

# **Postdoctoral Fellowship in High Performance Computing and Data Exploration and Analysis**

School of Public Health Sciences, University of Waterloo

## **Focus**

Configure and sustain a High-Performance Computer, develop a highly scalable and efficient computing infrastructure to deploy large-scale training of deep neural networks, and support high-performance processing of large volumes of structure, unstructured and geospatial data.

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## **Opportunity**

The [Aging and Innovation Research Program \(AIRP\)](#), led by [Lili Liu](#), focuses on acceptance and adoption of innovations by older adults, their care partners, and health care professionals. Innovations can include technologies, practices, and policies. A large portion of this research program focuses on technologies for the assessment and management of risks of going missing in persons living with dementia. This includes developing, applying, and evaluating individual and community-level strategies to foster dementia-friendly communities. This position will be co-supervised by [Antonio Miguel-Cruz](#), Adjunct Assistant Professor in the Faculty of Health.

## **Project summary**

This project aims to analyze existing data from different sources and partners to understand missing person incidents and lost person behaviour specific to persons living with dementia in Canada. This individual will develop a high-performance computing infrastructure to support computer applications like real-time dashboards and monitoring strategies to achieve this project's objectives.

The postdoctoral fellow will work with a research team to design and develop different machine learning applications, including neural networks, to predict and mitigate risks. The postdoctoral fellow will also propose strategies for creating databases, data warehouse systems, and multidimensional networks and will set standards for database operations, programming, query processes, and security. The postdoctoral fellow will model, design, and construct large relational databases or data warehouses and create and optimize data models for warehouse infrastructure and workflow, integrating new systems with existing warehouse structures to refine system performance and functionality.

The postdoctoral fellow is expected to participate in systematic and scoping literature reviews and support ongoing research projects in aging, innovation, and technology development. The candidate will also participate in primary data collection, including

conducting surveys and interviews and data analysis. Research activities will include collaboration with partner organizations, academics, and students within and beyond the research program.

**Specific activities include:**

- Hardware configuration
  - Verify stability, interoperability, portability, security, or scalability of system architecture.
  - Develop system and software, system integration, or distributed system architectures.
  - Confer with engineering staff and consult specifications to evaluate interface between hardware and software and operational and performance requirements of the overall system.
  - Specify power supply requirements and configuration, drawing on system performance expectations and design specifications.
- System and technical support
  - Collaborate with engineers or software developers to select appropriate design solutions or ensure the compatibility of system components.
  - Monitor functioning of equipment and make necessary modifications to ensure the system operates in conformance with specifications.
  - Provide technical support to other team members throughout the hardware configuration and use process.
- System preparation
  - Identify system data, hardware, or software components required to meet user needs.
  - Test and verify hardware and support peripherals to ensure that they meet specifications and requirements by recording and analyzing test data.
  - Store, retrieve, and manipulate data for analysis of system capabilities and requirements.
- Communication
  - Communicate with staff and partners to understand specific system requirements.
  - Write detailed functional specifications that document the hardware development process and support hardware introduction.
- Research
  - Identify complex problems and review related information to develop and evaluate options and implement solutions.
  - Use logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
  - Prepare grant applications, research protocols, manuscripts, technical reports, and presentations to academic and non-academic audiences.

The successful candidate will join a multidisciplinary research team led by Professor Lili Liu and will be co-supervised by Professor [Antonio Miguel-Cruz](#). The job involves independent and proactive work and supervision of students and research assistants (casual, staff and volunteer), and collaboration with other researcher and project team

members. Thus, the successful candidate is expected to work in multidisciplinary and multi-stakeholder projects.

## **Funding**

This fellowship is supported by funding from the Search and Rescue New Initiatives Fund (SARNIF), Public Safety Canada. The selected candidate will receive \$40,000.00/year (plus benefits, on a one-year contract, with the possibility for renewal).

## **Requirements - the ideal applicants for this position will have:**

- A PhD degree, within four years of completion, in software engineering, computer science or related fields. And an in-depth understanding of computer architecture and parallel computing, and solid programming experience
- Demonstrated interest or experience in hardware configuration, working with HPC or similar projects
- Comprehensive knowledge of Win32/MacOS/Unix inter-operability, TCP/IP and HPC systems and object or component-oriented development software — C++ , jQuery, Objective C, Scala, Python.
- Knowledge or experience of database management systems, such as: Apache Solr, MongoDB, NoSQL, Oracle PL/SQL and database user interface and query software experience, such as Microsoft SQL Server.
- Excellent written and oral communication skills to facilitate the development and maintenance of successful relationships with partners, colleagues, and students.
- Critical thinking and cognitive skills, including deductive and inductive reasoning and creative problem-solving.

## **Application process**

Interested applicants should [email Cathy Conway](#) with a cover letter that describes career aspirations, a recent CV, a one-page research statement, the earliest starting date, and the contact information of three references which will be contacted only after permission from the candidate is granted.

## **The institution**

The [Faculty of Health](#) is committed to improving the quality of life for individuals and communities through innovative education and research activities. The Faculty of Health (formerly Applied Health Sciences) is a leader in developing strategies that prevent disease and injury, protect and promote healthy living, optimize physical ability, and improve well-being across the life course.

The [School of Public Health Sciences](#) at the University of Waterloo is training a new generation of leaders, researchers, and change agents adept at thinking and responding to the complex adaptive systems that affect health and health care. Together, we are

seeking innovative solutions to some of the significant health challenges of our time: chronic disease prevention and management; health and ageing; health care system integration, management and informatics; food and water safety, security and governance; health inequity, including poverty and Indigenous health issues; and health and the environment.