

Greetings, Our team from the Florida Institute for Human and Machine Cognition (IHMC), SRI International (SRI), and our collaborators is inviting you to participate in a research study.

The study is sponsored by: The United States Office of the Director of National Intelligence (ODNI)

The title of this study is: **SaikoCTF Conference Capture the Flag (CTF) Study**

**Study objectives:** The overall objective of this project is to study the psychology of human-computer interaction and new cyber defenses. For this study, we will set up a Capture-the-Flag (CTF) cyber challenge, where you will seek out and exploit security vulnerabilities in systems, services, and applications in a simulated network. Your goal will be to capture specified codes and exfiltrate target files to your workstation while the system deploys countermeasures to block your attempts. Your participation will benefit our research program by helping us assess how these affect performance and responses.

**Prior Participation:** If you have participated in a previous SaikoCTF, thank you for your time, however, you are not eligible to participate in more than one SaikoCTF.

**Study location:** The study will be conducted at the HackInTheBox Security Conference (HITBSecConf) at the Intercontinental Hotel-Bangkok, 973 Phloen Chit Road, Lumpini, Pathum Wan, Bangkok 10330, Thailand. Please come to the SaikoCTF area located in the fourth-level foyer, just outside Ballroom 1 (Conference Track 1).

**Pre-participation activities:** These include reviewing this information about the project goals. If you wish to find out more, you will review a detailed consent form as part of your registration process. To participate in this study, you must be a healthy adult between 18 and 70. Participants should have correctable vision and hearing and have completed or are currently enrolled in college. Specifically, you should understand computer security processes and have experience with cyber CTF challenges. You must be able to sit wearing the VR headset and physiologic sensors for up to two and a half hours and reach or use all study input devices. The SaikoCTF challenge will take about one hour, and the remaining time in the 2.5-hour block is used to put on the VR and physiological sensors and calibrate them, as well as filling out surveys. We will collect data including 1) Questionnaires on demographics, decision-making styles, and personality. 2) Physiological data (brainwaves, heart rate, respiration rate, and changes in sweat) to track your cognitive load, stress, and emotional state; and 3) Your game-time strategy, choices, and performance while playing the CTF. If you wish to participate, you will be assigned a randomly generated participant identification number for your data. You will then complete a skill screener to assess your cybersecurity experience. Afterward you will complete a short demographics questionnaire and surveys that evaluate your decision-making and personality style. Then you will be able to schedule a slot by choosing a starting time for a two-and-a-half (2.5) hour block during the conference to complete SaikoCTF. Up to seven other individuals will participate with you in the same session, but each person will work in their own simulated network, and no teaming or adversarial interactions will be allowed in the CTFs. When you arrive for your single, scheduled test session, you may ask any questions you have about the study or your rights as a participant.

**Study activities:** You will be asked to arrive at your scheduled time on your date of participation. You will receive an in-briefing and an overview of the CTF challenge and then don a chest strap heart rate and respiration sensor, place two skin conductance sensors on your left index and middle finger, and a headset that will record your brainwaves that includes a virtual reality (VR) display. You will then sit at a table with a physical keyboard and complete a series of calibration tasks to track your eye position and identify changes in the sensors you are wearing. The VR headset will connect to a Kali Linux virtual machine (VM) that includes the full Kali penetration testing toolkit. You will then start the CTF challenge trial, using your technical knowledge and problem-solving skills to capture the flags. You will receive points for each flag or target file you capture and have 60 minutes to accumulate as many points as possible. You will be asked to complete a post-test survey and assessment after the CTF trial, and the top scores will be posted by the SaikoCTF handle only. After you remove all the sensors, you will receive a debriefing from the researchers before departing. Your total time commitment at the venue is approximately two and a half (2.5) hours, plus up to one (1) hour before your visit for registration. Registration includes reviewing the consent form, completing the CTF skills screener, and completing a set of personality tests.

**Risks to you as a participant:** All of the potential risks are considered minor, and only the first is considered likely. 1) You may experience a headache or nausea while using the VR and EEG due to their weight. Because the VR is visual, closing your eyes should mitigate any nausea, and the headset is adjustable to fit your head. 2) The scenario will be conducted in a group environment which carries risks associated with airborne diseases. All equipment used by participants will be sanitized between individual users. Additionally, you may wear an N95 mask if you prefer. 3) Only your assigned, randomly generated identification number will be used to tag your recorded data, and no connection to your personally identifiable information will be created. This will mitigate any risks to your confidentiality in the event of a data breach.

**Study participation outcomes:** The results of this study may be published in scientific research journals or presented at professional conferences. However, your name and identity will not be revealed and the data we collect from you will be coded only with your identification number.

Participation in this study may benefit you by serving as an opportunity to challenge yourself and your cyber skills; you will receive an electronic SaikoCTF badge and a summary of your SaikoCTF soft skills assessment results.

Your participation will benefit our research program by helping us understand how to better design countermeasures against cyber-attacks.

**Your rights as a participant:** You can choose not to participate. Your participation is voluntary. Your participation will not influence anything that falls outside of this research context. A decision to not participate will involve no penalty or loss of benefits to which you are otherwise entitled, and you may discontinue participation at any time and for any reason. If you do decide to participate, you may withdraw from this study at any time and for any reason and can request to have your data deleted.

If you have questions about this research study or questions about your rights as a research participant, you can call Meredith Yeager at +1 (850) 202-4462 or [irb@ihmc.us](mailto:irb@ihmc.us), who is Vice-chair of the IHMC Institutional Review Board (IRB).