An Innovative Approach Using Mixed Reality to Improving Career Readiness

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Introduction and Motivation

- In the broad sense, career readiness means having both the knowledge and skills necessary for employment in the desired occupation
  - Yet, employers are finding graduates from cybersecurity programs lacking in some of the practical experience and intangible soft skills needed to do the job
- Higher education institutions are developing programs that emphasize the “hard” technical skills required in cybersecurity
  - But many are failing to prepare students for the critical “soft” skills needed to succeed in the workplace
- Educational institutions must evolve to keep up with rapidly changing demands of business and technology

Soft Skills and Their Importance

- What are soft skills?
  - Non-technical skills, or soft skills, include leadership, communication, collaboration, adaptability, integrity, creativity, problem solving, etc.
- Why are they important?
  - While many solutions to problems in cybersecurity are technical in nature, soft skills and related competencies are considered vitally important for the job candidate
    - The cybersecurity field operates in a global, fast-moving, and ever-changing adversarial environment
    - Much of the work requires broad, critical perspectives to approach problems from diverse perspectives
    - Employees need to be adaptable and able to think outside-of-the-box to find innovative solutions to challenges

Experiential Learning Through VR/AR

- We propose using a mix of VR and AR tools to develop core practical experience as well as soft skills through a curriculum that expands well beyond the classroom
  - Able to simulate practical real-world situations
    - Enables students to learn how to deal with these situations using trial-by-error without real-life repercussions
  - Recent technological advances increase delivery options and make the experience more lifelike
  - Developing soft skills using VR is much more cost effective than using traditional experiential methods
    - E.g., geographically dispersed, intercultural environment
  - Allows students to learn at their own pace

A Three-Tiered Approach

- Increase soft skill competencies
  - Introduce and develop soft skills that encourage creative problem solving using open source VR tools that simulate leadership education
  - Student choices differentially impact the situation, provide immediate feedback, and drive the actions in new directions
- Encourage engagement through experiential learning
  - Engage in open, active learning using meaningful learning activities that are valuable and relevant
  - Have individual and collaborative real-world experiences that will sustain student engagement
- Learning and networking opportunities through professional development
  - Network with potential employers
  - Participation in competitions and other hands-on learning activities

VR/AR Module Development

- Implement a 3D VR-based cybersecurity analysis environment
  - Enable learning in a collaborative environment using a 360° camera
  - Integration of VR and IoT technologies (e.g., wearable devices)
  - Multiple viewpoints from different angles communicating in real-time
- Simulate leadership education and working in diverse teams
  - Communicate effectively in intercultural situations to both technical and non-technical audiences
- Gain hands-on experience with cybersecurity using data visualization and manipulation
  - Especially in working of cyber-physical systems not normally available using traditional methods, such as SCADA environments such as power stations and water treatment plants

Conclusion

- Cyber threats are becoming more potent, persistent, agile, and difficult to detect and mitigate
  - Employers want graduates with practical experience as well as soft skills to hit ground running without wasting time/money on training
- Current mindset is to focus on “hard” skills that directly apply to problems in the field
  - But cybersecurity requires out-of-the-box thinking, making the ability to communicate effectively, work in teams, think creatively, and adapt quickly a necessity in the modern workplace
  - Soft skills are becoming the differentiator in cybersecurity
- The integration of practical experiences with soft skills that span across all objectives and address changes in cybersecurity can be achieved using open source VR/AR tools
  - Enables students to hone their situational awareness, improve their adaptability and flexibility, and operate within disparate cultures