MASTER THESIS Using Augmented Reality as a tool for troubleshooting separator alarms
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POPULAR SCIENCE PAPER **August Alfredsson and Adam Oldin**

Industrial technology is more advanced than ever, but the machines still break down. How can Augmented Reality be used as a tool for troubleshooting when you actually don't have the knowledge needed?

Some say that the fourth industrial revolution is here now that machines can communicate with each other. This combination of Internet of Things with industrial machines has been labeled Industry 4.0. Internet of Things is the idea that devices and things that previously have been disconnected should be connected to the internet to communicate and share information. Examples of everyday objects that can be a part of Internet of Things are light bulbs, garage doors and fridges.

Alfa Laval, manufacturer of liquid separators, together with B&R, industrial automation company, want to explore the possibilities with Industry 4.0 and especially how Augmented Reality (AR) can be used as a tool when troubleshooting separator alarms. Augmented Reality is the fusion between the real world and the virtual world, this fusion enhances our perceived reality and aids us to easier visualize complicated information.

Our master thesis covers the development and evaluation of an AR application for troubleshooting separator alarms. The final AR application shows instructions to the user and highlights the corresponding component as a 3D model in AR. By mapping the virtual 3D models of the components in 3D space to their respective physical components on the separator the user will see a brightly colored virtual component on the screen overlaying the actual physical component. This helps the inexperienced user to find the components and complete the instructions on their own.

During the project we performed user tests to evaluate whether or not this application could be useful for people without experience of troubleshooting separator alarms. When we asked the testers if they thought the application could help inexperienced users with troubleshooting separator alarms. In addition to this the majority of the testers felt overall more confident in troubleshooting the alarms themselves. Users with professional experience felt that the application could not help them personally, but if it's used by others it could indirectly reduce their own workload and therefore help them as a consequence. All of the participants in the user tests thought that the application could be useful for educational purposes.

Current AR technology is good enough to use in a prototype like ours, but issues with tracking and drifting (the virtual objects tend to diverge from the direct 3D mapping to their physical counterpart and "fly away") makes it too unstable to use in an actual product. Nevertheless, the future is bright and new technologies will soon emerge, like AR glasses and improved room tracking.