Products of Creative Activity

Augmented Reality

Hospital AR
Quartz AR
Faciem AR

Virtual Reality and 360 Video

VR Drone
VR 360 Robot
360 LifeStream
"Out of the Blue: Galapagos in 360," *The Washington Post*

Artificial Intelligence and Human-Computer Interaction

My Reporter
FilmSync
Gesture News

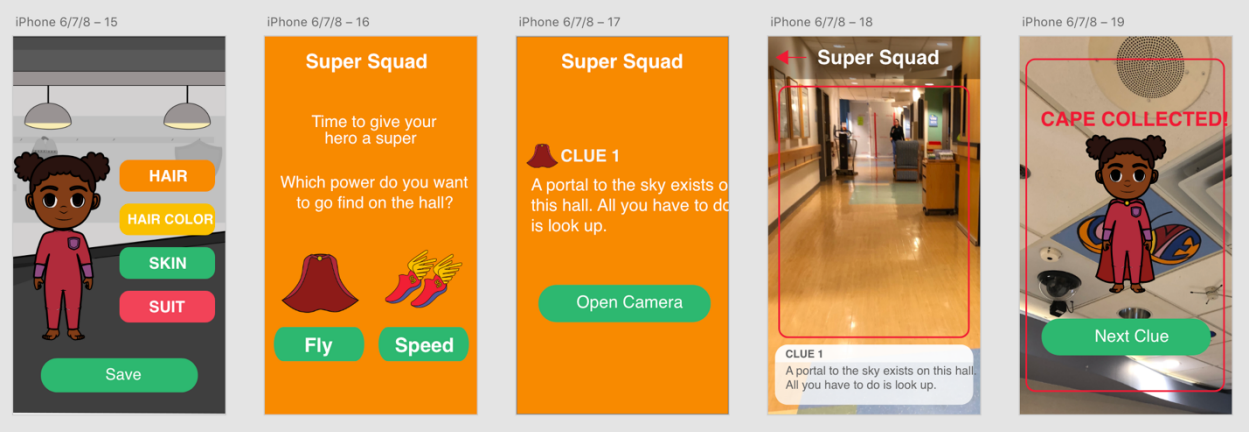
Augmented Reality

Hospital AR

Quartz AR

Faciem AR

Hospital AR: Augmented Reality Mobile Application to Mobilize Hospitalized Pediatric Patients



Screenshot of prototype for Super Squad AR App

Super Squad is an augmented reality app that leverages storytelling, gamification and augmented reality to engage pediatric patients at UNC Children's Hospital in physical activity. The app leads 8- to 13-year-old patients on a journey through the hospital floor to find clues and solve problems. Collaborating with UNC pediatrician and faculty member Dr. Richard Hobbs, M.D., we have designed the experience to improve patient outcomes and solve the problem of motivating long-term pediatric patients to exercise.

The initial prototype funding came through two awards: a $10,000 gift from Bandz Boyz and a $10,000 grant from UNC Hospitals' Innovation Fund. The project will be implemented in Fall 2018 with plans to expand to multiple children's hospitals across the state.

Demo Video

Role	Co-creator, Technical Director
Funding	$20,000
Publish Date	Pending September 2018
More Information	bit.ly/hospitalAR

Quartz AR: Drone-Captured 3D Models of Landmark Buildings Presented in Augmented Reality for Quartz Publishing

Early prototype 3D model of L.A. housing project created from drone footage for Quartz

