

EASILY IMMERSIVE HEADS-UP-DISPLAY NAVIGATION

Our proposal is to create a virtual reality simulation utilizing a heads up display interface that provides firefighters access to data and information in order to enhance their ability to combat fires and save lives. We will stress the importance of information that does not impede the firefighter's view of the action while it is happening in a given scenario. The challenge here is to provide the firefighters with details that will improve their performance via Augmented Reality, voice commands and Artificial Intelligence tools. We propose that the visual iconic display on the glass interface attached to the helmet will not interfere with the firefighter's view of his surroundings. The firefighter will also have the choice to be able to switch to solely a voice activation mode for the information from the display.

While there are several different positions such as firefighter, fire captain, battalion chief and firefighter paramedic, this prototype will focus on the role of the firefighter and his communication with the captain. The following are five prime features that we will implement in the simulation to enhance the job of the firefighters:

1. Visibility

We intend to address these issues:

- Night or dark - infrared camera solution
- Smoke and Fire
- Other obstructions

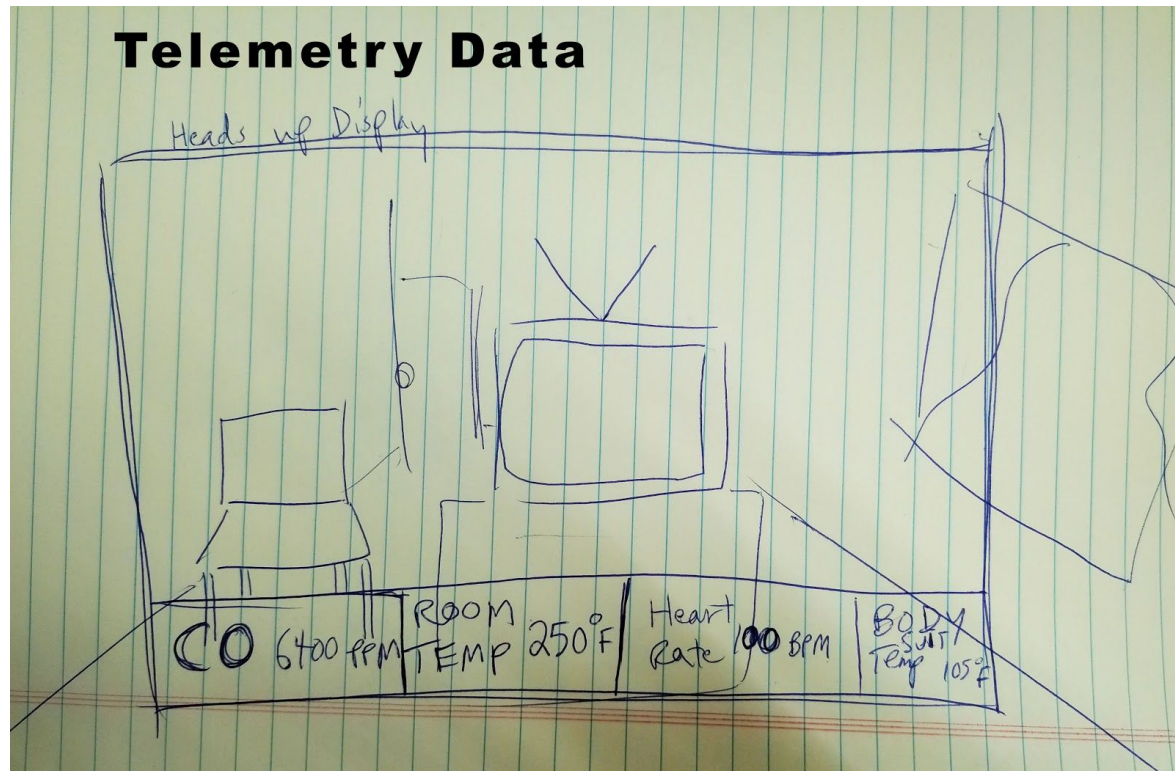
Deterioration of visibility during fires is a known problem for firefighters. With advancements in sensors and HUD displays a solution to this problem can be developed. Infrared cameras can be incorporated into a heads up display that will allow firefighters to see heat zones through smoke as well as help guide and orient the firefighter in low visibility environments.

