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Screen Door Labs

Screen Door Labs is creating a Heads-Up-Display system to expand the perception of public safety officers. Officers see real time geotagging of each team member, waypoints to the targets, and aerial video feed from drones with their virtual tool belts. They can customize several modes for different information display for each different scenario. In the virtual reality simulation, officers get familiar with the tool belt. After the training, officers wear an off-the-shelf augmented reality glasses and use the exact same holographic tool belt in the field. Our Heads-Up-Display system helps officers perform their missions more safely, effectively, and efficiently.

Most critically, our HUD dramatically reduces the latency of delivering intel from eyes-in-the-sky and team locations to the officer in the field. Instead of using screen sharing from a tablet computer and calling out what a drone pilot sees over the radio, all of the first responders can view the feed while keeping their hands free.

First responders will gain a heads-up-display that enables them to view maps, video, and waypoints while keeping their hands free.
Information will be synced between teammates, reducing latency when compared to voice radio

42 Second Video Overview: https://youtu.be/WLKhZQyQ1OE

Project Description


Each first responder gains strategic view of what the team is experiencing.

Our Heads-Up-Display allows for remote control of the visual elements. Our display is divided into "slots" that can each be programmed to show different kinds of visualizations. Our currently supported data types are:

- Maps (Terrain, Topographical, etc.)
- 3D Scan of the scene from an Unmanned Aerial System
- Streaming Video from a UAS
- Streaming Video from another officer's AR glasses
- Pictures, such as a mugshot of a suspect
- Text message alerts
- Sensor Readings, such as location accuracy

The commander on scene, or an operator located remotely, can use a companion app (available for both Android and PC) to remotely configure their team's HUDs on demand. For example, if a new helicopter comes on the scene and locates the suspect behind a wall, the commanding officer can select that helicopter's feed and set it to display on slot 3 of everyone's HUD. Additionally, the commander can set a waypoint to where the suspect is hiding, and all of the HUDs will show an outline of where that location is, properly rendered based on the user's location.

Three slots are mounted to a virtual tool belt, while two additional slots are mounted to a stationary point on the glasses. The commander and the team members can configure their displays when the environment changes. The can save several different display presets and switch in between
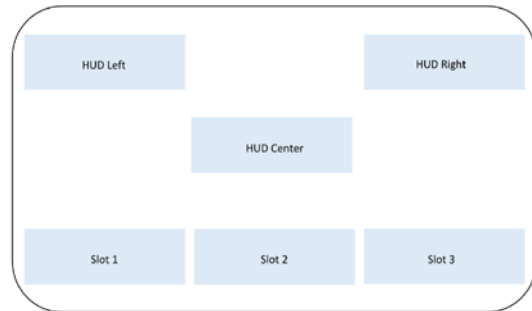
Visual "Slots" available on our Heads-Up-Display prototype

Example View: Slot 1 shows a map while HUD Right shows power levels and sensor readings. A waypoint is seen surrounding the suspect
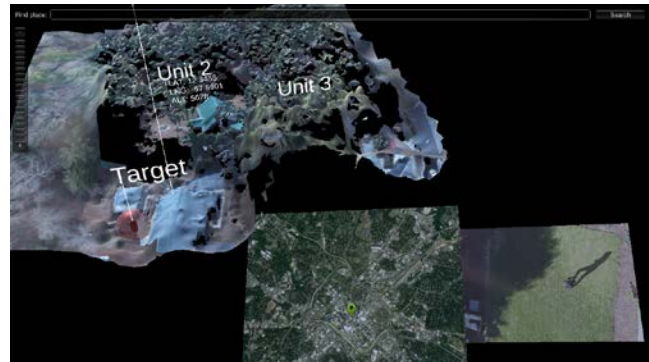

Example View: HUD Center displays a 3D map of the environment

them with a tap. Information displays are all synchronized by the server, giving the commander the ability to see precisely what each member see and thereby make sure each of them sees what they need to and when they need. Each officer can turn off the tool belt function in the simulation with a double tap. This is designed to allow them to completely focus on the environment when needed.

The Plan:

Screen Door Labs is building this project as a commercial solution. It has finished demo at Office of Los Angeles Mayor Eric Garcetti, and had conversations and demos with police officers/captains ranging from Virginia to California. Screen Door Labs believe users are who we serve. By constantly and continuously talking to law enforcement and learn from them, we can design the product that is easy to use and work just as they were to design it themselves. Through Office of Los Angeles Mayor Eric Garcetti, we are invited for a meeting with the port police later this year.

Example View: Slot 2 shows a satellite map, Slot 3 Shows a video feed from a UAS, and HUD Center displays a 3D map of the environment

Our design approach focuses on what augmented reality glasses (such as the HoloLens, Vuzix Blade, and the Epson Moverio) can do today while being forward compatible with glasses that are still in development (such as the Magic Leap and ODG R9). We will use Virtual Reality headsets (such as the HTC Vive) to assist with user training. Our User Interface and HUD will be standardized between both Virtual Reality and Augmented Reality, so training on one system applies directly to use of the other.

