

National Science Foundation WHERE DISCOVERIES BEGIN

#1500055

Smart Augmented Reality Glasses in Cybersecurity and Forensic Education

Nikitha Kommera Dr. Faisal Kaleem Syed Shah Horooni

Roadmap

- Introduction
- Research Objective and Goals
- Research Methodology
- Work in progress
- Challenges and Limitations



Introduction-Augmented Reality

Technology that allows users to view the real world with a superimposed virtual image layered over top.





Introduction-Examples



Introduction-Virtual Reality

It is a computer generated, interactive, three-dimensional environment in which a person is immersed.





Difference between VR and AR

Augmented Reality (AR)

The seamless integration of real and virtual worlds allows user to work in the real world while interacting with virtual objects.

Virtual Reality (VR)

The user is completely immersed in a computer-created environment and there is no interaction with the real world.





Introduction-Smart Glasses

Smart Glass is a wearable computer technology that adds information to what the wearer sees.





AR and VR Smartglasses revenue (\$ Million) **IDTechEx** VR Total Revenue AR Total revenue (\$)

Devices Currently used in our Research











Explore the potential of Augmented Reality technology-based teaching and learning approach via Smart Glasses to further enhance cybersecurity and forensics education.





Research Goals

- Creative ways to impart cybersecurity and forensic education through the use of augmented reality devices.
- Identification of key characteristics of cyber forensic workforce including the unique skillsets, deficiencies, and learning gaps.
- Increased student enrollment and retention in security and forensics program.



Research Questions

Can students learn and engage through the use of AR Will AR motivate and enhance students' learning experineces Will AR help in retaining and attracting students in cybersecurity field



Choice of ApproachData Collection

Data Analysis



Research Methodology

Take pre-
test beforee
e
performingv
the labS

Perform experiments wearing the Smart Glass AR Device will record all the activities

Fill out satisfaction surveys Take post-test *after* performin g the lab



Choice of Approach

A discovery based learning approach will be adopted which will allow students to interact with cybersecurity theories in an innovative, interactive and effective way, enhancing their overall live experience and experimental learning.



Data Collection

Research participants





Cybersecurity Lab



Data Collection

Quantitative data

Pre- post course tests

Qualitative data

- Observations of firstperson (students) videos (live or recorded).
- Student satisfaction surveys



Data Analysis

Pre- Postcourse quizzesMultiple choice questions

Can students learn and engage through the use of this new technology?



Data Analysis

Observations of first-person (students) videos (live or recorded). Student satisfaction surveys Demographic data

Will AR motivate and enhance students learning experineces?

Will AR help in retaining and attracting students in cybersecurity education?



Work in Progress-IOC Extract Project

A design and development of a proof of concept Android application is under development which in real time can identify and extract the Indicators of Compromise (IOC) (include IP address, domain name, email addresses, file hashes, etc.)





Screenshots

• •	• •	• •
🛔 🔧 🛆 🔺 🔅 🍞 📶 56% 📄 12:21 PM	🖸 🛔 🔍 🛆 🖬 🖇 🛱 🛜 📶 56% 🧰 12:21 PM	🚭 🛔 🔧 🛆 🖬 🔺 🛱 🍞 📶 ^{54%} 🛑 12:23 PM
IOC	Scan URL	O IOC PROCESS
Click Mic to Input Command	Beceipt for registration para	https://www.us-cert.gov/ncas/alerts/ TA14-329A
	aus-cert.gov/ncarOfficial-website of 1	Extract
	Oficial website of the Department of Homess USGS-CE UNITED STATES COMPUTER & HOME ABOUT US CAREERS ABOUTUS CAREERS ALSSET (TA14-3228)A) REGIN MANAGE	06665b96e293b23acc80451abb413e50 187044596bc1328efa0ed536d8aa4a5c 1c024e599ac055312a4b75b39590040a 2c8b9d2885543d7ade3cae98225e263b 4b6b86c7fec1c574705cecedf44abded 6662c390b2bb6291ec79873881c75d7 b269894f343657db2b15949641a67532 b29ca4f22ae757b25f79c1d4421139d b505d65721bb2453d5039a389113b566 26297dc3cd0b68de3b8469853585e5 ba7bb56534ce1e30c1e5415be31db1d bfbee3e78750ca520480700e440f8 d240f06e98c8d3e647cbf4d42d79475 ffb0b9b5b610191051a7bdf0806e1e47 01c21321b65df8473c079b077867ba
Auto Focus ON	Print 3 Tyreet n Set	47d0e8f9d7a6429920329207a32ecc2e 744c07e886497f7b68f6f7fe57b7ab54 db405ad775ac887a337b02ea8b07fddc
Use Flash OFF	Systems A Microsoft Windows NT, 2000, XP, Visia, and On November, 24, 201	bddf5afbea2d0ee077f2ad4e9a4f044d c053a0a3f1edbf059b51b5640e808ce e53422e458afdfe111bd0b87c1e9772c 18d499d82fcb290fdc2a9f70d6583 b9e4f9d32ce59F7c4daf6b237c330e25 d446b1ed24dad48311f287f3c65aeb80 8486ec3112e322f9f468bdea3005d7b5

