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Technical Training Augments Reality

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Technicians and engineers in the FAA Academy are revolutionizing the way technical training is being delivered across the nation. Thanks to their own ingenuity, personnel in the Academy have created and adopted customized virtual classroom training. A couple of years ago, a former Division Manager for Technical Operations Training within the FAA Academy, Dan L. Smith instigated world-wide interactive video teleconferencing (VTC) through the use of portable audio-video equipped carts.
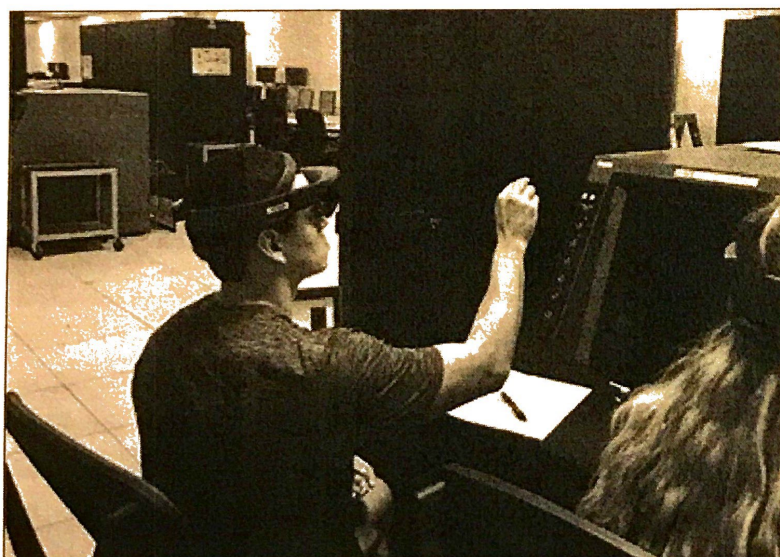
A University of Oklahoma Industrial engineering student researches the HoloLens technology in a Tech Ops lab.

Working within tight budgets to deliver critical training, Smith's staff was tasked with instructing technicians at the Longmont System Support Center in Colorado. They taught the Common Digitizer II Course, and their schedule involved having the students receive three weeks of theory training from the Colorado location, then travel to the FAA Academy in Oklahoma City to obtain a week's worth of hands-on training in a resident lab. This was a feasible means of offsetting training expenses, however the time between taking a theory class, and then working with the equipment in a lab was too much of a time gap. It became difficult for students to reinforce what they had learned between the training sessions. "We saved about $14k on that particular training effort, but more importantly, we were able to give them the training, where we couldn't have before," explained Smith. "The instructors were able to dive deeper into the subject matter, and the students' scores reflected their thorough understanding of the material."

Paul Tanner, an electronics engineer in the Academy's Central Service Branch (AMA-930) designed many of the functionalities of the carts in cooperation with Chris Dumesnil, who was then working as a Manager in the National Technical Services Division. Among several capabilities, the carts can be aligned with several cameras, aiding the instructors in showing the students different content on each of the screens. Dumesnil, now the Division Manager for Technical Operations Training explains, "The carts can do what a five-person production crew can do, but without people attached to them. They [the carts] can be configured with triggers, pressure-sensitive mats, and buttons for the instructors to use."

The carts are used for theory training, but the HoloLens augmented reality headset can allow the lab training to also be delivered via distance learning. The two tools together allow the FAA Academy to deliver an entire training package that is an equivalent to instructor-led training. This is not just speculation, as this has been verified by the research performed by the University of Oklahoma Industrial Engineering students just this year, during their Capstone Research Project sponsored by Mike Monroney Aeronautical Center.

Tony Darnell, Manager of the Terminal Automation Section at the FAA Academy, demonstrates the use of the HoloLens, showing how a virtual astronaut can interact with attendees.

On June 6th-7th this year at the National Center for Employee Development, the second annual Technical Operations Training Summit 2018 was held in Norman, Oklahoma. It was during this Summit that many ideas and experiences were shared about technical training. FAA Academy instructors, Ryan Deachin and Ronald Simms, of the Terminal Automation Section (AMA-421) took center stage, unveiling the practical capabilities of the HoloLens in a live action demonstration. Together, they impressed the attendees with a presentation of how this new auxiliary device could be connected to a Windows 10 processor. The HoloLens is a head mounted tool, where you can see the world around you, but it also allows another person to interact with the user's field of view through hologram drawing tools and arrows. Tony Darnell, Manager in the Terminal Automation Section (AMA-421) expressed, "At its core, the HoloLens is a full blown Windows 10 computer that you wear on your head, so all of your email, spreadsheets, even Technical Instruction Manuals and Orders are also available, just as though you were working at your desk in the office! But because they appear as holograms, with the HoloLens headset, you can adjust their size and place them anywhere in three-dimensional space. In the future, the HoloLens, can support the delivery of holographic instruction, meaning that the instructor appears in the headset as a hologram.

Combining the HoloLens with the portable audio-video carts enhances the virtual classroom experience for instructors and students alike. Dumesnil explains, "The instructor can guide the student using 3-D holographic symbols such as circles and lines. They can draw into the student's vision and they can see what the students are seeing."

Combining the carts with the HoloLens shortens the time between theory training and training in the lab. Darnell says, "Students will be able to transition to equipment training immediately after theory training. Timeliness in getting the hands-on piece of the training is a critical need in reinforcing the learning and thereby creating long term memories."

It appears that a science fiction training environment has arrived. Academy personnel expect that the HoloLens could eventually display most of the equipment within the National Airspace System (NAS) virtually, using holographic images on top of physical objects, which will help the user to feel like they are working with a piece of NAS equipment. Hyper-reality is a combination of physical and virtual objects. Dumesnil submits, "The HoloLens will map the space and recognize the solid structure."

The cart system allows for interactive distance learning experience anywhere in the world.

"The FAA Academy is a microcosm of the National Aerospace System (NAS), where all the operational Lines of Business come together. These endeavors have created an environment of innovation and out-of-the-box thinking. This culture has been enriched by the success of the HoloLens project," says Keith DeBerry, Director of the FAA Academy.

Starting July 30, 2018 -- all FAA laptop replacements will include Windows 10. And starting on August 13, 2018 and continuing through the end of 2019, existing AIT-managed computers will be upgraded in waves. This upgrade sets the stage for full-blown implementation of this new HoloLens technology. Because of the research that personnel in the FAA Academy conducted years ago, they are in a position to take full advantage of what was once deemed sci-fi technology.

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