IRC KeyNotes

STRATEGIC CONSTRUCTION MODELING AND DELIVERY
INDUSTRIAL RESEARCH CHAIR

Aminah Robinson Fayek, PhD, PEng

Director, Construction Innovation Centre

Canada Research Chair in Fuzzy Hybrid Decision Support Systems for Construction

NSERC Industrial Research Chair in Strategic Construction Modeling and Delivery

Professor, University of Alberta

INDUSTRY PARTNERS

Capital Power Corporation

Christian Labour Association of Canada (CLAC)

Construction Owners Association of Alberta (COAA)

Electrical Contractors Association of Alberta (ECAA)

Progressive Contractors Association of Canada (PCA)

Suncor Energy Inc.

Alberta Roadbuilders and Heavy Construction Association (ARHCA)

Merit Contractors Association

**NSERC
CRSNG**

A Collaborative Endeavour

SARAH MILLER

Introducing the
Construction Innovation Centre

Collaboration is and always has been fundamental to the NSERC Industrial Research Chair in Strategic Construction Modeling and Delivery (IRC). Over the past 13 years, IRC Chairholder Dr. Aminah Robinson Fayek has developed long-term partnerships with numerous owners, contractors, associations, and labour organizations; through these partnerships, she and her team have created innovative solutions to construction industry challenges.

At the annual Innovation in Construction: FORUM in May 2019, Dean of Engineering Dr. Fraser Forbes announced the establishment of a new initiative at the University of Alberta that will further strengthen the collaborative power of the IRC and other construction research groups at the university. The initial concept was proposed in the 1990s by the late John Poole, philanthropist and University of Alberta engineering alumnus, and the Construction Innovation Centre (CIC) was officially established this spring by the university and supported by Dr. Forbes and Dr. Simaan AbouRizk, Chair of the Department of Civil and Environmental Engineering. The CIC will provide numerous benefits to industry and the university, including "(1) the opportunity to tackle large, complex, interdisciplinary projects that are difference-makers for the industry; (2) a next step in our evolution of working with industry on making it stronger; and (3) bringing industry closer to university activity so they can help us shape our direction to be in sync with what is needed," says Dr. AbouRizk.
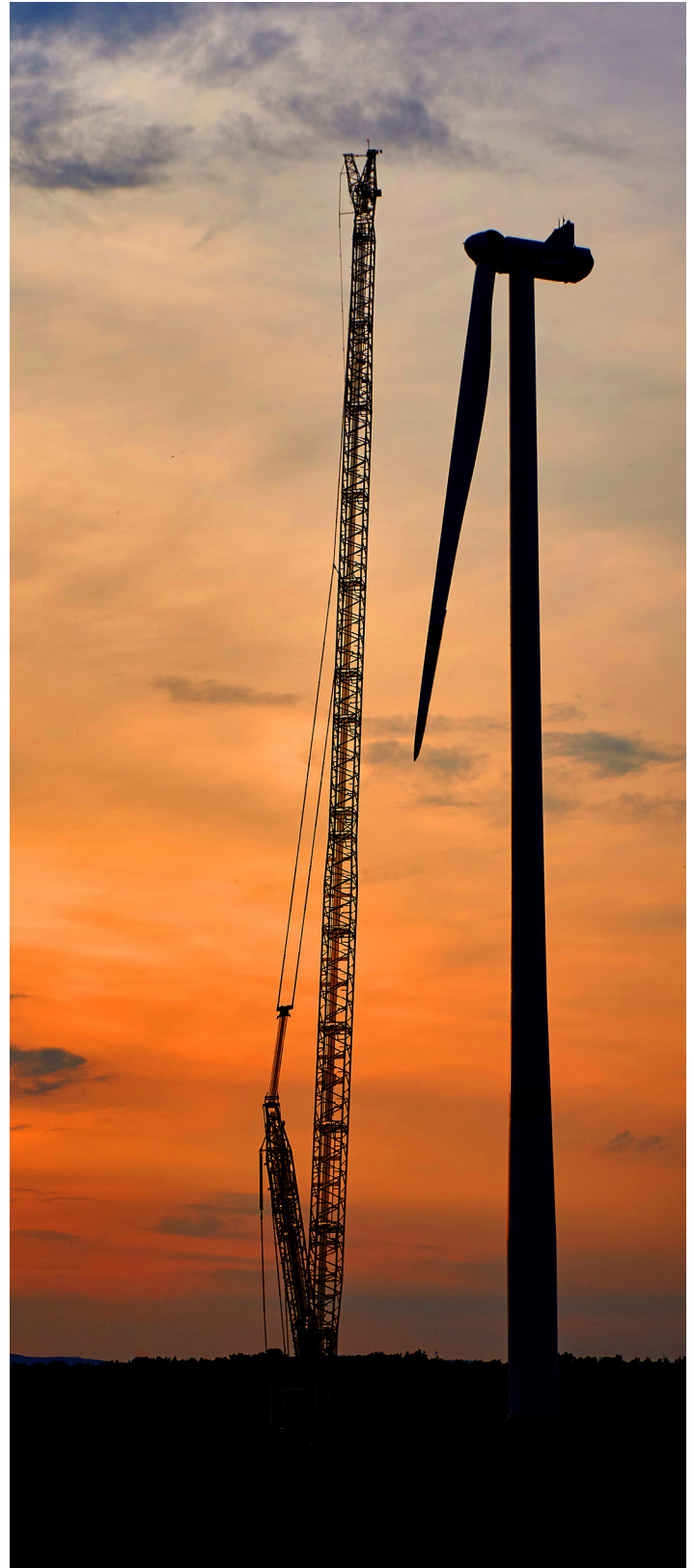
MESSAGE FROM THE CHAIR

