

TEAM BSHolo

Informatics major - summer semester of 2018

(Informatics ~ = Computer Science)

Abstract

Development for AR devices is still in it's infancy and has a lot of potential to grow - not only in entertainment, but industry applications, too.

By conducting this project, we set ourselves up with the essential skills needed for a lot of future jobs in this area, and we can contribute and/or steer some of the developments ourselves.

In addition, Augmented Reality devices are fun to use!

The vision we established:

By using AR, we develop an *interactive-cooking-system* which allows the user to prepare *healthy, home-cooked* meals within *limited time*. The user can easily *check out new meals* and receives *assistance with complex recipes*.

Student team members

Name	Rolle
Maximilian Albert	Software Interface Manager, Developer, trainee technical architect
Thomas Bachmann	Developer, Usability Engineer
Franz Fischer	Developer, technical architect
Lukas Grams	Project Lead & Product Owner
Christian Pritzl	Developer, Testing & QA

Project partner



BSH Hausgeräte GmbH is one of the world's leading companies in the sector and the largest home appliance manufacturer in Europe. To be the first choice for consumers worldwide drives the company and its employees. BSH aspires to improve the quality of life for people with its exceptional brands, high-class products and superior solutions.

Additional information can be found via clicking this link.

Technologies

- Microsoft HoloLens, Augmented Reality Device
- BSH Home Connect capable household appliances
- Unity SDK & Engine
- Visual Studio Windows Platform Development
- Vuforia Augmented Reality SDK
- Microsoft Mixed Reality Toolkit
- Home Connect API by BSH
- C# scripting
- JSON

Project goals

The initial task:

Create a HoloLens app which...

...guides the consumer through the recipes based on existing Home Connect app recipes,

...by illustrating the cooking process and

...using the Home Connect API to control the home appliances throughout the cooking process.

The vision we established:

By using AR, we develop an *interactive-cooking-system* which allows the user to prepare *healthy, home-cooked* meals within *limited time*. The user can easily *check out new meals* and receives *assistance with complex recipes*.

Project course

We started by gathering all available information - stakeholders, contact information and organizational conditions/constraints.

After discussing our ideas and defining the individual responsibilities of each team member, we set off by brainstorming potential features and running a survey on the same subject.

Additionally, we sorted potential uses and interests into personas and set up our communication- and development environment (gitLab repository, mattermost channel, mailing lists, IDEs and SDKs) Once these were done, we met with our contacts at BSH to define the project vision, talk about our ideas and get to know each other:



After this meeting we had a great number of potential features and the task to prioritize them ourselves, awaiting customer feedback - which we did, in regards to benefit, scope, feasibility and available tools.

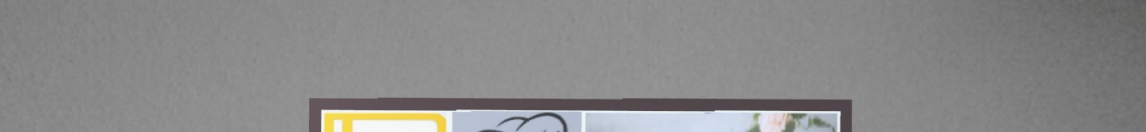
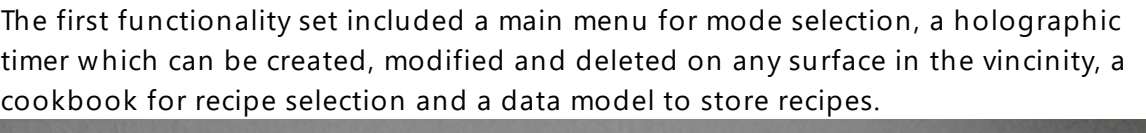
Those tools greatly increased shortly after our meeting - since we were provided with an extra-curricular Unity workshop organized by Prof. Beneken.

The first of three development sprints in total focused on familiarizing ourselves with the software development and deployment tools, aswell as the provided HoloLens hardware.

Some things were easy to implement with existing open source code provided (i.e. object recognition), while other things were more suprisingly complex to do (i.e. swipe gesture recognition). So we looked at a lot of different things and tried to see how far we could take them without much hassle.

We also looked at the systems we were to engage with, mainly the Home Connect API.

The first functionality set included a main menu for mode selection, a holographic timer which can be created, modified and deleted on any surface in the vicinity, a cookbook for recipe selection and a data model to store recipes.



Showing these to our customer contacts, we went on our second sprint to build another prototype, which added an improved timer appearance, GUI for displaying recipe steps and navigating through them, an upgraded data model for storing any sort of API call information to the home appliances, and our first remote control of a (simulated) oven!



After another sprint, a second extracurricular Unity Workshop and countless hours of final prototyping through e-learning courses, we came to a conclusion within a third and final prototype within the scope of the SE2 course.

This one included animations to help a user through recipes, two fully functional demo recipes helping the user by automatically pre-heating the oven at the right point during the recipe, additional speech output and voice commands.



The SE2 course is done, but this project is not - Prof. Beneken, Prof. Muehlbauer and BSH are already on talks about continuing this subject next semester within the DAS/DAT courses!

Conclusion

Working with AR devices is really interesting.

Working with Unity is really interesting, and great once one had initial training.

Working with undocumented SDK's, toolkits and API's is less interesting.

Being a classic project lead within a self-governing agile team is less interesting.

Using Git version control for changes in Unity is very challenging.

In summary, working with new and experimental Hardware and Software is exciting and mostly great, but often has drawbacks, too.