

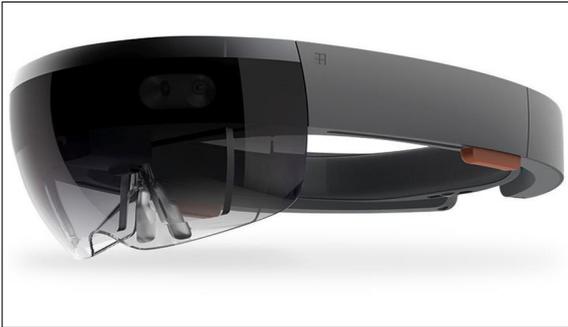
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Subject Area	Innovation in Products, Processes and Materials - Industrial Technologies
Project Partner	Hitachi Zosen Inova, Hardturmstrasse 127, Zürich



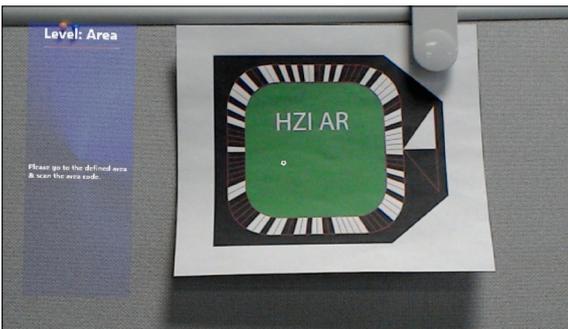
Glenn Patrick Huber

AR-Maintenance

A support system for EfW/Biomethane plants in O&M



Microsoft HoloLens
<https://www.aniwaa.com/product/vr-ar/microsoft-hololens/>



Vuforia VuMark tracker to scan and recognize
 Own presentation



Visualization of task & sensory data inside pilot application
 Own presentation

Problem: Augmented reality is a fast-developing research and engineering field, which has broadly increased in recent years. Hardware as well as software shows continuous improvement and various systems achieve reasonable prices, justifying in-house implementation. This development motivates the company Hitachi Zosen Inova (HZI), which develops energy-from-waste (EfW) and Biomethane plants, to invest into this area.

Power plants usually operate for several decades, leading the technology used to operate and maintain them to get outdated after some time. Additionally, projects involving the construction of big power plants take a long period of time, approximately a couple of years each (from beginning till commissioning), to finish. Therefore, HZI cannot change its internal systems and technology very often, since it could influence running projects. On the other hand, they bear the risk to lose touch with state-of-the-art technology. Keeping this in mind, HZI asks itself the question, if and how augmented reality could be implemented into the company's structure.

Result: During this project, a pilot application, implementing a user story for a maintenance task inside a Biomethane plant, could be developed. The software, realized on a Microsoft HoloLens using the Unity 3D engine & the Vuforia SDK, allows the user to visualize area specific task lists and sensory information based around Vuforia VuMark trackers, navigate through those task lists and process, document and finish the chosen tasks. Additionally, the research around the scientific question ("What factors are of importance for the acceptance of AR in O&M?") resulted in some hypotheses, suggesting that, in general, acceptance for AR applications in O&M is anti-proportionally associated to the age and experience (on specific plants and in general) of the user, proportionally associated to the complexity and scope of the tasks at hand and that AR offers the potential to reduce training time and error frequency, help workers in achieving allrounder-functionality (allowing workers with low level experience to complete high level tasks) and increase the overall workplace safety.

Conclusion: The findings show promising results and high potential for the future. Yet, the implemented pilot is still at base level, visualizing the basic functionality for a simple user story. Meanwhile, the established hypotheses are mostly made of the user's perspective and the methods used to identify them were not representative. It is therefore recommendable to undergo further research in this field, making both:

- further development of the application, including more functionality and more complex tasks
- additional studies, validating & verifying the hypotheses made in this paper, also including other perspectives like the management level.