

# Capstone Design Review Feedback

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## AR Sandbox (Group 7)

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**A description of the team's design choices and any constructive feedback regarding those choices.**

The team is using the Unity game development engine to build the software for their project, and the software runs on a special rig with a sandbox and Kinect camera/depth sensor array. The system already works to project terrain onto the sandbox, and read the terrain data out. However, the team is working to extend the systems to allow: loading custom terrain data, exporting the sandbox's terrain data, detecting and animating the effects of game pieces that can be placed in the sand. The team is planning on using the Vuforia SDK for Unity to add the game piece detection functionality. The Vuforia SDK supports detecting objects (i.e. playing cards) and rendering content over the object in real-time.

**A list of your concerns, thoughts, or advice for the project members based on the material and demo presented.**

My main concern is about their access to the sand box he project is completely stalled by lack of access to the sandbox. So long as the team gets adequate access to the tools they need this project design is sound, and the team will be able to achieve their goals!

**A list of areas in which you might collaborate, share resources or consult with the team you reviewed.**

There are no areas of collaboration because this group is using an entirely different tech stack.

## Immersive and Interactive Virtual Geographic Environments (Group 10)

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## **A description of the team's design choices and any constructive feedback regarding those choices.**

This team is planning on using Unreal engine 4 to visualize models created through a pipeline consisting of: loading models from `.tiff` heightmaps, analyzing and forming models via ArcGIS, and lastly, combining the models with satellite images to create textured meshes in CityEngine. The team is planning on target the Oculus Quest (no tethering to a computer required) as the platform for their application. Once the application is working as intended, the group plans on adding flood simulation, weather, and terrain physics.

It sounds like the `.tiff` data is normalized, so I recommend the team search for elevation data that they can use to convert the heightmap into the correct elevations.

## **A list of your concerns, thoughts, or advice for the project members based on the material and demo presented.**

This project group has a great grasp of their project and I have full confidence that they will be able to execute things and achieve the project partner's goals!

## **A list of areas in which you might collaborate, share resources or consult with the team you reviewed.**

There are no areas of collaboration.

## **Handheld AR device (Group 9)**

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### **A description of the team's design choices and any constructive feedback regarding those choices.**

The team is planning on creating a physical device based on a Raspberry Pi Model B with a Camera Board V2 piggy-backed on top, and some sort of projection hardware included to top things off. The team plans on using OpenCV and Python to analyze images and drive the device. The device will work by detecting and reading information from QR codes to render images via the projector; that is to say, as the user points this device around, a pattern of lights will be sent out from the device onto the surroundings that stays fixed relative to the surroundings (as in augmented reality). This device will support the use case of construction

management professionals who need to visualize not-yet constructed structures (i.e. plumbing pipes, HVAC systems).

The project team needs to find existing solutions or libraries to implement this project, because they have no hope of achieving their goals if they start from scratch. I recommend that this team coordinate with other AR teams to identify existing SDKs/libraries to do the heavy lifting.

### **A list of your concerns, thoughts, or advice for the project members based on the material and demo presented.**

The technical challenges involved in this project strike me as far outside the scope of a senior project. The students admit they are not knowledgeable about hardware, yet are taking on a project with a large hardware component. The team needs to play to their strengths and using a tool like Unreal Engine or Apple's AR Kit, instead of inventing a whole new kind of wheel. Furthermore, I do not think the design makes any sense. In order to project light onto buildings the hardware will almost certainly involve lasers, which will completely defeat the idea of projecting. A projector putting out enough power to light up a building in the daytime almost certainly does not exist. Even if this design was feasible, I do not think there is a difference to the user between using an iPad to achieve this effect, or using projection, and the iPad version could be slapped together in a few weeks with Unreal Engine and some AR libraries.

### **A list of areas in which you might collaborate, share resources or consult with the team you reviewed.**

We can collaborate on using the OpenCV Python bindings!