

How long is your experience as a radiographer?

I worked for six years as a radiographer and for two years as a 3D planner for medical devices.

What impression did the wearing comfort of the HoloLens make on you?

This was my first experience with the HoloLens. At first, it's a bit unfamiliar to use, after getting used to it there are no problems with interacting with it.

How about use time? Does it feel exhausting to use the HoloLens after some time?

It was not exhausting; I was quickly accustomed to use the HoloLens.

How do you rate the visual quality of the HoloLens application?

I found it to be clearly arranged. The menu structure is simple and you know your way around immediately. It is very user friendly; it doesn't take long to get into [the operation]. The quality of the 3D scans is high enough to make out details.

What was the impression of the HoloLens' Field of View? Was the field of view large enough? Were objects cut off?

Maybe this will get better with more use time, but at the beginning I had the feeling that I could not fit everything into my field of view. Maybe that's a user specific issue which resolves with more experience in using the HoloLens. When the hologram sizes are adjusted and the menu is pinned, so that holograms won't occlude each other, it works well.

How was the stability of the holograms? Were they stable enough in the real world to put someone inside? Did they wobble or shake?

No, nothing wobbled or jittered. I think the best thing would be a higher table so that users don't have to bend down. This might cause the Field of View to slip away from the holograms. But it was stable in any case.

Do you feel that you successfully completed all the tasks on the task sheet?

Yes, all worked well.

What is your opinion on the applications menu?

The menu is very logical, I can open and close it when I don't need it. I can pin it down, which is very important because otherwise I have it in my field of view all the time. It is clearly arranged and intuitive.

Did you find the options you were looking for?

Yes.

Could you easily undo or redo any action if you needed to?

For example, if I want to repeat the audio instructions. No, there were no problems here, it worked great.

Were all menu items you expected present?

As a basis I found it to be very good. The information needed is all there. A possibility in the future would be to introduce some gamification. Users could measure their progression or a matching

between the real person and the hologram, showing how far they differ in their position could be useful.

How do you feel about the methods of interaction with the holograms? Is the placement of holograms in the desired position and location intuitive or difficult?

The learning curve is relatively steep, you may be a little clumsy at first. But after a few tries you master it quite fast.

Would a short training for new users be helpful?

Yes, a training or short introduction on how to use and interact with the HoloLens would be great. For example, a thing you just have to know before using the HoloLens is the Gaze Cursor. You must pay attention to the cursor and not to the position of the hand. Someone must tell you that.

Interaction with the HoloLens is not very intuitive?

Users would figure it out eventually, but I would not have found out about the Gaze interaction immediately.

What worked as expected when manipulating the holograms? What didn't?

At first, I assumed that the corners of the bounding box were for rotating the hologram. I expected to be able to rotate and enlarge at the corners, which I believe is technically impossible.

Any suggestions on how to improve the interaction methods?

It would be great if holograms could be easily touched with the user's hands and made bigger or smaller. But I do not know if that is technically possible.

Do you have any wishes for additional input methods?

Voice control for enlarging holograms would be desirable. Positioning with speech is probably difficult but voice-controlled resizing and rotating of holograms would be great.

Did the system provide enough feedback on your inputs?

Yes, there is always a click when you hit buttons. When rotating holograms, it didn't click, but here you have an immediate visual feedback if the interaction works.

Was visual and audible feedback given sufficiently?

Yes

Did you get confirmation if your inputs were accepted?

Yes

Did you have any issues with the application? Did you encounter any errors or crashes?

Nothing, no errors and nor crashes.

Did you have any difficulties with interacting with the menu or the holograms? Have there been problems with holograms occluding each other or in the interaction with the real world?

Orientation in the real world was possible, I didn't run into anything.

Did the holograms behave as you expected? Were there any problems placing the holograms on the bucky table?

No, there were no problems with the placement of holograms. With brightness and transparency of holograms maybe. Placing test patients into the hologram did not work as well in artificial light as it did in daylight. But there were no issues with the interaction with the holograms.

Compared to other application on the HoloLens, how was this application to use?

Sorry, I do not know any other HoloLens Applications.

How useful was the hologram to help the positioning of your test patients body part?

It depends a bit on what kind of learner you are. It's easy for me when I can see something and replicate it. For me a visual aid is a great enrichment. On the one hand, I can see how the position will look like and can prepare myself for positioning a real patient. On the other hand, when positioning the patient, I have visual clues how to position the patient's body part or a wedge pillow for example.

Was the size adjustment of the holograms useful?

The resizing was useful. I feel that it makes a difference how far away I am from the patient and therefore I must resize the hologram accordingly.

Was it easy to place the patient in the hologram?

This is probably also a matter of practice and depends on how skilled you are at concentrating on what you are seeing and interacting with your patient at the same time. It takes some practice, but it's fun.

Was the hologram transparent enough? Was the brightness adjustment of the HoloLens useful?

That depends on the light conditions. A voice command to adjust hologram transparency would be neat. If I already have my hands on the patient and want to check the position, I can make the hologram more or less transparent by voice control while still manipulating the patient with my hands.

Was the hologram stable enough to reliably assist in the positioning?

The holograms were stable, it is possible to move around the room and the holograms stay in position. I could circle around the hologram without it moving.

Did the virtual light beam localizer help with the positioning of the real-life localizer?

I think so, here it is important to be able to change the transparency so that I can see the central beam more clearly. The central beam on the hologram helps a lot as a guide for the positioning of the real central beam.

Do you think AR applications can benefit the education of radiographers?

Yes, I think AR can be used in education radiographers. There are few internships long enough to train rare special radiographic procedures. These could be practised with an AR application. Another possibility is self-learning without the presence of a lecturer or trainer. Additionally, new technology promotes interest to try the application. This curiosity could be used as an advantage to promote learner participation.

Do you have any further comments or remarks?

No