POSTDOCTORAL FELLOW/RESEARCH ASSOCIATE POSITION

Application of Artificial Intelligence (AI) in Foundation Engineering

About the Position

The Department of Civil Engineering at Lassonde School of Engineering, York University is seeking a highly motivated and qualified **Postdoctoral Fellow/ Research Associate** to join a multi-year, collaborative research initiative in geotechnical engineering and artificial intelligence. This position is funded by the Ministry of Transportation Ontario (MTO) and an NSERC Alliance Grant.

Research Focus

The successful candidate will contribute to a research project directed by Prof. Rashid Bashir, Associate Professor, Department of Civil Engineering, that applies advanced artificial intelligence (AI) and machine learning techniques to enhance foundation design and geotechnical analysis. The project centers on two primary research objectives:

1. Development of an AI Tool for Data Extraction: Creating a comprehensive methodology and framework to extract critical geotechnical data from Foundation Investigation Reports in PDF format. This includes developing and validating techniques for processing multiple data types—including borehole logs, laboratory test results, field measurements, design analyses, and performance data—using advanced technologies such as Optical Character Recognition (OCR), image processing, natural language processing (NLP), and deep learning models.
2. Integration of Extracted Data with AI Modeling: Developing an integrated system that processes extracted geotechnical data using machine learning algorithms (deep neural networks, random forests) to predict critical design parameters including bearing capacity, settlement behavior, slope stability, and other key geotechnical performance metrics.

Key Responsibilities

The Postdoctoral Fellow will:

- Lead or contribute significantly to the development and validation of data extraction methodologies from diverse report formats (printed, scanned, handwritten documents)
- Implement and test advanced technical approaches including OCR, table extraction tools (Tabula, Camelot), image processing, and NLP techniques
- Conduct comprehensive literature reviews on AI applications in geotechnical engineering and foundation design
- Conduct pilot testing and validation of extraction methods for borehole logs, laboratory test data, field measurements, and design analysis results
- Develop, train, and validate machine learning models for geotechnical parameter prediction and soil classification
- Prepare and organize extracted datasets for AI model development, including data cleaning and preprocessing
- Collaborate with MTO staff and stakeholders to ensure alignment of project outcomes with practical implementation needs

- Document research findings and contribute to technical reports, conference proceedings, and peer-reviewed journal publications
- Participate in project meetings and presentations to stakeholders

Required Qualifications

- PhD in Civil Engineering, Geotechnical Engineering, Geoenvironmental Engineering, or a closely related field
- **Candidates with Graduate degrees in computer science/engineering and data science with extremely relevant experience will also be considered**
- Strong background in **geotechnical engineering** with solid understanding of soil mechanics, foundation design, and subsurface characterization
- Demonstrated expertise in **machine learning and/or artificial intelligence** applications, with proficiency in relevant programming languages (Python, R, MATLAB, or equivalent)
- Experience with **data processing and analysis**, including statistical methods and numerical modeling
- Familiarity with **deep learning frameworks** and machine learning libraries (TensorFlow, scikit-learn, PyTorch, etc.)
- Excellent written and oral communication skills
- Proven ability to work independently and as part of a collaborative research team
- Strong organizational skills and attention to detail

Preferred Qualifications

- Experience with **natural language processing (NLP)** and/or **optical character recognition (OCR)** technologies
- Previous work with **geotechnical data management** or subsurface characterization databases
- Familiarity with geotechnical analysis software (e.g., finite element modeling tools)
- Experience extracting and processing data from technical reports or similar documents
- Publication record in peer-reviewed journals related to AI/ML applications in civil engineering
- Background in climate change impacts on geotechnical infrastructure (an asset to Prof. Bashir's research program)

What We Offer

- Competitive Salary: Commensurate with experience, following York University postdoctoral fellowship guidelines
- Research Environment: Access to state-of-the-art facilities and software at the Lassonde School of Engineering
- Funding: Multi-year project support from MTO and NSERC Alliance Grant
- Mentorship: Direct supervision by Prof. Rashir Bashir,
- Collaboration: Opportunity to work directly with the Ministry of Transportation Ontario and contribute to infrastructure policy and practice
- Professional Development: Support for conference presentations and peer-reviewed publications
- Academic Community: Integration into a vibrant research community at York University

About the Department

The Department of Civil Engineering at York University's Lassonde School of Engineering is committed to advancing knowledge and practice in engineering disciplines with a particular emphasis on sustainability, climate resilience, and innovation. Prof. Bashir's research group has consistently secured external funding from MTO, NSERC, and other agencies, and his team actively contributes to advancing the state-of-the-art in geotechnical engineering and climate adaptation.

Location

York University, Toronto, Ontario, Canada

Application Instructions

Interested candidates should submit the following materials via email to Prof. Rashid Bashir (rbashir@yorku.ca):

- A comprehensive Curriculum Vitae (CV)
- A Cover Letter (1-2 pages) describing your research interests and why you are suited for this position
- A Research Statement (1-2 pages) outlining your experience with AI/ML, geotechnical engineering, and data processing
- Contact information for 2-3 academic references

Application Deadline: Open until filled

Anticipated Start Date: As soon as possible

York University is an equal opportunity employer committed to building a diverse and inclusive community. We welcome applications from all qualified candidates and provide accommodations throughout the recruitment process.