Validation of a Virtual Reality Tool to Test Consumer Response in Supermarket Settings

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Background

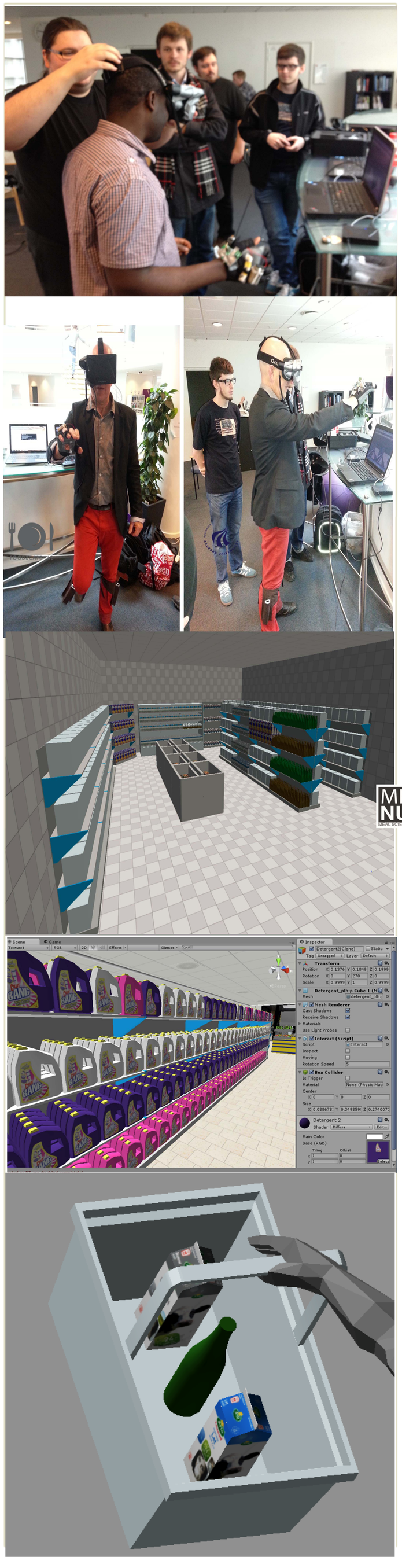
Normally, when researchers want to do a study on consumers' behavior, the possibilities are limited to:
Doing a mockup – having a design either recreate a staging from pictures or create an entirely new stage, out of cardboard or similar (a model approach)
Building the stage – having to help build the actual stage completely and filling it with real objects (a food lab approach)
Using the actual location – using the actual location as a stage if possible (a living lab approach)
Recently, researchers have been looking for other possibilities. For example, a team from Holland (Waterlander et al. 2011), has created a simulation of a supermarket with a traditional computer setup, meaning screen, mouse, and keyboard and virtual shopping is a growing field of research Westland & Au, Lee & Chung (2014). With recent developments and availability of head mounted displays, such as the Oculus Rift, it is possible to create even more realistic simulations, where actual body movements are used to control the interaction with the computer instead of the mice and keyboard. The obvious advantage is that the food environments are developed virtually at no cost, other than time when creating and texturing the models. The aim of this study was to carry out a usability test of the virtual supermarket tool (VST) that simulate a real life check-out experience at the cash register in a supermarket and allows for studies of food consumption and food choice behaviour.

Method

The development of the virtual supermarket tool (VST) included the following equipment:
an Oculus Rift (first development version), a Windows Laptop for running the software,
3 Wii Remotes, a custom-made fingerless glove with three infrared diodes and a button for selecting objects and 2 holsters for placing the Wii Remotes on the subjects' legs.

The equipment was pre-tested among experts at the campus and then taken into a living lab test among shoppers in a real life users in a supermarket setting.

The results showed that further testing among "early mover" users was necessary.
As a result a total of 30 total participants were recruited from the university student housing Otto Mønsteds Kollegium.
They were asked to test the equipment and answer questions categorized under the following themes: visuals, mobility, precision, movement, interaction and ease of looking around.
The information gathered was stored on a server, which allowed the researchers to collect and import data into a work sheet for further analysis.



Results

The results from the testing so far of the virtual supermarket proved promising, as the participants felt it was both possible and comprehensible to relate to the shopping routine of each individual.
A number of weaknesses were found in the usability test. Results showed that it lacked the capability to compare virtual behavior with real behavior seeing since it was not possible to have the test participants consecutively shopping inside a real-life supermarket.

While the virtual reality supermarket was indeed viewed positively by most participants, it nevertheless had certain shortcomings.
The weaknesses of the test included the fact that augmented glove was too bulky and fragile and that the lighting of the virtual environment would have been better with Unity Pro.

Discussion

The weaknesses identified could be addressed in the following way.
The hit-box of the shopping basket would need to have its coding altered so as to achieve the enlargement. The excavated circuit of the mouse tended to block the light from the infrared LEDs and a solution to this would be to re-design the layout of the glove's gadgetry to as to swap the current positions of the LEDs and the mouse circuit, thereby allowing the HMD's Wii remote control a clear view of all three LEDs without the need for tilting the real-life hand backwards at all.
The fact that the participants often felt the need for walking backwards or sideways needs and wanted to move faster than anticipated to be further studied.
The fact that the participants attempted to keep their grip closed upon trying to grab a virtual item could be addressed through a modification in which each real-life step taken by a user to be represented by two or three steps in the digital world. This would result in which participants would have to walk-in-place a lot less, and thereby get around the store with more ease.
While the virtual supermarket concept seems well made, the interactive aspects can be taken even further, through the use of more advanced input- and output devices, so as to optimize the virtual experience even more.
However the test showed that the potential test subject might be limited to younger and middle-aged participants due to their familiarity with computers. It can be anticipated that the tool can be applied to a wider target group than only middle aged users.

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