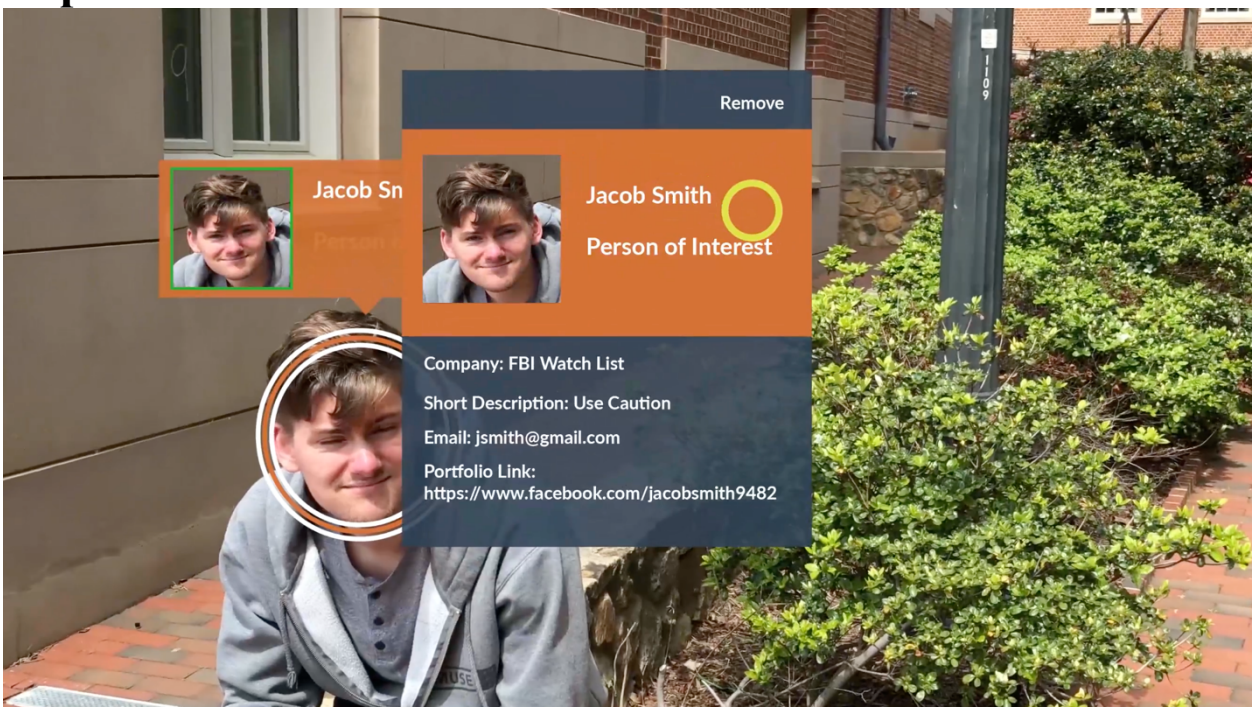
In partnership with Quartz, one of the top 10 news apps in the Apple App Store with 20 million monthly users, the mobile AR experience combines videogrammerty, photogrammetry, pre-programmed drone waypoint flying, open-source augmented reality code-bases and 3D authoring to create a unique AR news experience for a large audience.

This project leverages existing research from UNC Emerging Technologies Lab projects and was fully funded by Quartz for $7,500. The project will launch in Fall 2018.

Demo Video

Role	Lead Researcher, Technical Director
Funding	$7,500
Publish Date	Pending November 2018
More Information	bit.ly/hospitalAR

Faciem AR: Augmented Reality and Facial Recognition Experience for Field/Beat Journalists