Expanding opportunities for collaboration and innovation

The construction industry is an essential part of the Canadian economy, contributing seven percent of Canada's GDP and employing more than 1.4 million workers; in Alberta, the construction industry accounts for ten percent of the province's employment. With construction organizations seeking to improve performance by implementing innovative processes and technologies, including advances in artificial intelligence, construction methods and materials, automation and robotics, and more, it is important for researchers to work with industry to develop effective solutions in critical areas. Practitioners are tackling head-on the challenges associated with clients' increasing sustainability requirements, with new types of construction projects, and with the availability of hundreds of new ways to improve performance and productivity. As the workforce is renewed with the next generation of construction practitioners, it is vital not only that they receive training in the latest construction techniques, but also that the expert knowledge acquired by retiring practitioners over their long careers is captured and transferred to the next generation. The face of construction is changing, and individual organizations, as well as the Albertan and Canadian industries in general, must keep up.

The face of construction is changing, and the Albertan and Canadian industries must keep up.

The NSERC Industrial Research Chair in Strategic Construction Modeling and Delivery (IRC) is dedicated to helping our partners remain the vanguard of organizations implementing innovative, research-based solutions for construction challenges both old and new. The IRC has always been a collaborative venture, with our research directions influenced by the needs of our industry partners, who represent owners, contractors, labour organizations, and associations who are active in Alberta, in Canada, and beyond. In the remaining two years of the program, the IRC team will continue its research under the themes of organizational competencies and performance, productivity modeling and analysis, and construction risk modeling and analysis. As discussed in my Message from the Chair in Issue 8 of IRC KeyNotes, my research as Tier 1 Canada Research Chair in Fuzzy Hybrid Decision Support Systems for Construction, through my NSERC Discovery Grant, and as a principal investigator of the University of Alberta's Future Energy Systems project will also continue to inform and enhance the solutions we provide to our IRC partners.

In addition, I am beginning a new role as Director of the Construction Innovation Centre (CIC), an initiative launched by the University of Alberta that will bring together expertise from various construction research groups under one umbrella.

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Message from the Chair
Continued from page 2

This will enable industry partners to access interdisciplinary teams who will develop solutions to specific problems faced by our partners and the construction industry as a whole. The focus of the CIC is to maximize the impact of our collaborative research on the Albertan and Canadian construction industries. To ensure that our research addresses the pressing issues faced by industry, the strategic direction of the CIC will be informed by an Executive Management Committee consisting of construction industry and government leaders. Research results and training on developed technologies will be provided to industry, and students will learn valuable skills that they can apply as either academic researchers or industry professionals. This is an exciting opportunity for the Albertan and Canadian construction industries—including our IRC partners—and the University of Alberta, and we hope to see the CIC grow to be an internationally recognized centre for cutting-edge research and interdisciplinary solutions to high-priority challenges in construction. The CIC is profiled in our feature on page 1, and more information can be found at uab.ca/cic or by emailing me at aminah.robinson@ualberta.ca.