Current hardware shortcomings include the difficult of capturing video from an Unmanned Arial System and streaming it to other devices. This processes also commonly induces extremely high levels of latency. We will use an HDMI to RTSP converter to standardize the signal into a data network, then stream it from a server to our HUD app. By using a separate streaming device, we reduce latency of the host.

Some current heads also have difficulty with retaining gyroscope accuracy over several minutes. We are incorperating sensors fusion techniques to integrate the magnetometers and other sensors on AR/VR headsets to maintain accuracy.

Performance metrics include:

- **Ease of switching HUD modes** (seconds, taps)**:** How long does it take for a user to switch the visual mode of a HUD slot?
  - Target: Less than 5 seconds and four taps
- **Time reduction to navigate to a location** (in seconds per event)**:** To what extent does our system reduce time to understand a precise location and find a walking route there?
  - Target: Save > 5 seconds per event and > 5 seconds per target change when compared to calling over a radio
- **Accuracy in knowing a teammate's location** (in yards/meters): If we ask a first responder to estimate the location of a squad mate, how accurate is their response
  - Target: Improve estimate accuracy by > 5 meters when out of line of sight compared to calling over a radio
- **Display accuracy** (in degrees of visual arc): If an icon is drawn over a waypoint, how far many degrees out of alignment is the hologram from the real thing?)
  - Target: Less than 15 degrees
- **Latency** (in seconds)**:** To what extent does our video stream
  - Target: Less than 3 seconds from observation to display on the HUD

Resume Information

Kari Wu

Co-Founder, Business

Kari Wu earned both her MBA and MS in Media Ventures from Boston University. Her father taught at Taiwan Police College and her grandfather was a police officer for more than 30 years. She was a television reporter for 3 years and had published her book, *Startup Fever: How Failure Can Prepare You For Success*. She had internship experience with MassVentures (a Boston-based venture capital), Emblematic Group, and Two Bit Circus. She lives in LA where she connects to the Asian American community. Kari speaks both English and Mandarin Chinese. Kari Wu gained her Human-Centered Design certificate from IDEO.org.

Seth Persigehl

Co-Founder, Technical

Seth Persigehl is a full-stack engineer with 5 years combined experience working for the government, the past two of which focused specifically on data visualization in mixed realities. He also volunteered with a Virginia emergency radio group supporting the county's fire department. Before venturing to CA, he was a leader in the 1,800+ member DC Virtual Reality meetup group. He has solid personal relationships in the greater DC metropolitan area, Pennsylvania, and Kansas.

SETH PERSIGEHL

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SUMMARY

Seth Persigehl is a full stack AR/VR engineer. He has worked for the government in DC for five years, focusing specifically on VR data visualization for the past two. He was a co-organizer of the 1800+ member DCVR meetup community and a frequent AR/VR hackathon attendee. As a serious gamer, he is actively developing an AR display plugin to serve the Factorio gaming community. He has also 3D printed and programmed a functional NASA Apollo guidance computer that was featured on *kotaku.com*.

Seth lives and breathes technology: he assembled a network of three 486 computers using serial ports when he was 6, built his electric bike from parts when he was 14, and when he got to college converted an M185A3 military repair truck into an off-road mobile gaming center.

EXPERIENCE

Augmented Reality Engineer
Screen Door Labs, Los Angeles, California, 2017 to present
- Creating an AR solution to extend the perception of public safety officers by utilizing headsets, drone feeds, geotagging, and real-time communications.

Virtual Reality Engineer
Great-Circle Technologies, Chantilly, Virginia, 2015 to 2017
- Developed data visualization applications for the Government, including geospatial information, social networks, DNA, and others.
- Educated government decision makers on the capabilities of AR/VR by giving presentations, attending technical exchange meetings, and writing original documentation.

Virtual Reality Technologist
Self-Directed Study, Springfield, Virginia, 2013 to 2015
- Experimented with cutting edge Virtual Reality headsets, including the Oculus DK 1 and DK2.
- Researched and created VR prototypes in the Unity and Unreal Engine game engines.

Network Technician B – RWIC Level IV
Washington Metropolitan Area Transit Authority, Network Communication Services – Wireless Infrastructure Group, Washington D.C, 2011-2013

EDUCATION

Massachusetts Institute of Technology (2016)
- Big Data and Social Analytics Certificate

Northern Virginia Community College (2008)
- 45 credits completed towards AS of Computer Science

CERTIFICATIONS

Unity Certified Developer · FCC Amateur Radio General · IC³
Comp TIA A+ · WMATA Roadway Worker In Charge IV

LANGUAGES

Unity C# · Unreal Engine 4 · Python · Microcontroller C++

KARI WU

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SUMMARY

Kari is an MBA driven to use AR/VR to spread ideas across the world. She has analyzed expansion plans at four AR/VR startups. As a former television news reporter, she published a book on how failure prepares startups for success. Kari thrives in the fast pace life of working on product ideation and development.