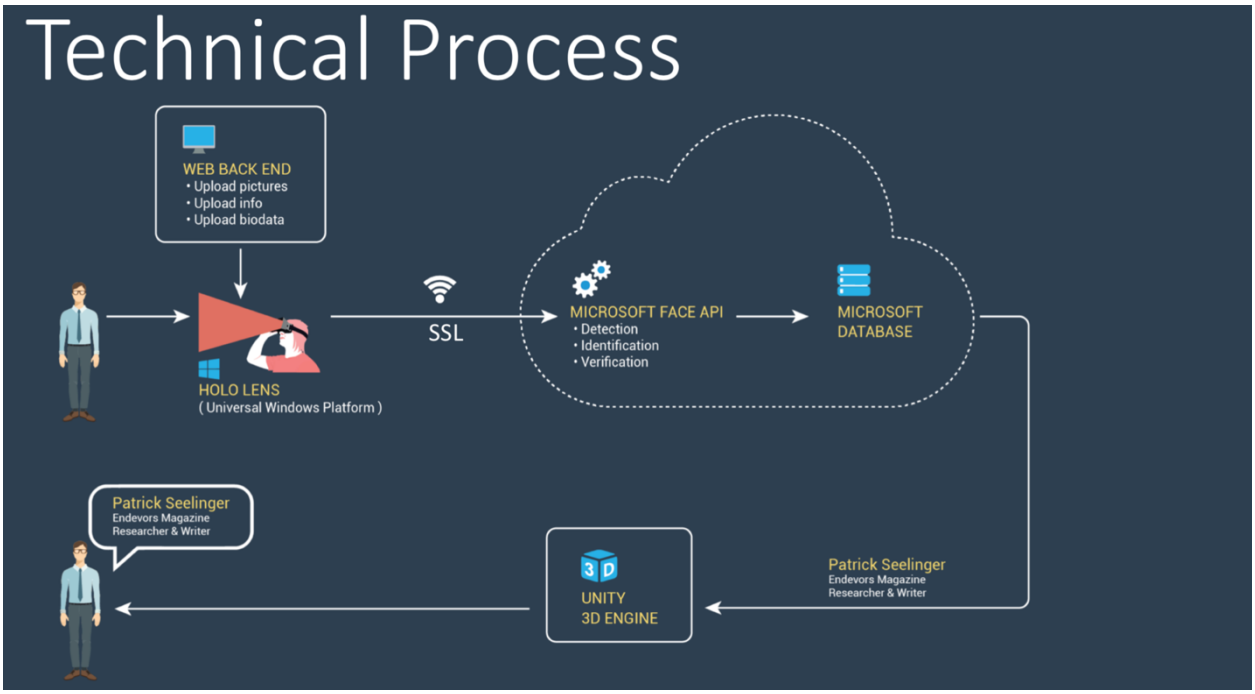


Screenshot of HoloLens heads-up display of Faciem AR's facial recognition technology

Faciem (Latin for Face) uses Microsoft's HoloLens and facial recognition algorithms to present the names, titles and publicly-available information about public figures to journalists via a heads-up display, allowing journalists to identify public figures at events in their community.

The project is in the commercialization phase and has since been modified for government security applications. Faciem AR was one of 20 companies invited to present and demo to the U.S. Army's Thunderstorm 18, an elite showcase of new technologies that solve existing problems facing the armed forces. Thunderstorm is a classified, invitation-only, three-day event presented by Southern Command Special Forces and Penn State University. Faciem AR was also invited to present to the Transportation Security Administration for potential use in securing airports.

The application leverages the sensors, projectors and processing power of the Microsoft hardware and uses mobile data networks and cloud technology to recognize the face. The augmented reality graphics are produced dynamically and presented in the glasses in 3D space to enable the user to continue working and interacting while receiving the information.



Technical process and system overview of Faciem AR

Demo Video

Role	Lead Researcher, Creator
Funding	Reese News Lab Innovation Funds
Publish Date	January 2018
More Information	bit.ly/sk-faciemAR

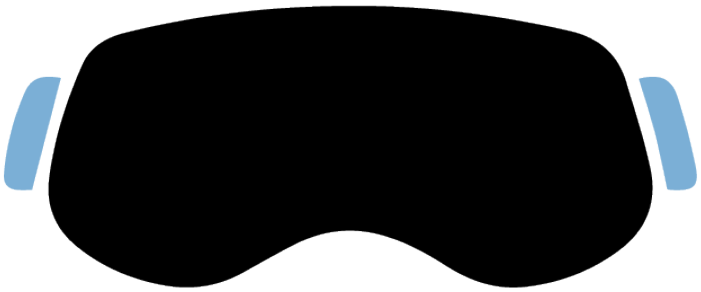
Virtual Reality and 360 Video

VR Drone

VR 360 Robot

360 LifeStream

"Out of the Blue: Galapagos in 360," *The Washington Post*



VR Drone: Flying Camera Platform for Recording Live Virtual Reality Video

Early version of the custom-built VR Drone including a UNC-designed and built 14-camera stabilization rig

The custom-built large hexacopter captures smooth 360-degree aerial video content for news organizations and film productions using a custom gimbal commissioned for this purpose. *The New York Times* is a partner and will be the first to use the drone in an upcoming international project. The VR Drone was presented at the Journalism Interactive Conference in October 2017. The concepts and design were used by McClatchy Publishing and their innovation lab, Video Lab West, in 2017.

This technology, a combination of hardware and software, solves the significant problems of capturing aerial 360 that is smooth and stable. 360 video storyteller and journalist have struggled with issues caused by vibration, movement and stitching of multiple cameras which are addressed by this technology.

Development of the VR Drone took multiple iterations. The drone can now accept multiple commercial camera rigs and do live streaming for breaking news. The drone requires a licensed pilot and can carry a 17-pound payload.

VR Drone with the Insta360 Pro camera attached

While developing this large drone, we worked with UNC Campus Police Chief Jeff McCracken and the UNC administration to help create the policy to enable drone flight on campus.

Learn More

Role	Lead Researcher, Creator and Pilot
Funding	Reese News Lab Innovation Funds
Publish Date	January 2018
More Information	bit.ly/vrdrone

VR 360 Robot: Human-Tracking Robot for Recording and Streaming Live Virtual Reality Video (360 Video)

Ducille is a semi-autonomous rover that captures smooth 360-degree video content. It can be controlled remotely or can follow an on-camera reporter. The prototype was presented during the opening keynote at the Journalism Interactive Conference and presented at the Online News Association Conference in 2016. Journalism Interactive is the top academic media innovation conference and ONA the largest professional organization. Ducille is being used by WRAL, a local news broadcaster, and was used by *The Washington Post* at the 2016 presidential political conventions. The project was funded by Reese News Innovation Funds and is currently in the commercialization process.