2. Telemetry -

We intend to address sensory information about your environment:

- How much oxygen in your tank - usually you have 4500 psi or 30 minutes of air - Artificial Intelligence can decide it is too dangerous and you need oxygen or it is safe and you can live without the extra oxygen.
- Your hydration levels, blood pressure and heart rate can be sent to Captain when there is a serious situation at hand
- How hot is your environment - do I need to have a facemask on?
- Smoke detectors or air monitors

Through the use of sensors the firefighter will have a wealth of telemetry available. Data such as oxygen levels in their tanks as well as hydration, heart rate and blood pressure would be readily available. It would be presented in a manner that is non-obtrusive yet aid their skills in fighting fires. Special attention will be given to the fact that this information should not distract the firefighter but allow them to have access to high value information when needed.



3. Open Roof for Ventilation -

We intend to address the situation where there is a need to cut hole in roof to let out heat smoke in the chimney:

- Captain can give information about where to cut the whole and transfer information to the firefighter - heads up display points with the guiding arrow, based on schematics, blueprints or telemetry based on the fire, as well as where water pipes are located in a structure

In addition to having access to telemetric data the firefighter will be in constant contact with his Captain. The Captain would have information different than what the firefighter would have allowing them to make informed decision based on existing and current conditions. With actionable information, the Captain would be able to instruct the firefighter where on the roof to cut a hole, for example. With this information the firefighter would see not only where on the roof to cut a hole but guide the firefighter to the correct location and outline the size of the hole the Captain ordered.



4. Pumper truck -

We intend to address the issues relevant to the pumper truck:

- How high and how far can you get the water to go
- How much pressure do you have
- How much water do you have in your truck - when will the 500 gallons run out if in 2 ½ minutes and when to connect to a hydrant

Ladder truck -

We intend to address the issues relevant to the ladder truck:

- How high up does this ladder need to go

With a HUD display the firefighters would no longer need to estimate the reach of the water stream of their pumper trucks since the HUD will take care of it. The HUD would outline the stream and its reach and offer guidance as to how best to use the water and or ladders in their fire trucks.

