



CiSE-ProS: Cyberinfrastructure Security Education for Professionals and Students



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Summary

Mission Statement:

To adopt well-established teaching and learning practices to provide in-person and online training avenues for practitioners to develop core competencies in secure computing relevant to advanced cyberinfrastructure (CI). There is a need to develop programs that prepare CI-professionals and open the gates for new workers in the field. In conjunction with training, a certification system will help recognize trained CI professionals, validating existing training models.

Our Purpose:

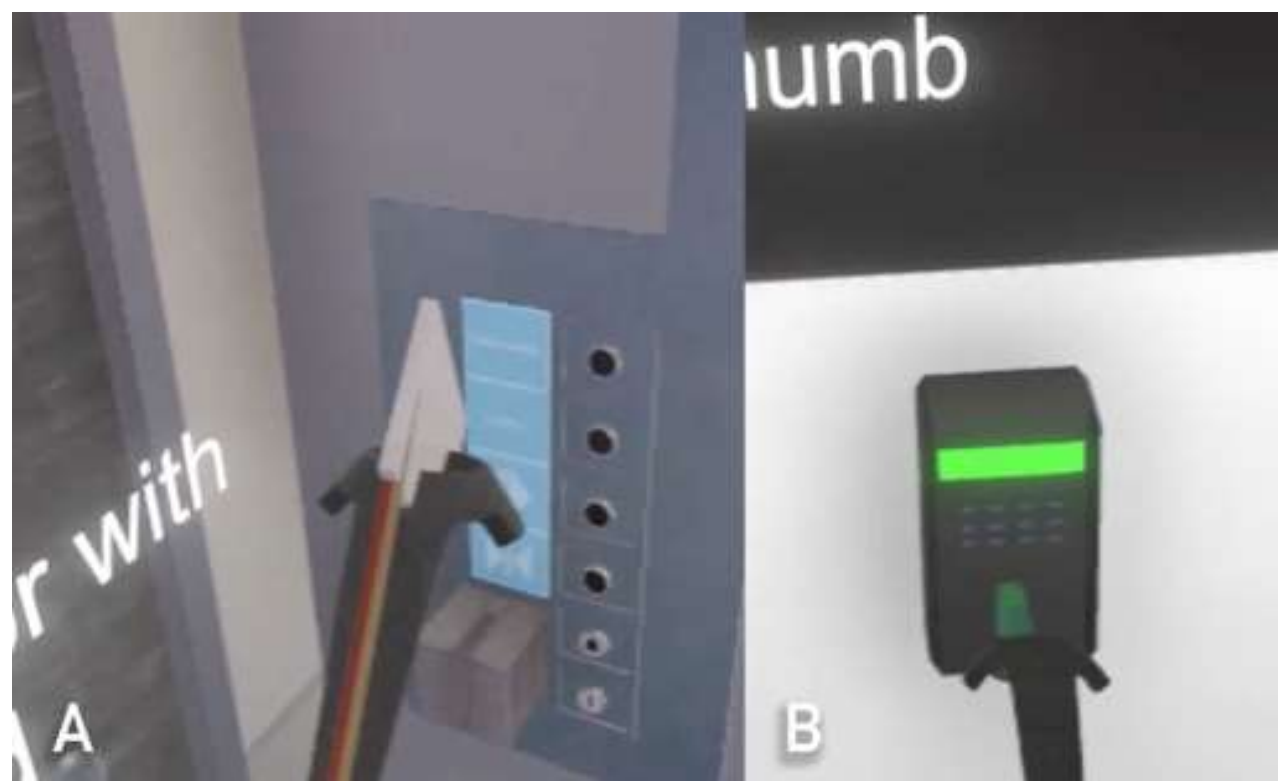
A spate of intrusions at advanced cyberinfrastructure sites across the nation demonstrates the urgent need to train system administrators in securing data and computational resources. The rapidly evolving nature of the cybersecurity landscape requires CI professionals to be prepared to address current threats, while simultaneously identifying and mitigating new threats. The Cyberinfrastructure Security and Education for Professionals and Students (CiSE-ProS) training program will build core competencies in secure-computing using hands-on activities. The project leverages competencies in an academic-public-private collaboration to determine certification standards in CI cybersecurity training.