A fourth generation of the robot is in development with Segway Robotics that will include a custom application for journalists and 360-degree video. This partnership will enable a more affordable robot for journalists across the industry and will be available in January 2019 for less than $2,000.

The robot solves several issues facing virtual reality storytellers. It enables the journalist to get out of the scene when shooting 360 degrees or puts them in the frame by letting the journalist lead the 360 audience on a tour via the following robot. It also captures smooth, stitchable, moving 360 video which is has been quite difficult prior to this solution.

The original prototype in December 2015 started with a small step ladder, drill motor and a wench remote so the producer/journalist could get a moving 360 video shot. It was simple and accomplished the task but was heavy and unreliable. This prototype evolved to a robot built on an outdoor, weatherized robot development kit which enabled public presentation at conferences in 2016 and 2017 that lead to support from the Knight Foundation.

Demonstrating Ducille to Chancellor Folt and the UNC Chapel Hill's Board of Trustees

In the summer of 2017, a completely custom, semi-autonomous robot was designed and built but at a cost too prohibitive for local and regional media companies to afford. After learning from our first three iterations, we developed a partnership with Segway to build our journalist and 360 video functionality as an integrated addition to a robot they plan to bring to market in the fall of 2018.

Learn More

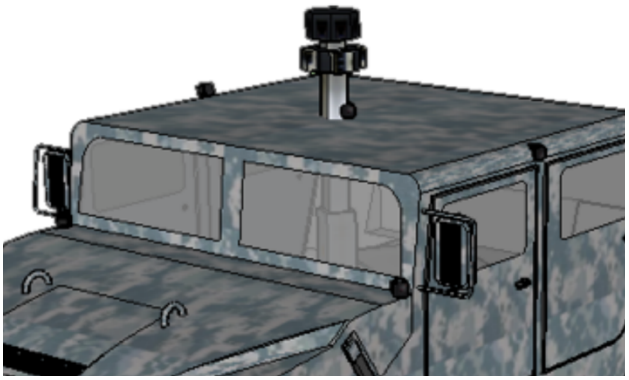
Role	Lead Researcher, Creator
Funding	Reese News Lab Innovation Funds
Publish Date	October 2016 - current
More Information	bit.ly/vrrobot

360 LifeStream: Mobile Real-Time Stitching and Streaming Process for 360 Video Content

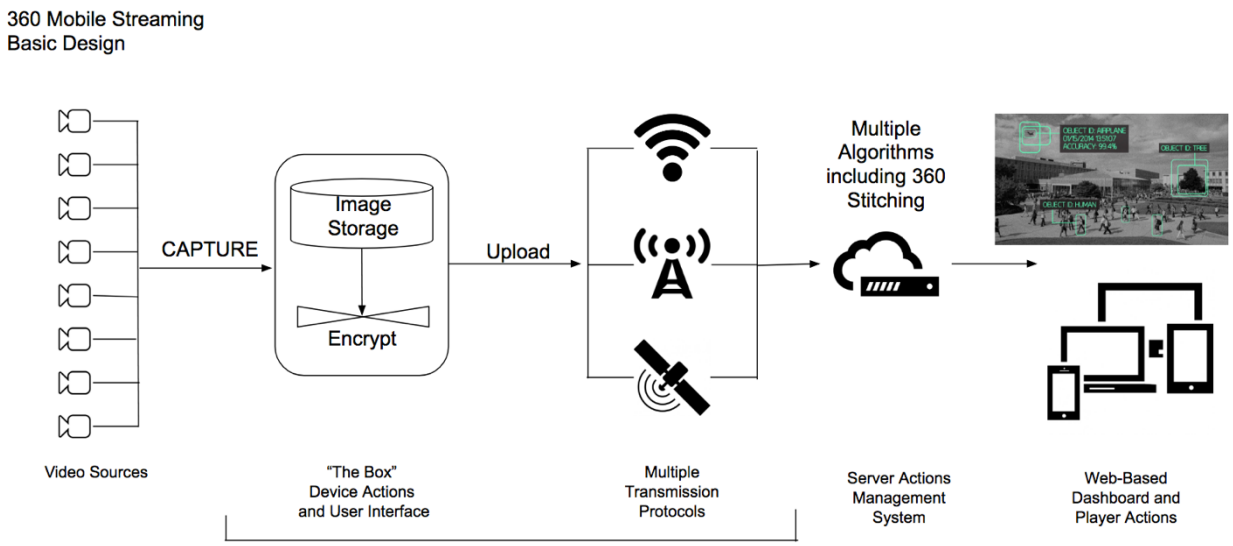
Kentucky State Police test a prototype of 360 LifeStream