In addition to my appointment as Director of the CIC, I was also recognized by the American Society of Civil Engineers with the Peurifoy Construction Research Award. I am honoured to have been recognized for my contributions in fuzzy logic theory and practice for construction engineering and management. My career has been one of both intentional and serendipitous moments that led me to develop a genuine enthusiasm for and interest in fuzzy logic and its applications in construction. I have now been applying fuzzy logic techniques in my research for almost 30 years, and my work has been instrumental in driving a paradigm shift in construction engineering and management research and practice. Since fuzzy logic techniques are able to model subjective uncertainty and account for expert judgment, they can be used to more accurately predict performance outcomes and help identify areas for improvement than classical logic techniques on their own. Fuzzy logic has limitations, however, and my research has therefore evolved to include the development of techniques that integrate fuzzy logic with other artificial intelligence, machine learning, and simulation techniques. These fuzzy hybrid techniques overcome the limitations of each individual technique to provide efficient, effective solutions to the issues that my industry partners have encountered over the years. I am excited to continue the research that has earned me this recognition, and to continue to work with industry partners on developing novel ways to overcome the challenges of improving performance on construction projects. The Albertan and Canadian construction industries, and our partners in particular, have demonstrated their commitment to developing and using research-based tools and techniques in their practices, and I am glad to share that commitment with them, now and for the future. ∎

NSERC Alliance Grants to replace Industrial Research Chairs

The Natural Sciences and Engineering Research Council of Canada has begun consolidating several of its research partnerships programs into a single grant program for university researchers collaborating with private-sector, public-sector, or not-for-profit organizations. Current grant holders, including the Industrial Research Chair in Strategic Construction Modeling and Delivery, will be supported through the remaining years of their programs, after which they will be eligible to apply for one of two Alliance grant options. Option 1 offers grants of $20,000 to $1 million per year for a duration of one to five years, with NSERC contributing 50% to 66% of project costs, depending on the size of the partner organizations. Option 2, which has not yet been launched, will provide grants of $20,000 to $200,000 per year for a duration of one to five years for partnerships that include at least one organization recognized for NSERC cost-sharing; NSERC will contribute 90% of costs for projects with a private-sector partner organization and 100% of costs for public and not-for-profit partner organizations. More details can found on the NSERC Alliance webpage. ∎

Construction Innovation Centre

The CIC, with Dr. Robinson Fayek as its first Director, will bring together over 30 engineering professors. Its mission is to "provide breakthrough research, education, and training that directly benefit Canada's construction industry and lead to the sustainable and economic development of our built environment and a competitive advantage for the Canadian construction industry." Continued industry collaboration will be essential for accomplishing this mission. Participating researchers, including professors in the Hole School of Construction Engineering, the Nasseri School of Building Science and Engineering, the Masonry Engineering Research Group, and the Steel Centre, have established deep connections with industry in Edmonton, in Alberta, and beyond. To ensure current and future industry interests are represented at the CIC, visionary and senior leaders and important stakeholders from the private, not-for-profit, and government sectors will sit with university members on the Executive Management Committee, which will help shape the direction of CIC initiatives.

With just over two years left in the current IRC program, research undertaken in collaboration with her industry partners will remain a focal point for Dr. Robinson Fayek and her research team—and as the first director of the CIC, Dr. Robinson Fayek will be able to facilitate even more opportunities for collaboration with other researchers at the University of Alberta and beyond. Larry Staples, advisor to long-term IRC partner the Construction Owners Association of Alberta (COAA), describes the CIC as a "clear path to understanding what [other research groups] are doing, whether that's in structural steel or masonry or trenchless technologies and so on. If there seems to be some synergy with other professors and other student groups, [the CIC] is a clear path to those relationships."
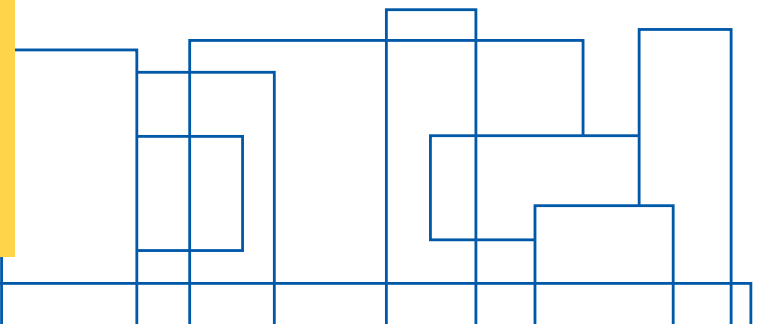
Vision

The vision of the Construction Innovation Centre is to be an internationally recognized centre for research, teaching, and industry training in engineering, constructing, and servicing the built environment— the focal point for academia, industry, and government to come together and meet the grand challenges facing the construction industries and to create high-impact innovations across the construction engineering spectrum.

