Position Available: Postdoctoral Fellowship

Model-Based Security Compliance-By-Design for Low-Earth Orbit Satellite Operations Segments

A Postdoctoral Fellowship is anticipated to be available in collaboration with Telesat as part of a Mitacs-funded research project starting in September 2021. The Cyber Security Evaluation and Assurance (CyberSEA) Research Lab at Carleton University is currently seeking qualified applicants to fill this position.

Position Details
- **Position:** Postdoctoral Fellow
- **Expected Start Date:** September 1, 2021
- **Hours:** Full-Time
- **Appointment Term:** 1 year, with an opportunity to continue depending on performance and funding availability
- **Duties and Responsibilities:** Conducting research activities to achieve the project objectives; project management and coordination of the research team and project partners.

Project Description
Low-earth orbit (LEO) satellite constellations and their associated segment systems and networks promise global connectivity with high throughput, low latency, and improved economics. Such systems demand increased levels of security and resilience to provide assured services to customers. As a result, compliance with a variety of security standards, policies, and regulations is required and must be demonstrable throughout the system development lifecycle (SDLC) for these systems to develop customer trust and find widespread use. However, there are numerous challenges associated with effectively maintaining the traceability of specifications and security controls during system design and beyond to support security assurance and audit activities. The traceability of this compliance is a common problem in the industry and is expected to become increasingly challenging as these systems evolve. Thus, there is a need for a systematic way to validate and trace the application and compliance of cybersecurity controls mandated by such standards and regulations throughout the lifecycle of large and complex systems.

This project seeks to use model-based systems engineering (MBSE) approaches to develop an architecture and design framework to support the traceability of compliance requirements to the architecture design of the operations segment of Telesat’s LEO system. The operations segment connects the overall LEO system by orchestrating the space and ground segments to deliver the service. It combines central control and local intelligence to optimize performance. The expected outcome is an architecture metamodel with standardized interfaces supporting traceability and compliance-by-design for cybersecurity standards, similar to what AUTOSAR has become in the automotive domain.

Objective
The general objective of the project is to design a standardized architecture design framework for the operations segment of low-earth orbit satellite constellations supporting traceability and compliance-by-design for cybersecurity standards. This will involve identifying the set of security requirements from relevant standards, designing and specifying a security
compliance-by-design architecture framework and design methodology for a LEO satellite operations segment, and developing traceability support for demonstrating security compliance among LEO operations segment architecture components.

**Desired Skills/Qualifications**

Suitable candidates will have a doctorate in Software Engineering, Computer Science, or a related field. Ideal candidates will be self-motivated with an ability to work independently and to communicate effectively in a team environment. A background in computer security, model-based systems engineering (MBSE), and software architecture and design is highly desirable. Experience with requirements engineering and traceability is considered an asset. Applicants should also have very strong written and verbal communication skills.

**Host Research Institute Information**

Carleton University is a public comprehensive university, founded in 1942, in Ottawa, Ontario, Canada. The research-intensive Faculty of Engineering and Design at Carleton University is recognized as one of Canada’s leading institutions in the study and research of engineering, architecture, industrial design and information technology. Since the inception of engineering at Carleton in 1945, our experts have pushed the bounds of innovation and discovery. Carleton focuses on anticipating the needs of industry and society, and offers forward-thinking programs with real world application and produces research that is helping to shape our present and future. The Department of Systems and Computer Engineering is a recognized world-class institution in software engineering, computer systems engineering, communications engineering, and biomedical engineering. Together with the Department of Electronics, the Department of Systems and Computer Engineering constitutes one of the largest and most research-intensive centres for Electrical and Computer Engineering and Software Engineering education and research in Canada. The Cyber Security Evaluation and Assurance (CyberSEA) Research Lab conducts advanced academic research to develop systematic and rigorous approaches for evaluating and assuring the cyber security of software-dependent systems.

**Further Information**

For more information about Postdoctoral Fellowships at Carleton University and the Department of Systems and Computer Engineering, please visit: [https://carleton.ca/postdocs/](https://carleton.ca/postdocs/).

**How to Apply**

Interested applicants are to send a CV, cover letter (maximum one page) detailing your research interests, qualifications, and experience, and contact information for at least two references by email to the CyberSEA Lab Director:

**Jason Jaskolka, Ph.D., P.Eng.**

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For more information about how to apply, please visit: [https://carleton.ca/cybersea/positions-available/](https://carleton.ca/cybersea/positions-available/)

**Application Deadline**

Applications will be reviewed as they arrive until a suitable candidate is found.