VR LifeStream is an application developed to provide broadcast organizations and police vehicles real-time video streams of live situations. The project started as a collaboration with Dr. Diane Pozefsky in the UNC Computer Science department and was initially funded with a gift of $10,000 from a donor. It has since been commercialized and licensed to Kampouris Security for deployment to local police departments and the military.

The project was tested with the Kentucky State Police and presented to U.S. military but was suspended due to lack of funding and competition from consumer cameras and larger security companies.



The system can stich the images in the vehicle or in the cloud and streams that image and metadata to a command center in real time.



Overview technical design of 360 live stitching and streaming system

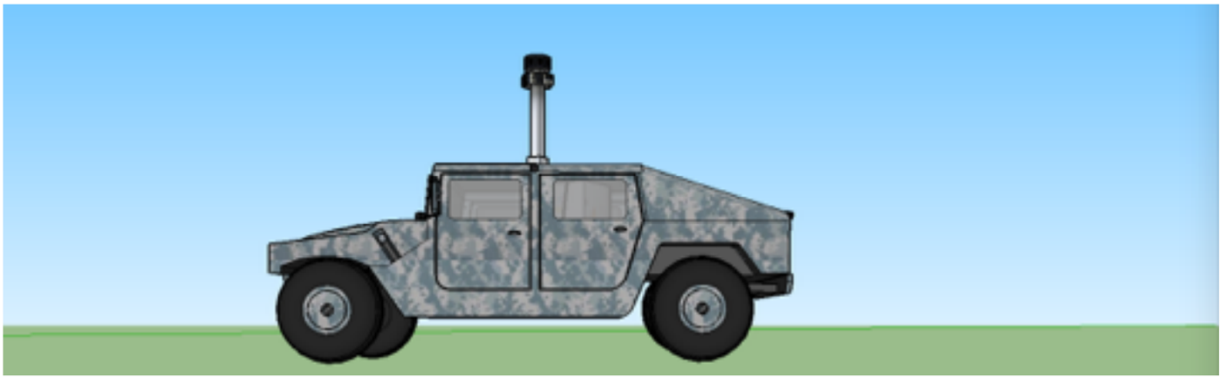
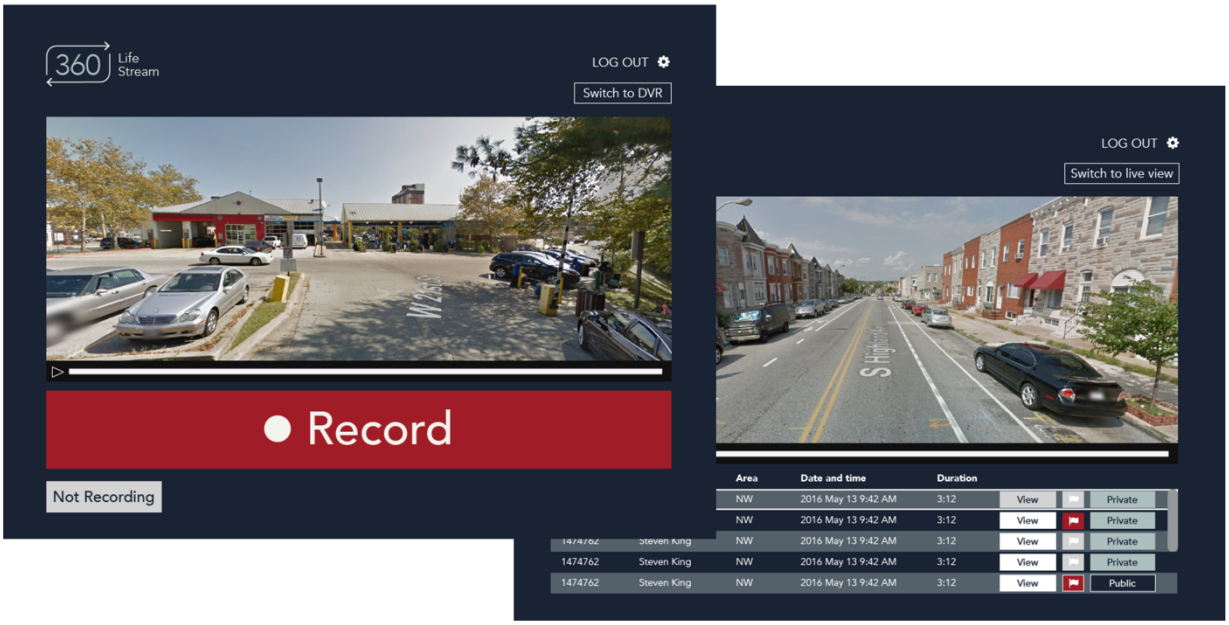


