

Holodisaster: Leveraging Microsoft HoloLens in Disaster and Emergency Management

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Holodisaster is the name of a research project at York University's Disaster, Emergency and Rapid Response Simulation (ADERSIM) initiative¹ that aims to develop holographic disaster simulations that are mixed with the reality and can be viewed using the [Microsoft HoloLens](#) technology. According to Microsoft, HoloLens is the first fully self-contained, holographic computer, enabling users to interact with high definition holograms (*Figure 1*) that is very much different from the existing augmented and mixed reality technologies.

Users can wear the 580-gram HoloLens headset that runs Windows 10 to map their environments and display virtual or holographic 2D and 3D objects anchored to that environment. According to Rod

Furlan², HoloLens results are the best mixed-reality experience to date by a standalone, untethered device.

While augmented and mixed reality seem to have great applications and specialized niches in a number of sectors, including manufacturing, transportation, construction, business, public health and medicine, Microsoft has listed disaster and emergency management as one of the HoloLens application areas and encourages research and developments in this field. HoloLens applications in medical education and air transportation already have begun. For example, Japan Airlines



Figure 1. [Microsoft HoloLens](#).

(JAL) has developed new training applications for engine mechanics and flight crew trainees using the [Microsoft HoloLens virtual reality headset](#).

Practical Scenarios

Consider that you want to run an emergency exercise for a train derailment, plane crash, terror attack, tornado, volcano eruption, mass shooting, or crowd incidents. You can add the derailing train, crashing plane, moving tornado, or erupting volcano to the reality. HoloLens applications enable you to add these scenarios to the real world as 3D holographic objects. You also can interact with these objects through voice, gestures, finger taps, and gazing (see *Figure 2* on [page 21](#)). Alternatively, imagine that you are in an EOC where you can wear your Microsoft HoloLens and view as many maps, videos, TVs and charts as you want without having them all physically installed on the walls.

Development of Applications for HoloLens

Holodisaster is developing various applications for HoloLens

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¹ ADERSIM initiative consists of an EOC form simulation facility and a research training program funded by Ontario Research Fund (ORF), Natural Science and Engineering Council (NSERC), and York University.

² Furlan, Rud, 2016, "The Future of Augmented Reality: HoloLens Microsoft's AR headset shines despite rough edges," SPECTRUM.IEEE.ORG, North American, June 2016, page 21.

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Conclusion

Police, fire, and EMS academies are established, well-recognized methods of training aspiring public safety professionals across the United States. The Emergency Manager 1 course, in New Jersey, has clearly demonstrated this model of training can be successful when applied to emergency managers. More so, this model should be quickly recognized as the new

national standard of baseline training in emergency management and adopted in all states. While the FEMA National Emergency Management Basic Academy is a purposeful first step forward, it must be significantly re-engineered to successfully scale nationwide and target the correct audience of aspiring and new emergency managers. The Emergency Manager 1 course can undoubtedly serve as a template for any state or agency wishing to implement an emergency management academy course in their jurisdiction. ▲

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that can be used in disaster and emergency management, education, training, emergency planning, response, and recovery. From hologram modeling of various hazards to emergency response equipment to simulated disaster scenarios, education and training of emergency managers and personnel are important application areas for HoloLens. Basic emergency management functions such as search and rescue operations, evacuation, mass casualty management, and provision of social services in reception centers can be simulated and practiced using HoloLens applications. Specific applications can be developed for very specific emergency management functions when needed.

Simulated Environments to Train Emergency Managers and the Public

The Holodisaster project is developing simulated environments allowing emergency managers at all levels to educate and train disaster response functions. Adding disaster scenarios to reality in form of augmented reality, the HoloLens enables disaster management trainees to better visualize the disaster scenarios.

The Holodisaster project also develops and tests HoloLens applications for emergency public education. Being able to add hazards to the existing environments as mixed reality, or adding and viewing various risk mitigation actions to the real world, enables people and audiences to better appreciate the hazards and understand hazard mitigation measures. Educating the public about the hazards and



Figure 2. HoloLens in use.

mitigation measures with HoloLens applications could be more effective and personalized. Teaching school age children about hazards in their own environment will be very attractive and much easier with HoloLens. The first public education experiment of Holodisaster was held at York University on Oct. 13, 2016, during the International Day of Disaster Risk Reduction.

HoloLens has promising applications in tele-training and activities as well. Consider situations where certain search-and-rescue operations or use of equipment that can be guided by experts that are not present in the disaster or emergency scenes. HoloLens could allow experts to send themselves into the first responders' environment and guide them virtually in a more realistic manner. Similarly, EOC members can immerse themselves into the disaster scene using HoloLens technology. Needless to say, the same can be applied to situations where emergency management personnel can provide guidance to non-experts (the general public) who happen to be in inaccessible emergency situations or to be the first

persons on a disaster or emergency scene before the arrival of emergency personnel.

Although holographic technology has experienced some disasters in the past (such as google glass), Microsoft has learned from those experiences by putting this technology in the hands of developers and researchers first. As stated by Dr. Melissa DeCapua, who has listed the applications of HoloLens in nursing, "[the applications of this world-changing innovation are endless.](#)" It is evident that combining HoloLens with existing and emerging technologies will create very powerful technologies and tools for future emergency managers. However, in its early stages, there is a great need for close collaboration between researchers and professional to leverage this technology and develop useful applications for it.

The Holodisaster project team welcomes ideas and suggestions from IAEM members and is looking forward to working with practitioners who are interested in developing and using HoloLens in applications in disaster and emergency management. ▲