The construction industry has often been criticized for being slow to adopt new technologies, which, Mr. Staples points out, are necessary for improving productivity and attracting capital investment. "Things are changing rapidly in Alberta and around the world in terms of expectations of 'more for the money' for clients. And that means better performance during a construction project and coming up with structures that operate more efficiently and have a lower carbon footprint. Cost expectations are rising among clients, and performance expectations are rising among clients and society, and it's going to take a lot of brainpower to make progress in those fields." By working closely with industry to develop innovative techniques and technologies that can meet those expectations, and by training current and future construction practitioners as well as academics, the CIC will "propel the industry forward," in Mr. Staples' words. "Right on our doorstep here we have world-class expertise within the CIC—in fact leading the CIC—so we just see it as a perfect match-up."

Now that the CIC has formally been established, the next step will be "making it happen," according to Dr. AbouRizk. This will involve setting up the required management infrastructure to support the CIC's first projects and deliver the Innovation in Construction: FORUM in 2020. With the expertise and experience that both academia and industry bring to the CIC, the centre will bring about transformational changes in construction practice, leadership, and culture. "I would like [the CIC] to be a game changer influencing practice and policy," says Dr. AbouRizk. "We are developing a long-lasting collaborative research and development program with industry that will be second to none."

For more information on the CIC, please email Dr. Robinson Fayek, Director, at aminah.robinson@ualberta.ca. ∎

Goals

✦ Accelerate and support innovation, productivity, and competitiveness in Alberta's and Canada's construction industries through high-impact research projects

✦ Identify industry needs and align CIC research programs to meet these needs

✦ Provide a unified platform for solutions to construction industry problems through multi-disciplinary research

✦ Train the next generation of construction engineers and workforce with leading-edge knowledge and skills

✦ Enhance engagement with all levels of government to grow and sustain investment in Canada's construction industry

Students of the NSERC Industrial Research Chair in Strategic Construction Modeling and Delivery (IRC) are hard at work on both courses and thesis research. Some of our newer students are expanding on research themes that have been the focus of the IRC since the beginning of its third term in 2017, for example, productivity modeling and analysis and risk analysis and contingency determination. Other students are branching into new areas of application on how artificial intelligence, machine learning, and simulation can be applied to help solve construction industry problems and improve performance. All of the students' work is promising to lead to innovative techniques and tools, and we have chosen to highlight two projects that demonstrate the practical results delivered by the IRC.

Tool to support digitalization implementation in the industrial construction sector

Digitalization—leveraging digital technologies and data to improve processes—helps companies deliver projects efficiently and effectively. Businesses and industries of all kinds are undertaking digitalization, but it can be a challenge for companies to determine which digital technologies will have the greatest return on investment and how to best implement these technologies. In the construction industry, recent studies on digitalization practices highlight that performance does not meet its potential due in part to a lack of adoption and use of digitalization technologies.

In partnership with the COAA and the Alberta Ministry of Economic Development, Trade and Tourism, this research project develops a fuzzy logic decision support tool for digitalization implementation in the Alberta heavy industrial construction sector. The Construction Industry Institute (CII) developed an information integration opportunity assessment tool (CII tool) to help construction companies assess their information integration practices, which are a subset of digitalized operations, and plan for new investments. The tool that will be developed through this research project builds on the CII tool to provide a new method of handling the subjective uncertainties involved in construction companies' assessments of digitalization implementation opportunities.

Project team members are currently collaborating with the COAA to develop a questionnaire and possible web portal to solicit feedback to develop a community of practice. Data will then be collected through a different questionnaire and used to develop the tool, which is expected to be finalized late next year.

The tool will enable users to evaluate and rank promising digitalization opportunities so that construction companies can select those with the greatest benefits and possibility of success. This research project will increase knowledge of the effects of digitalization in the construction industry, helping to advance industry's productivity and competitiveness.

Modeling construction organizational competencies influencing performance

Organizational competencies have a significant influence on performance, and it is vital that organizations in the construction industry assess and enhance their competencies in order to improve performance. Previous studies have focused on either individual- or project-level competency and performance, but have spent little to no time on organizational-level competencies in the construction domain even though organizational competencies exert a considerable influence on performance. Doctoral student Getaneh Tiruneh is addressing this gap as part of his research program by developing systems that construction practitioners can use to evaluate and improve their organizational competencies and performance. His work is building on previous IRC research that related project-level competencies to project key performance indicators by expanding it to the organizational level.

If you would like further information about either of these projects, please contact Dr. Aminah Robinson Fayek at aminah.robinson@ualberta.ca or 780-492-1205.

