the streaming server.

4. Experiences and continuation

Working with the player is quite comfortable and has proven itself.
A disadvantage is the aforementioned effect that the YouTube streaming platform sometimes displays advertisements.
We are currently working on a solution that will allow the videos to be made available on another server.

Navigating within a lecture is relatively easy with this player. It would be desirable to be able to set context-dependent jump labels in order to directly select content across lecture boundaries.
This would then enable students to directly select content from other lectures at points where reference is made. This function can be added in principle. The prerequisites for implementation are currently being investigated.

Literature

[1] Paella Player - the multistream player for lectures https://paellaplayer.upv.es/
[2] Movavi Screen Recorder https://www.movavi.de