æ 1



Work in Progress- Student Assistance through AR

A design and development of an Augmented Reality windows application for Microsoft HoloLens is under progress which assists students in completing the lab successfully.





Mobile Forensics through AR

Mobile forensics is the process of extraction of data from any mobile device such as smartphones, tablets, etc.

AR will help speed up the above process.





Mobile Forensics through AR

Forensic examiner wears the HoloLens. HoloLens records the entire forensics procedure Interaction between the glass and the user is made through voice recognition or through some automated process

Provides seamless hands free mode of operation.





- New Technology
- Speech recognition in the Smart Glass can pose to be a challenge.
- Enable Artificial Intelligence for the Smart Glass to assist the student when he/she needs help.
- Correctly recognizing the text in real time





- Privacy issues
- Students cannot wear the Smart Glasses for extended period of time.
- BYOG Bring Your Own Glass.
- Expensive



Conclusion

Analysis of skillset and characteristics of a good cyber security student using an Augmented Reality Glasses.

Provide students with facility to use forensic tools and train them with the effective use of new technology.

Student enjoy using Smart glass in an innovative way and improve their ability to learn course materials.





Biocca, F., Tang, A., Owen, C., and Xiao, F. (2006). Attention funnel: Omnidirectional 3D cursor for mobile augmented reality platforms. Proceedings of the ACM CHI 2006, Conference on Human Factors in Computer Systems, 1115-1122.

Chuanzhu Xu. Virtual Reality vs. Augmented Reality. Retrieved from http://sites.temple.edu/tudsc/2015/11/26/virtual-reality-vs-augmented-reality/.

Cyber threat analysis. (2014). InfoSec Institute. Available: http://resources.infosecinstitute.com/cyber-threat-analysis/

Dr Harry Zervos. (2015). Ushering in new form factors in portable electronics Retrieved from http:// www.wearabletechnologyinsights.com/articles/8649/smart-glasses-ushering-in-new-form-factors-in-portableelectronics?rsst2id=143.

Goldiez, B., Livingston, M.A., Dawson, J., Brown, D., Hancock, P., Baillot, Y., & Julier, S.J. (2004). Advancing humancentered augmented reality research. Paper presented at the 2004 Army Science Conference, Orlando, FL, USA



References

Indicators of Compromise. Retrieved from https://en.wikipedia.org/wiki/Indicator_of_compromise Smart Glasses Market Report. (2014). Retrieved from https://gamesalfresco.com/category/ar-devices/. Smart Glasses. Retrieved from https://en.wikipedia.org/wiki/Smartglasses Microsoft HoloLens [online]. Retrieved from https://www.microsoft.com/microsoft-hololens/en-us Vuzix 100 [online]. Retrieved from https://www.vuzix.com/Products/m100-smart-glasses. Virtual Reality. Retrieved from http://www.maxim.com/gear/sony-playstation-vr-226-inch-virtual-reality-screen-2016-07 ThreatConnect. Retrieved from https://www.threatconnect.com/.





Thank You Any questions?

