Helping Human Workers Perform in a Connected Industrial Environment

- The innovations of Industry 4.0 have been focused on improving connectivity between machines. However, they fail to cognitively assist human workers in this digital environment.

- By providing human workers with easy access to the insights of an intelligent environment, we can massively improve the efficiency of routine tasks such as inspection.

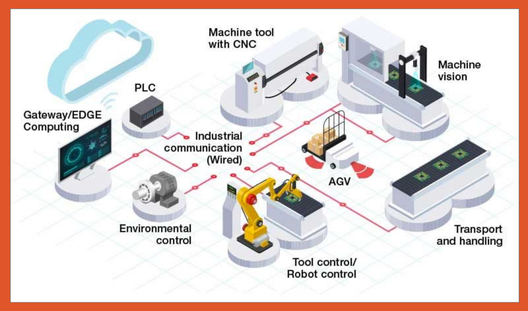

Figure 4: Generic Industry 4.0 Environment. Image credit: Texas Instruments https://www.ti.com/applications/industrial/industry-4-0.html

- The software tool we have designed will eventually be able to integrate with connected devices in industrial environments, such as sensors, robotic arms, and other HoloLens devices in the area. Specifically, this has potential to simplify and increase the efficiency of inspection processes via visual reporting.

Oregon State University

Mixed Reality Inspection Tool

Combining Mixed Reality Technologies to Augment Human Cognition Across Manufacturing Domains

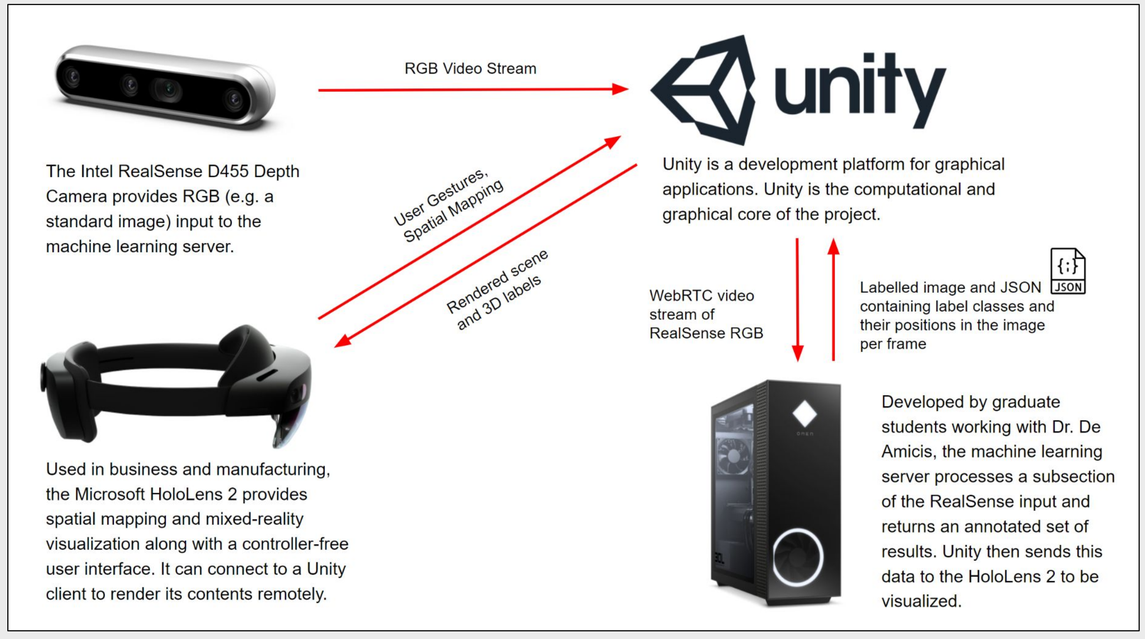

Figure 1: The top-level system architecture.
Since the software components are hosted on a server streaming to the HoloLens 2, this means the system is scalable.

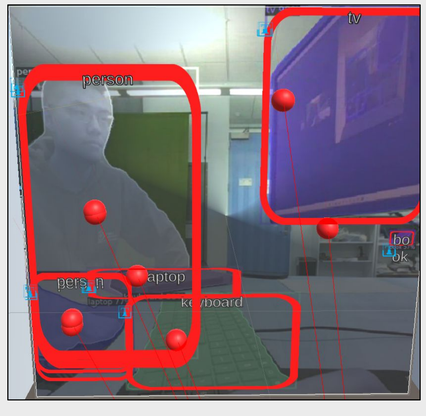

Figure 2: Label projection from the projection anchor view. Red balls indicate the hit points from the projection raycast onto a collider. Each 3D label is generated and transformed around a hit point to fit over their corresponding 2D label from the current labelled RGB frame.

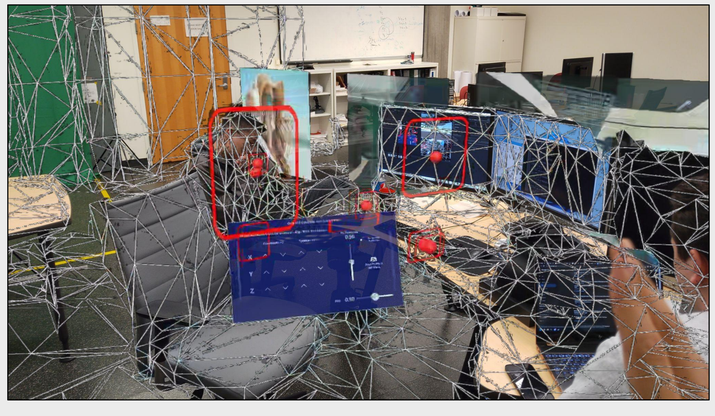

Figure 3: Demonstration of 3D labeling placed over the spatial mesh while wearing the HoloLens 2. The hand menu (the blue rectangle) provides controls allowing the user to fine tune the placement of the projection anchor and manipulate other label parameters.

Next Steps

- Our project is currently limited in the sense that the user has to manually calibrate the label projection anchor over the realsense camera to make use of the 3-D labelling system. This is not only cumbersome, time-consuming, and inaccurate, but also limits the 3-D labelling system to static usage.

- For our next steps, we plan to use a camera that can relay its positional information to the Unity client, thus removing any need for calibration.

About Our Team

- We are a group of three Computer Science undergraduates with an interest in machine learning, mixed reality, and the practical applications of both technologies in the real world.

- Our project partner is Raffaele De Amicis, associate professor at the school of Electrical Engineering & Computer Science. Dr. De Amicis has provided us the equipment, lab, and guidance for the project. His graduate research assistants aided the project, providing insight and solutions to technical difficulties.

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