EXPERIENCE

Augmented Reality Product Manager, 2017 to present
Screen Door Labs, Los Angeles, CA
- Create an AR solution to extend the perception of public safety officers leveraging 4G LTE
- Identify partners including AR and drone manufacturers

MBA Intern (Immersive Media), 2016-2017
Two Bit Circus, Los Angeles, CA, 2017
- Conducted market research for their location-based entertainment

Emblematic Group, Los Angeles, CA, 2017
- Initiated strategic movements on product creation and marketing
- Standardized and recorded production processes

MassVentures, Boston, MA, 2016
- Conducted due diligence on a $10 million VR startup

Jamong, Daegu, South Korea, 2016
- Advised the leading Korean VR startup on global expansion
- Sponsored by Daegu Digital Industry Promotion Agency

Independent Media Consultant, 2014-2015
MPT Consulting, Taipei, Taiwan
- Led social media content development with 16 staff from 7 offices
- Managed Facebook accounts; grew following by 500% in six months

Reporter, 2011-2014
TVBS TV Network / CTITV Television Inc, Taipei, Taiwan
- Planned programming content, resulting in 98% of feature news pitches entering production
- Interviewed over 200 startup entrepreneurs globally

EDUCATION

Boston University Questrom School of Business, 2015-2017
- MBA (Dean's Achievement Scholarship)
- MS in Media Ventures (STEM program)

IDEO.org, 2015
- Human-Centered Design (Design Thinking Training)

National Chengchi University, 2007-2011
- BA, Journalism (CNN iReport University Program)

PUBLICATION

Startup Fever: How Failure Can Prepare You for Success, ISBN:9789865695385

HACKATHONS

Outreach Lead, "Creating Reality", Los Angeles, CA, 2017
Participant, MIT Media Lab's "Reality, Virtually", Boston, MA, 2016
- Developed a VR survival game with a team of 6

LANGUAGES

Mandarin Chinese · English

Support Letters

Seth Persigehl *is a genius. My experience working with him at GCT was one of constant wonder. It felt like he had a new demo or new technical milestone ready everyday when I came to work. These projects ran the gamut from reviving the dead server we threw in a closet (it was an issue with a chunk of memory) to programming the physics of a chain in his latest VR demo. Humble, willing to work, and capable of technical miracles, I know it's just a matter of time till his company goes big.*

In the time I worked with him Seth independently engineered a point to point wireless network using first responder spectrum; he programmed and installed a bunch of raspberry pi units to run the lights and other systems in his house (pre-nest!); he designed, built, and sold a VR-based data vizualization rig (obviously); and, many other fantastic projects. My only regret is that I don't have the capital to fund his company right now.

—Eric Groo, Research Statistician at Great Circle Technologies Inc

Smart and competent, **Kari Wu** *will go far. She was a great intern at Emblematic and we keep trying to find way to bring her on full time into our tiny boot-strapped company!*

—Nonny de la Peña, CEO and Founder of Emblematic Group

Kari Wu *served as an intern for MassVentures during the summer of 2016. She has a background in television journalism and social media marketing, and was completing her MBA at BU. We found her to be a great worker. She is innately curious and full of questions, moreover, she is brave and willing to ask them.*

—Jennifer Jordan, Vice President/ Venture Capitalist at MassVentures

Expanding Perception for Public Safety Officers

◇ Screen Door Labs

Project Summary

- Screen Door Labs is creating a Heads-Up-Display system to expand the perception of public safety officers. Officers see real time geotagging of each team member, waypoints to the targets, and aerial video feed from drones with their virtual tool belts. They can customize several modes for different information display for each different scenarios. In the virtual reality simulation, officers get familiar with the tool belt. After the training, officers wear an off-the-shelf augmented reality glasses and use the exact same holographic tool belt in the field.

Participant Summary

- Kari Wu has her Human-Centered Design certificate with IDEO.org on top of her MBA/MS in Media Ventures. Her grandfather was a police officers for more than 30 years. She has worked with 4 VR companies before starting Screen Door Labs.

- Seth Persigehl is a full-stack Augmented Reality engineer with 5 years combined experience working for the government, the past two of which focused specifically on data visualization in mixed realities. He also volunteered with a Virginia emergency radio group supporting the county's fire department.

Technical Outcome

- First responders will gain a heads-up-display that enables them to view maps, video, and waypoints while keeping their hands free.

- Information will be synced between teammates, reducing latency when compared to voice radio