The CiSE-ProS program is currently:

- Training the current CI workforce to secure data and computational resources using on-site and continuing education programs
- Preparing undergraduate and graduate students for productive cybersecurity careers.

Our Goals:

- Increase awareness of cybersecurity issues in research computing via a seminar series
- Prepare learning outcomes that describe standards for CI professionals prepared to address cybersecurity threats
- Design activities through which preparedness with respect to the standards can be evaluated
- Design scoring schemes to evaluate performance on the evaluation activities
- Develop learning activities, including virtual reality modules, to develop learners with respect to the learning outcome standards



Cybersecurity Workshop Objectives:

- Software development
- Systems architecture
- Cybersecurity management
- Incident response
- Vulnerability assessment and management
- Data Administration
- Secure networking
- Secure authentication and remote access
- Auditing maintenance for secure data
- Penetration testing
- Securing cloud computing

Project Team



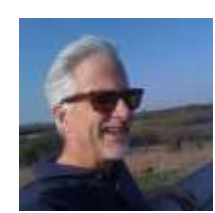
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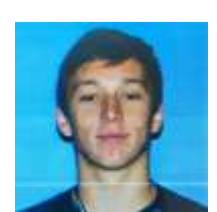
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Advisory Board

The Advisory Board will help the project team prioritize learning outcomes, assessment activities, scoring schemes, and learning exercises throughout the development process, allowing the project team to evaluate the efficacy of the practices in both academic and continuing education contexts. The board and the assessment team includes:

- NVIDIA
- Lenovo
- Von Welch, Indiana University
- Anita Nikolich
- Jill Gemmill, Clemson
- Dell
- Kenneth M. Merz Jr., Michigan State

Broader Impact and Outreach

- **Train the next generation of CI professionals** - Outreach activities targeted towards K-12 students include HPC summer camps and short courses.
- **K-12 outreach efforts** – The project team will promote CiSE-ProS efforts directly to K-12 students and teachers by organizing classroom demonstrations, events and pilot projects at local schools.
- **Addressing national priorities for cybersecurity workforce development** - The project meets national and global needs by training the next generation of cybersecurity proficient CI professionals and students.
- **Research opportunities for undergraduates and teachers** – School teachers and undergraduate students will be able to participate in CiSE-ProS via collaborating Research Experiences for Undergraduates (REU) and Research Experiences for Teachers (RET) programs at Texas A&M.
- **Summer Computing Academy**– The project team organized the Summer Computing Academy at Texas A&M University in 2017 and 2018. The camps were attended by 65 high school students at both an introductory and intermediate level. We seek to create an educational experience that addressed the needs to impart computing skill and comprehension to upcoming members of the research community through interactive activities and unique experiences. Topic areas included comprehension of Unix/Linux text-base; understanding of how HPC relates to science; confidence in strong cybersecurity practice, and enhanced motivation to pursue a career in STEM.



Virtual Reality Prototype

- **Experience:** In the prototype the user learns about the security procedures involved in a data center and inspects hardware for signs of tampering. The user must follow the security protocol and replace a rack with another.
- **Software:** Unity 3D
- **Hardware:** HTC Vive VR Headset and Controllers powered by NVIDIA GPUs.



Short Course Program

- We use short courses to augment HPC and cybersecurity education.
- Our short courses are available to all students, faculty, and staff at Texas A&M University through online and in-person formats.
- Students in our summer programs are offered free access to these short courses, in order to retain participatory interest.
- Future short courses on system integrity will utilize our CiSE-ProS system.
- Our courses are attended by members of nearly every college at Texas A&M, including the colleges of Engineering, Agriculture and Life Sciences, and Science.
- According to surveys, our short courses are well-received and beneficial for research.



References

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