Fig. 2 Standard Humvee with 360 Video Mast in raised position ready for live stitching and streaming.

Concept design image and example stitched video image presented to U.S. Army

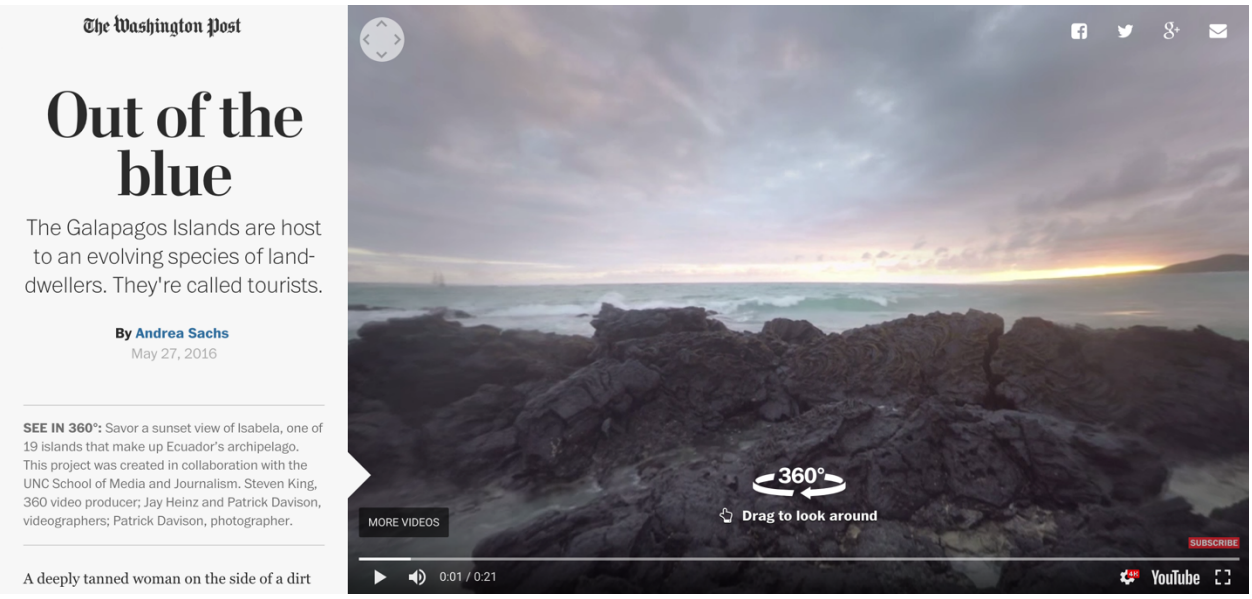


Screenshots of in-car user interface

Learn More

Role	Lead Researcher, Creator
Funding	$10,000
Publish Date	Presented in 2016 - 2017
More Information	bit.ly/vrlifestream

“Out of the Blue: Galapagos in 360,” *The Washington Post*



Screenshot from washingtonpost.com/graphics/lifestyle/galapagos

To help *The Washington Post* learn how to create content in 360-degree video, I led a team of journalists, photographers and videographers on a 360-video interactive documentary project shoot in the Galapagos Islands. The coverage was published May 27, 2016, on *The Washington Post* website, print edition and mobile app. It included a behind-the-scenes article about how the project was created. The endeavor was funded with a $25,000 gift from the Washington Post Innovation Fund.

