STRATEGIC CONSTRUCTION MODELING AND DELIVERY
INDUSTRIAL RESEARCH CHAIR

ASSESSING THE EFFECT OF MOTIVATION ON CONSTRUCTION CREW PERFORMANCE

ABOUT THE CHAIR

Established in January 2012 under the leadership of Dr. Aminah Robinson Fayek, the IRC in Strategic Construction Modeling and Delivery operates within the Hole School of Construction Engineering in the Department of Civil and Environmental Engineering at the University of Alberta.

The Chair brings together construction industry owners, contractors, and labour groups working in Alberta and across Canada to develop comprehensive, research-based solutions to key industry problems. Giving particular attention to Canada's oil and gas, utilities, industrial, and commercial construction sectors, the Chair focuses on strategic concerns related to construction management—such as construction industry productivity, project delivery, and performance. Research undertaken includes improvements to labour productivity, structuring projects and teams, assessing owner and contractor competencies, and reducing project execution risk.

The Chair's research program takes advantage of fuzzy logic's ability to capture and quantify the many subjective uncertainties that challenge construction projects. Researchers combine fuzzy logic with other forms of uncertainty modeling, artificial intelligence, and simulation techniques to develop advanced decision-support tools and approaches.

Mohammad Raoufi
mraoufi@ualberta.ca

Mohammad is a PhD student in the University of Alberta's Hole School of Construction Engineering and a researcher for the IRC in Strategic Construction Modeling and Delivery. To learn more about his research, email him at the address above or visit the IRC's website at:

► strategic-construction.ualberta.ca

Background

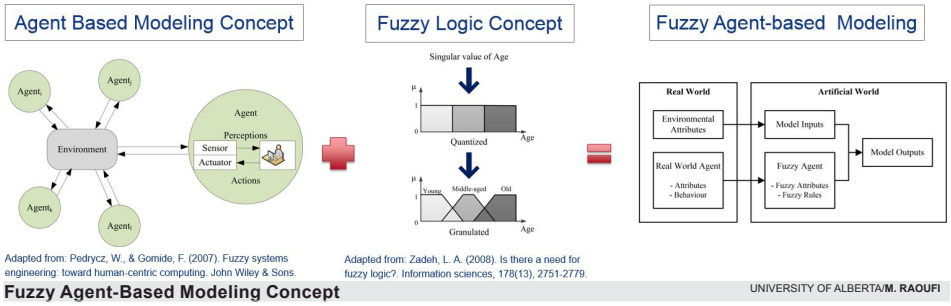
- There is a large research gap in existing construction literature regarding the factors affecting construction crew motivation.
- There is a lack of research into modeling the complexity of interactions that exist among crew workers and the subjective uncertainties involved in the factors affecting construction crew motivation and performance.
- Agent-based modeling is capable of modeling complex systems of interacting agents.
- Fuzzy logic is able to deal with subjective uncertainty.

Objectives

- Define and study how motivational factors affect crew performance metrics (e.g., crew productivity).
- Evaluate multi-level motivation and how peers affect individual motivation in a crew.
- Measure crew motivation based on factors affecting motivation.
- Combine fuzzy logic and agent-based modeling to analyze complex models in construction.
- Develop a model that describes the relationship between motivational factors, crew motivation, and crew performance metrics.

Methodology

1. Identification	• Identify factors affecting crew motivation of construction crew workers from existing literature in both construction and non-construction domains
2. Quantification	• Quantify input (e.g., motivational factors) and output (e.g., productivity) variables; define sub-factors and select appropriate measures.
3. Modeling	• Develop the fuzzy agent-based model for assessing the effect of motivation on construction crew performance



Adapted from: Pedrycz, W., & Gomide, F. (2007). Fuzzy systems engineering: toward human-centric computing. John Wiley & Sons.

Adapted from: Zadeh, L. A. (2008). Is there a need for fuzzy logic?. Information sciences, 178(13), 2751-2779.

Fuzzy Agent-Based Modeling Concept

UNIVERSITY OF ALBERTA/**M. RAOUFI**

Industry Applications

When applied by industry, this study will:

- Provide a base for better understanding the relationship between motivational factors, crew motivation, and crew performance.
- Enable better prediction of labour performance at the construction crew level, helping to prevent or at least mitigate common cost overruns and schedule delays.
- Provide participating partner organizations with critical motivational factors affecting crew performance metrics, from which policies and procedures can be designed to improve crew performance metrics attributes such as turnover rate, absence rate, and safety (incidents).

NSERC CRSNG

UNIVERSITY OF ALBERTA

Tel: 780.492.1205 | **Fax:** 780.492.0249 | aminah.robinson@ualberta.ca | **www.strategic-construction.ualberta.ca**
3-013 Markin/CNRL Natural Resources Engineering Facility | University of Alberta, Edmonton, Alberta, Canada T6G 2W2