

Theses topics supervised in collaboration with the Professorship of Professur Biotechnology in Ressource Management (Civil Engineering Faculty)

related to (educational) 360-degree models (project 360° Bildung/Education <https://www.360-degree.education>)

Descriptions are subject to customization based on individual preferences of students.

Integration of quizzes/puzzles into 360-degree models

The walk-through of a 360-degree scenario for teaching purposes can be didactically supported with quizzes. Integrating the quiz questions visually into the 360-degree scenario and collecting the results as a basis for assessment and learning analytics is desirable. Ideally, the questions would be stored as a kind of script that immediately displays a result after a question has been answered - i.e., explains the correct answer with further text or informs the user that the answer was incorrect and then displays the text or an image. The Virtual Tour Pro software from 3D Vista is a tool that can be used to integrate quiz questions into 360-degree tours and also evaluate them. Another tool is H5P.

Research Questions

- What options are available for integrating quizzes into 360-degree models?
- How can the results generated in 3D Vista, for example, be saved separately and automatized for each user and transferred to the learning management system?

Contact: Florian Wehking (florian.wehking@uni-weimar.de)

Using / Integrating Ambisonic Sound

The use of Ambisonic Sound in 360-degree models significantly increases immersion (especially when using HMDs or cardboards). The recorded sound is spatialized in the virtual environment and the user gets to hear where a sound is coming from when turning the head or changing the viewing direction with the mouse. So far, this form of sound usage is only available in linear 360-degree videos, e.g. on Youtube, but not in photo-based 360-degree models / tours. Possibly there are other programs besides the so far used software Pano2VR (in which Ambisonic cannot be used) that are already more advanced in this regard. The software Virtual Tour Pro offers the possibility to assign different audio files to certain areas of a 360-degree panorama (<https://www.youtube.com/watch?v=bU2Ym4L72M0>). This could be considered a workaroud, since an Ambisonic recording could be saved out in several single files with different directions.

Research Questions:

- What are the possibilities to integrate Ambisonic files to individual 360-degree images of a tour, which software would is required?

Contact: Florian Wehking (florian.wehking@uni-weimar.de)

360-degree video control

To move around within the 360-degree video, a video progress bar would have to be displayed, which allows the user to fast-forward the video, or one of the buttons on the VR controller would have to be assigned a play/pause button on an HMD. If the user pushes the joystick on the controller forward, for example, the video is played forward at regular speed.

If the stick is released, the video stops or pauses. If the joystick is pressed backwards, the video is rewound. So one could run back to the starting point. It might also be possible to control speed levels via the joystick. So by pushing the joystick halfway forward, one moves forward at half speed etc. - this could also be a tool to get the problem of motion sickness under control.

The expected advantage of this navigation method might be that the motion sickness that occurs in a 360-degree video does not occur, since the user decides on the speed of movement. Tests have shown that a linear 360-degree video, in which the camera moves freely along a street, for example, causes nausea in users. The eyes say that the body is moving, but the whole body gives other signals. The idea is to give users back control over the movement or speed of the video.

For maximum immersion, the sound of the video should continue to be heard even when the video is paused. This preserves the impression that the user is on site.

Such a video could be recorded with a drone flying at eye level, under which a 360-degree camera is mounted. Thus, the sky would have to be retouched, which most users probably only look at once at the beginning. Insta360 offers the possibility to mount the 360-degree camera on a drone for the Insta360 One R Twin Edition modular camera. The modular system, consisting of two individual cameras, allows you to split the camera parts and attach them to the top and bottom of the drone in the so-called Aerial Mod. In this way, the drone in the middle is "stitched away".

Research Questions

- To what extent is it possible to control 360-degree videos, e.g., using a navigation menu?
- To what extent has 360-degree video navigation already been tested in studies and what were the findings?

Contact: Florian Wehking (florian.wehking@uni-weimar.de)

Attention Guidance in 360-degree models

360-degree models are characterized by their richness of detail. Especially in learning settings (e.g., 360-degree.education/) , this richness of detail may distract from the information of interest; learners may also feel overwhelmed in 360-degree models. Approaches to address these challenges include attention guidance. Attention guidance comes in many forms, such as obscuring less relevant sections of the image or guiding learners through 360-degree models.

Research Questions

- What forms of attention guidance are viable?
- Which options might be technically integrated into (web-based) 360-degree models?

Contact: Heinrich Söbke (heinrich.soebke@uni-weimar.de)

360-degree models as a means of communication

360-degree models offer the opportunity to document municipalities in which construction measures are to be carried out as part of the analysis of the existing situation. It is important for different users to be allowed to incorporate their information (e.g., via a digital board in each 360-degree image) or to enter into an exchange with each other. This could include viewing specific situations together, but also making contact: for example, an agent could place a virtual flag on a street corner and note a messages and its addressee in it. The addressee would receive an email asking to check out the message in the 360-degree model.

Research Questions

- To what extent might a digital board/notebook be integrated into the 360-degree model so that all users may contribute comments (possibly similar to EtherPad or BIM-Models)?
- What possibilities are there to extend the communication between users, e.g. through email notifications or (messenger) apps?

Contact: Mario Wolf (ulrich.mario.wolf@uni-weimar.de)