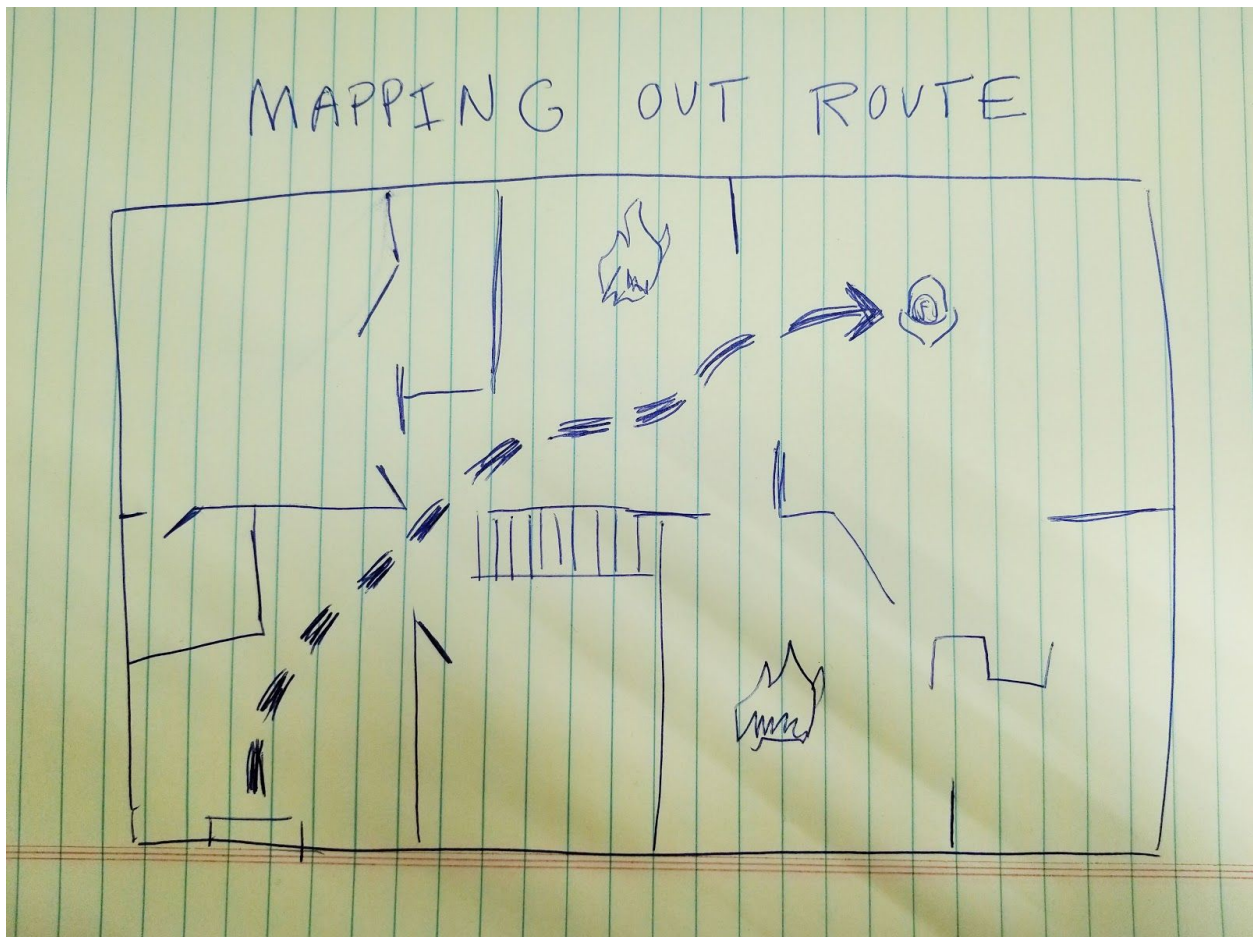
5. Mapping Out route

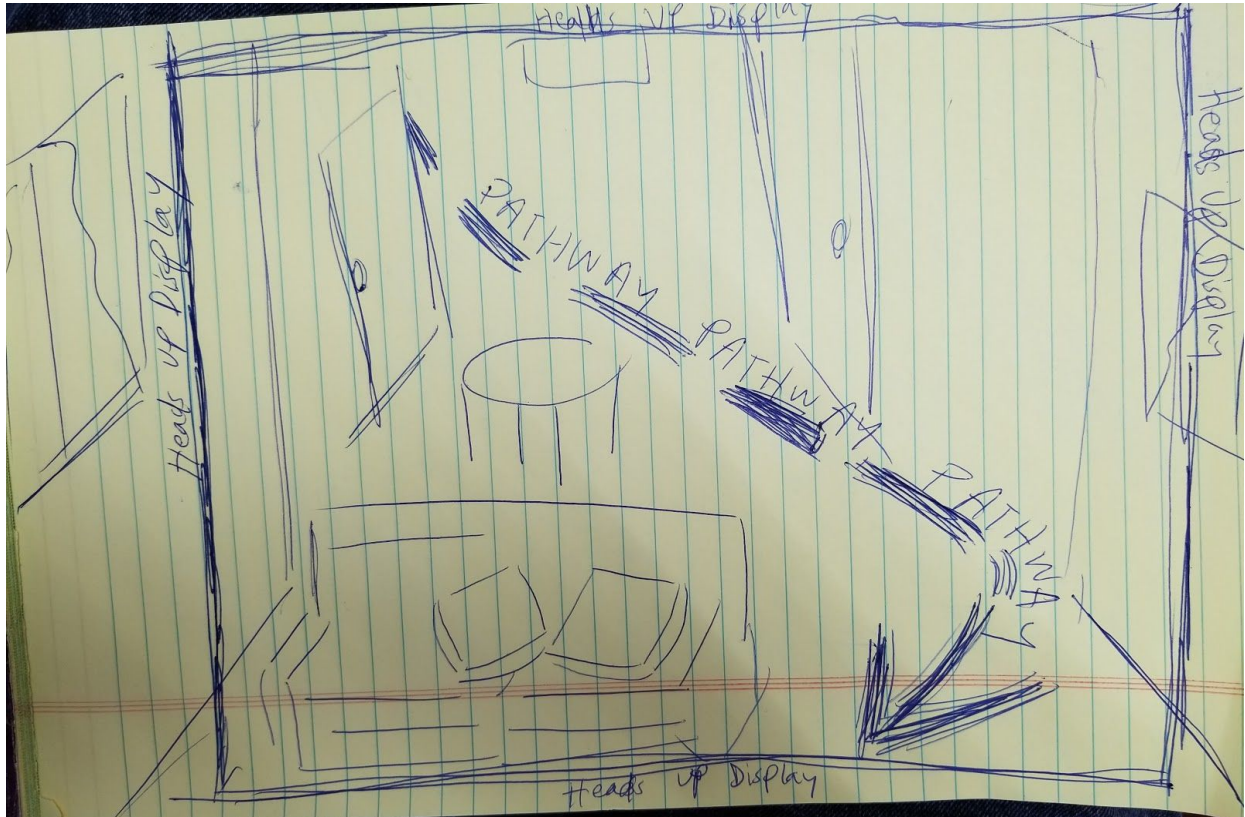
We intend to mapping out a route one takes in a given area:

