

## Review of Bachelor's Thesis

**Student:** Fajtová Klaudia  
**Title:** Controlling Virtual Avatar in Microsoft HoloLens with Use of Real-World Elements (id 22767)  
**Reviewer:** Beran Vítězslav, Ing., Ph.D., DCGM FIT BUT

1. **Assignment complexity** **more demanding assignment**  
The assignment requires familiarity with a number of advanced technologies, from augmented reality and its implementation in HoloLens glasses and the Mixed Reality Toolkit, through the integration of the Xbox controller and utilization of the Unity framework, to operations with 3D data structures when implementing a new application.
2. **Completeness of assignment requirements** **assignment fulfilled**
3. **Length of technical report** **in usual extent**
4. **Presentation level of technical report** **90 p. (A)**  
Technical report is very well organised. It guides the reader from the general concepts of augmented reality and selected specific technologies and devices, through the actual design of the solution with a detailed explanation of individual steps and parts, to implementation details and procedures. The text ends with a careful description of the experiment, its implementation and especially the evaluation and discussion of the results. The solution proposal part should be better introduced by definition of application goal and user needs.  
The report is written in a comprehensible, professional and factual manner.
5. **Formal aspects of technical report** **90 p. (A)**  
The work is written in English, and what the reviewer (native Czech) can judge, it contains minimal grammatical errors and the level of expression is above average. The report is written in LaTeX and has a good typographic quality. The author carefully formats the text and except for a few names of classes and methods that escaped her in the text and are not italic, everything is carefully formatted.
6. **Literature usage** **95 p. (A)**  
Selected study resources are relevant and cover all key aspects of the work - from augmented reality in general, through partial key technologies and devices, to the methodology of user experience testing. The acquired knowledge is properly separated from author's ideas.
7. **Implementation results** **85 p. (B)**  
The software solution is built on the Unity platform and uses assets from the Mixed Reality Toolkit. The implementation language is C# and the source code is well structured. Comments could be more complete. The quality of the implementation output shows a very good understanding of technologies and issues.
8. **Utilizability of results**  
The work presents a new game for HoloLens glasses with Xbox controller and proposes a new way to make the necessary 3D data available by modifying the scanning component "Spatial Understanding" of Mixed Reality Toolkit.
9. **Questions for defence**
  - Have you considered using audio feedback? How could it be used and for what type of usability problems?
  - Have you considered using gamification tools, e.g. levels with progressive difficulties, for easier understanding of the game mechanics?
10. **Total assessment** **95 p. excellent (A)**  
Mrs Fajtová got acquainted with the augmented reality using relevant study resources. She designed a quite original fun game using 3D space around the user, the HoloLens AR glasses and Xbox controller. The design includes creative procedures and methods, such as placing targets in the scene or the mechanics of the game. During the implementation, she solved a number of non-trivial technical problems. Testing of the resulting functional system is designed and implemented very professionally and with high quality. The student did very well in all aspects needed to create a high quality solution.

In Brno 17 June 2020

Beran Vítězslav, Ing., Ph.D.  
reviewer