Watch Video

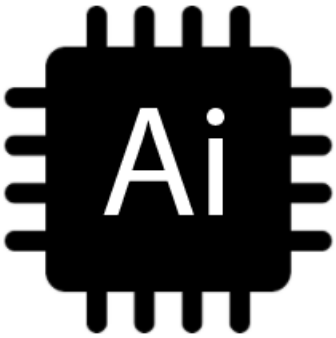
Role	Producer, Editor
Funding	$25,000
Publish Date	May 27, 2016
More Information	bit.ly/twp-blue

Artificial Intelligence and Human-Computer Interaction

My Reporter

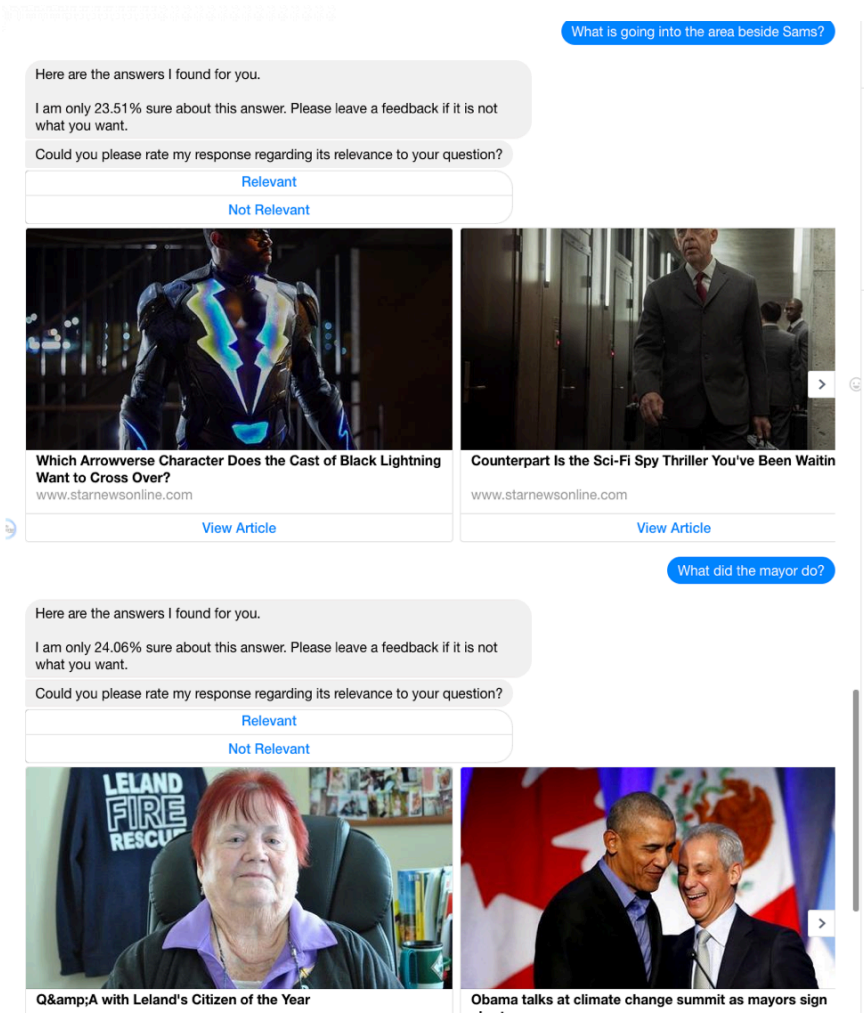
FilmSync

Gesture News



My Reporter: Artificially Intelligent Journalist Messaging Bot

Leveraging IBM's Watson Cognitive Computing technology, the My Reporter bot trained on thousands of newspaper readers' questions and hundreds of journalists' responses and then indexed local and national media sites and information services to provide responsive answers about the local community to readers. The first implementation is with *The Star News* in Wilmington, N.C. It will launch in app stores as *The Pulse* in September 2018 and can be customized and deployed to other publications quickly.



Screenshot of training the bot on localization

Learn More

Role	Lead Researcher, Creator
Funding	CISLM Knight Funds
Publish Date	September 2018
More Information	bit.ly/myreporter

FilmSync: Contextual Information Delivery System for Asynchronous Viewing of Linear Experiences

Diagram of FilmSync interaction

The FilmSync app uses open-source digital watermarking technologies and pitch-detection processes in a unique way to provide delivery of server-based content in sync with linear presentations when viewing live events or when recorded or streamed later. The project was a recipient of Knight Prototype Grant for $35,000 in 2014.

This technology helps the journalism industry engage audiences through second-screen experience apps. News and documentary producers can provide additional, contextual information in sync with the video content for an informed viewing experience. It also has implications in online learning environments and distributed classrooms. It was commercialized and licensed to ASK-Media for distribution.

