

# Gang Li

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gangli-engineering.com

## Education

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### Ph.D. Civil Engineering

University of Saskatchewan, Saskatoon, SK, Canada 2023  
- Dissertation: *"Modelling of Cracked Reinforced Concrete Corrosion in Service Environments"*

### M.Sc. Civil Engineering

University of Saskatchewan, Saskatoon, SK, Canada 2014  
- Thesis: *"Effect of Cracks on the Transport Characteristics of Cracked Concrete"*

### B.Eng. Materials Science and Engineering

Chongqing University, Chongqing, China 2008  
- Specialized in civil engineering materials

## Professional Associations

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### Registered Professional Engineer (P.Eng.)

Association of Professional Engineers and Geoscientists of Saskatchewan (APEGS)

## Professional Experience

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### Research Associate

Corrosion and Electrochemical Engineering, University of Saskatchewan Saskatoon, SK, Canada  
Jan 2024 – Present

Project: *Electrochemical evaluation of iron-based alloys corrosion and protection for potash mining environments*

Partnership: Nutrien

- Led an electrochemical study on corrosion processes in potash mining, focusing on anodic and cathodic behaviours of iron-based alloys. Enhanced quantitative corrosion prediction, aiding strategic material selection and improving sustainability of mining assets.

### Mitacs Accelerate R&D Engineer

University of Saskatchewan and various partnerships Saskatoon, SK, Canada  
Sep 2020 – Dec 2023

Projects:

- *Effective concrete mixes for Saskatchewan sidewalks using locally available pop-out prone aggregates*  
Partnership: City of Saskatoon  
- Developed cost-effective remedial strategies for reducing, and possibly eliminating, pop-out damage to concrete sidewalks, as well as other potential forms of damage caused by freeze and thaw cycles and ASR.
- *A non-destructive approach for assessing the integrity and performance of waterproofing membranes in bridge decks*  
Partnership: ZACARUK consulting Inc  
- Developed a non-destructive method for assessing the integrity of waterproofing systems in reinforced concrete bridge decks. The proposed technique is used to assess the quality of a newly installed membrane system, or to determine whether the membrane is deteriorating during its service life.
- *A rational data-driven probabilistic approach for assessing the condition and performance of RC structures*  
Partnership: ZACARUK consulting Inc

- Developed life-cycle deterioration model software for predicting the service condition of reinforced concrete structures using field data. The software employs probabilistic analysis to optimize maintenance and repair strategies, significantly extending asset lifespan. Applied to Moose Jaw Inland Grain Terminal and Petrofka Bridge, enhancing maintenance scheduling and structural health monitoring.

### **Consultant**

ZACARUK consulting Inc  
Aug 2019 – Dec 2019

Moose Jaw, SK, Canada

- Designed a moisture monitoring system for concrete silos, provided personnel training for the installation and operation of the system. Assessed the carbonation-induced corrosion conditions using collected field moisture content data.

### **Research Engineer (full-time & part-time)**

University of Saskatchewan, City of Saskatoon  
May 2014 – Sep 2015 & Sep 2015 – Apr 2018

Saskatoon, SK, Canada

Project: *Bridge arch repair and life-cycle cost assessment*

- Developed and implemented advanced corrosion monitoring systems for a reinforced concrete arch bridge, focusing on moisture, conductivity, and oxygen levels. Conducted detailed analyses of concrete pore solutions to evaluate rebar corrosion behaviours under various environmental conditions. Designed a transport model to project corrosion scenarios influenced by diverse conditions and climate change. Optimized rehabilitation strategies to enhance lifecycle cost-efficiency. Led test panel validation, managed construction projects, and coordinated multi-party collaborations to ensure cohesive rehabilitation treatments.

## **Programming and Software Development**

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### **Programming Experience:**

- Python: Advanced expertise in data science (Pandas, Matplotlib), machine learning (Scikit-Learn, TensorFlow), and advanced computational techniques including probabilistic and numerical modelling. Proficient in object-oriented programming.
- COMSOL Multiphysics & MATLAB: Specialised in modelling reactive chemical transport in porous media, electrochemistry, and material mechanics. Highly skilled in conducting large-scale simulations on high-performance computing clusters.