- Heads Up display records your path
- Will utilize that path as a guide to safety or let your captain and other firefighters know your location

- Captain will see the best route that matters for the firefighter in trouble

An important role the HUD will have is in search and rescue of firefighters themselves. While entering a fire the HUD will map their progress through the structure. This mapping as well as information regarding the firefighter's stamina will be relayed to a central computer that will monitor the firefighters vitals e.g. oxygen levels in their tanks, body temperature, heart rate and location. Artificial intelligence will be used to assess the firefighters safety and in case they become incapacitated or find themselves in an emergency situation, the AI will alert the Captain with the location, vitals as well as best route to reach them.





Biographies of the Team:

Michael J. Brenner

Michael J. Brenner, Trainee, Virtual Reality Academy and Development Lab @ CUNY on the Concourse, Lehman College partnered with EON Reality, is currently in the inaugural year of the offered program which focuses on both Virtual Reality and Augmented Reality. As a visual thinker and designer, he hopes this training will provide him with amazing opportunities that present new and creative professional challenges. He previously graduated from SUNY Fashion Institute of Technology (FIT) where he majored in Advertising Design with a minor in Creative Technology. At FIT, he studied UX and UI design, focusing on functionality and the user. His prior work experience as a lawyer in private practice, and his psychology degree from SUNY Binghamton, have both laid a foundation for his research, persuasion, and presentation skills.

Vincent Navarro

Vincent is the Research Coordinator for the Department of Urology at Weill Cornell Medicine with an appointment as Adjunct Lecturer with the Chemistry Department at Lehman College, City University of New York. He received a BS in Bio-Chemistry and an MS in Computer Science, both from Lehman college. At Weill Cornell, he spends his time developing antibody-drug conjugates targeting prostate cancer. Antibodies developed through his research are currently in clinical trials. At Lehman, he teaches the next generation of scientists and doctors in general and organic chemistry laboratory techniques.

Aaron Holness

Aaron Holness brings years of experience in programming mobile applications for Android, Windows Phone and Windows. These applications include games as well as utility applications. He also

is a trainee at the Lehman College Virtual Reality Academy and Development Lab @CUNY. Aaron also has an extensive history as a real estate investor in New York City.

Michael, Vincent and Aaron have a strong VR/AR background and have a long history working together. We have been working together since early 2017 on a variety of VR/AR projects. One of the projects has been an instructional safety simulation for hazardous chemicals in an oil refinery. In fact, the team are all members of the prestigious Virtual and Augmented Reality Training Academy and Development Lab through EON Reality partnered with Lehman College @ CUNY on the Concourse. EON Reality is one of the largest Companies in the AR/VR field. EON Reality is an international leader in the VR/AR markets. EON Reality has been around for almost 18 years, involved in knowledge transfer in Industry Education and Edutainment. Lehman College is one of the leading colleges in New York City and a part of the City University of New York. This is a one of a kind academy with many types of VR/AR equipment. The lab has access to multiple VR/AR platforms including the HTC Vive. The members of the lab have access to VR/AR experts from across the globe. These experts include EON staff with experts in programming, art and other VR/AR specialties. The training provides modules for virtually every aspect of creating simulations for VR and AR, including agile project management, 2D/3D asset creation, rigging and animation, interactive content development, scripting and program development, immersive stereoscopic deployment, and more. Further information on the program can be found at <http://lehman.edu/vr/>. Between the three of us, we have presented VR projects in various exhibitions such as at the New School, NYU and the Javitz Center, and have been filmed on television news outlets such as CNBC, CUNY TV, and News 12 in the Bronx.