Learn More

Role	Lead Researcher, Creator
Funding	CISLM Knight Funds
Publish Date	September 2018
More Information	bit.ly/filmsync

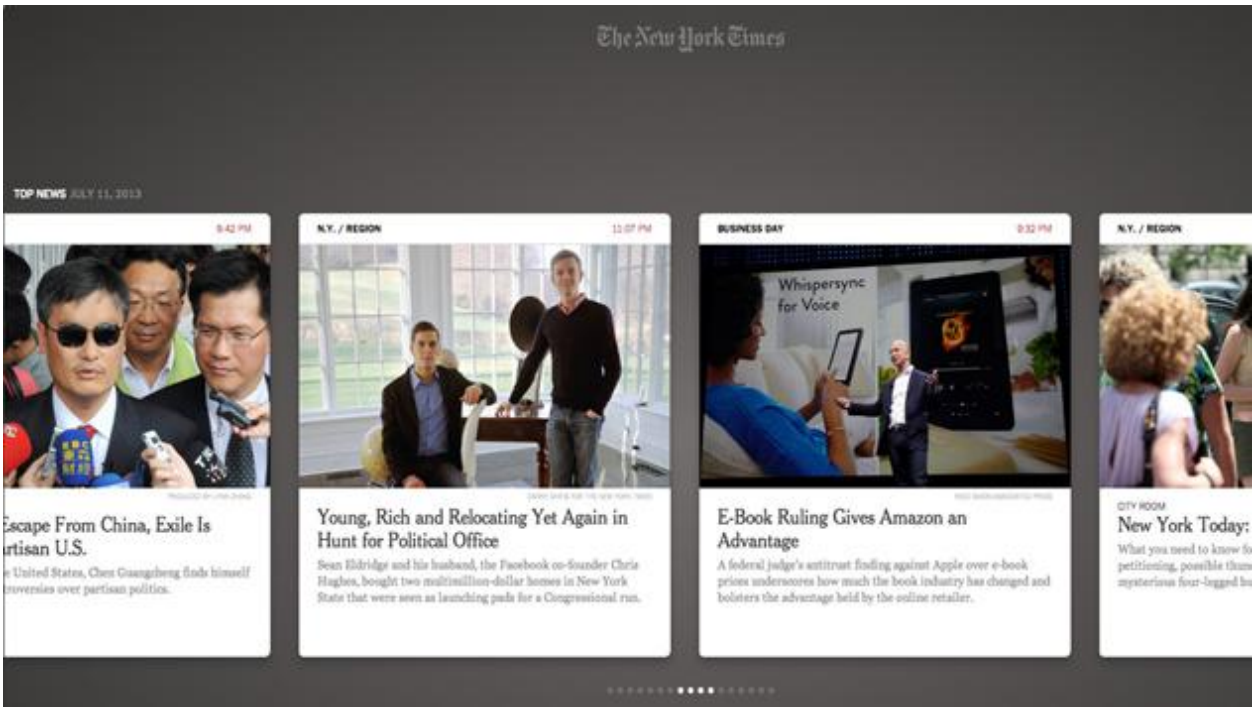
Gesture News: Non-touch Gesture Interfaces for Interacting with 3D Models and News

Executive Editor of *The Washington Post*, Martin Baron, demonstrates the gesture interface on a 3D model at the 2015 White House Correspondents' Dinner

This technology demonstrates an innovative approach to interacting with 3D content by using portable motion tracking. The interface allows users to interact with the content without touching any computer device.

The first implementation of this technology was for *The Washington Post's* "Intensive Care for a Damaged Dome" experience to provide users a unique way to learn about the dome's renovation through motion tracking. It was funded by a $20,000 Washington Post Innovation Fund grant and first published March 1, 2015. It was also presented at the 2015 White House Correspondents' Dinner to media executives, high-ranking government officials, celebrities and journalists as a "Future of News Technology" exhibit.

One implementation of my research uses a consumer gaming gesture sensor (Microsoft Kinect) to consume and interact with news and social media. This was a collaboration with the Massachusetts Institute of Technology Media Lab team working on the open-source DepthJS library. The concepts, research and a version of the technology was implemented by *The New York Times* in 2013 as the first gesture-controlled news app after they hired my graduate assistant, Kathryn Faulkner.



Screenshot of *The New York* Times Gesture News App designed by Kathryn Faulkner after designing UNC's Gesture News app while working at UNC

Watch Video

Role	Lead Researcher, Creator
Funding	N/A
Publish Date	January 2013 and March 2015
More Information	bit.ly/gesture-news