### **Developed Software:**

- Li, G. (2024). Reference Electrode Potential Converter (v0.0). Zenodo. <https://doi.org/10.5281/zenodo.10937502>. Web app.
- Li, G. (2022). Rational-RC: a practical life cycle deterioration modelling framework for reinforced concrete structures. Version v0.2.3. ([Documentation](#)).
- Li, G. (2021). Ground Penetrating Radar Line Scan Data Visualization and Measurement. Web app.
- Li, G, Evitts, R, & Boulfiza, M. (2018). Homogenized-model-simplified-circuit: code for “the simplified circuit model” (v1.0.0). 2019 NACE Northern Area Western Conference (NACE NAWC 2019). Zenodo. <https://doi.org/10.5281/zenodo.1406210>.
- Li, G., Evitts, R., Boulfiza, M., & Li, A. (2018). A customized Python module for interactive curve fitting on potentiodynamic scan data (Version v1.0.2). Zenodo. <https://doi.org/10.5281/zenodo.1406195>.

## **Publications**

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### **Journal Papers**

6. Li, G., Boulfiza, M., & Evitts, R. (2024). On the subtleties of rebar corrosion behaviour in cracked concrete. (under review with *Cement and Concrete Composites*)



- Focused on building foundational programming skills through extensive coding exercises, adaptive grading systems, and interactive learning tools. Implemented comprehensive feedback mechanisms to enhance student learning and reduce exam anxiety.

### **Faculty Member**

St. Peter's College, U of S first-year engineering program Muenster, SK, Canada  
*CMPT 142 Introduction to Computer Science for Engineers*  
Sep 2022 – Present

- Adapted course content to enhance the immersive learning experience of a small-sized class. Utilized formative assessments to provide immediate feedback. Adjusted instructional methods to accommodate diverse skill levels.

### **Teaching Assistant**

University of Saskatchewan Saskatoon, SK, Canada  
2009 – 2014 (various terms)

- Material testing lab – *CE 212 Civil Engineering Materials*
- Problem solving lab – *CE 318 Applied Engineering Mathematics*
- Structural analysis software tutorial lab – *CE 463 Advanced Structural Analysis*

### **Certificates and Awards**

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- 2024 Certificate in University Teaching and Learning, The Gwenna Moss Centre, University of Saskatchewan
- 2024 Nomination for PhD Thesis Awards, University of Saskatchewan
- 2021 Certificate of Project Management, Mitacs
- 2020 Certificate of Applied Machine Learning in Python, University of Michigan (via Coursera)
- 2020 Certificate of Contribution, NACE Calgary Sector
- 2016 Saskatchewan Innovation and Opportunity Scholarship, Government of Saskatchewan

### **Professional Engagements and Presentations**

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#### **Presentations:**

- Ministry of Highways and Infrastructure Web Conference Jul 30, 2020  
*Deterioration of structures: testing and rehabilitation*
- NACE Northern Area Western Conference (Regina, Canada) Feb 6, 2020  
*Homogenized corrosion parameters of rebars in concrete*
- NACE Northern Area Western Conference (Calgary, Canada) Feb 7, 2019  
*Corrosion Prediction with 3D Model Utilizing Meteorological Data and Properties of Site-extracted Rebar and Concrete*

#### **Invited Talks:**

- College of Materials Science and Engineering, Tongji University (Shanghai, China) Jul 31, 2024  
*Modelling of cracked reinforced concrete corrosion*
- Saskatoon Engineering Society (Saskatoon, Canada) Nov 29, 2019  
*Corrosion Arch Rehab for the University Bridge*
- NACE Calgary Luncheon Technical Session Jan 25, 2019  
*Computer-aided Assessment of Arch Rehabilitation Strategies for the University Bridge*

**Media Engagements:**

- Interview on Global News Jan 8, 2019  
Topic: *Calcium chloride and its corrosive effects on concrete and asphalt*
- Live Interview on 630CHED Radio *Ryan Jespersen Show* Aug 22, 2018  
Podcast: *Corrosion & the maintenance needs of civic structures* (Duration 20:40)