2021–2022 GRANT RECIPIENT REPORT
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DIGITAL TRANSFORMATION FOR STEEL MANUFACTURING GRANT

This project developed a pilot augmented reality system for steel industry workers to provide safety information and procedure information in the field. The system has two key applications: hazard awareness training and lockout/tagout assistance. The system was developed using the Hololens 2 headset with integrated hard hat from Trimble for use in the field, as well as 360-degree videos with virtual reality headset and controllers for classroom training.

The goals of the project were to develop an augmented reality (AR) application to assist with maintenance and safety in the steel industry, and to identify and address practical issues that may prevent deploying AR in the field.

The Augmented Reality Maintenance and Safety System (ARMSS) provides a means for viewing safety overlays and complex procedures on an augmented reality headset or other display out in the field where they are needed, or on virtual reality (VR) headset in a training environment. An augmented reality headset displays digital information such as images and video, projected on see-through lenses in front of the wearer. The headset also includes camera and other sensors which allow it to track the environment and recognize key locations and markers on equipment. Using this capability, the system delivers hazard information and step-by-step instructions and animated guides for various maintenance and/or safety procedures. The visuals are displayed on top of the equipment, directing the worker to the correct locations, and visually verifies understanding of hazards in the area and logs when each step is completed.

Practical implementation in the field was considered such as wearability with other personal protective equipment.

AR storyboards were developed for each documented procedure, showing how each piece of safety information or maintenance steps were to be viewed when using an AR device. Where applicable, 3D models of some equipment were used in combination with animations, but preference was given to developing AR materials that could be developed rapidly and require less 3D modeling/animation expertise.

The system was developed for use with both AR and VR. While the VR version could be used in the classroom, the AR system provides the most benefit from being used on-site in the field.

The project included significant student engagement throughout the development. The project enabled students to study digital technology challenges and promoted career opportunities in the steel industry. ✦