Goodbyes and hellos

The IRC would like to congratulate Dr. Nasir Siraj for the successful completion of his research program. Dr. Siraj's thesis, "Hybrid Fuzzy System Dynamics Model for Risk Analysis and Contingency Determination," explored risk analysis techniques for construction, with a focus on the development of a novel hybrid fuzzy system dynamics model for analyzing both risks and opportunities. The model allows experts to evaluate the probability and impact of risk and opportunity events using natural language; it accounts for the interrelationships of these events and their influence on one another; and it determines construction project contingency. The IRC team is excited to see what the future will bring for Dr. Siraj!

In January, two new MSc students joined the IRC group. Sara Ebrahimi is excited to be working with Dr. Robinson Fayek on the creation of a data warehouse of construction productivity factors and measures. Sara will then use the data warehouse with data mining and machine learning techniques to develop solutions for optimizing construction labour productivity. Matin Kazerooni has also begun working on productivity solutions. His project involves the development of an artificial intelligence decision support tool for predicting productivity and recommending productivity improvement strategies. Both Sara and Matin will be finishing up their coursework at the end of the 2019 fall semester, after which they will work full time on their thesis projects. Welcome! ∎

Dr. Nasir Siraj completed his doctoral studies on hybrid fuzzy system dynamics models for risk analysis

New MSc students Sara Ebrahimi (left) and Matin Kazerooni are focusing on different aspects of productivity improvement for their thesis projects.

Construction Owners Association of Alberta (COAA) 2019 Best Practices Conference

The Construction Owners Association of Alberta (COAA) hosted the 27th annual Best Practices Conference on May 7–8, which focused on the theme of digitalization in construction. This year's conference featured 17 workshops, several plenary sessions, networking opportunities, awards presentations and a keynote presentation by Sandy Martin of Suncor Energy on Digital Transformation from the Owner's Vantage Point. Close to 500 people attended the conference, including COAA board members, industry partners, member companies, and students. The COAA also introduced its newest committee, Future Leaders of Industrial Construction (FLIC), which comprises younger members of the organization who are driven to make changes in industry.

The IRC team contributed to two workshops. Postdoctoral fellow Dr. Mohammad Raoufi and COAA advisor Larry Staples presented on the digitalization implementation support tool that the IRC team is currently developing in collaboration with the COAA (see page 5). This tool will help construction organizations determine which digital technologies to implement for the greatest benefit to performance. Postdoctoral fellow Dr. Nima Gerami Seresht discussed the Advanced Work Packaging (AWP) Assessment Tool© developed by Dr. Robinson Fayek and the IRC team, which has been offered to all COAA members as well as Construction Industry Institute AWP committee members. IRC students had the opportunity to network and share their research by participating in the Student Poster Competition, which the COAA graciously sponsors in addition to providing students with complimentary conference registration. This year, eight IRC students from the University of Alberta were joined by three students from the Centre for Project Management Excellence at the University of Calgary Schulich School of Engineering. Yisshak Gebretekle, a first-year PhD student in the IRC program, received the most votes from conference attendees for his poster "Modified Construction Productivity Model Using Fuzzy System Dynamics," taking home the Best Student Poster Award.

The IRC team would like to extend their thanks to the COAA for once again making this valuable experience possible. Attending the Best Practices Conference is a great opportunity for students to meet construction practitioners and learn about practical industry concerns, and the IRC team is grateful to have such a productive partnership with the COAA.

Innovation in Construction: FORUM 2019

On May 22, the Hole School of Construction Engineering (HSCE) hosted Innovation in Construction: FORUM 2019 at the University of Alberta. Under the theme "Spark Success," the event included capital project updates from industry, tech talks from HSCE researchers, and networking opportunities. The forum also included the announcement of the Construction Innovation Centre (CIC), which was introduced by Dean of Engineering Dr. Fraser Forbes. As the first director of the CIC, Dr. Robinson Fayek participated in the panel "Advancing Collaborative Research to New Heights: The Launch of a New Initiative," where she talked about the

opportunities the CIC will bring to University of Alberta researchers and construction industry partners. The other panel participants were Dr. Robert Driver and Dr. Carlos Cruz Noguez, representing steel and masonry respectively at the University of Alberta; Dr. Mark Hagel, Executive Director of the Alberta Masonry Council; Jim Kanerva, General Manager at Carry Steel; Travis Chorney, Senior Vice President at PCL Industrial Management Inc.; and Dr. Amir Jamshidi, Director of Engineering at Supreme Group LP. Dr. Robinson Fayek also presented a tech talk on Fuzzy Risk Analyzer©, a tool for construction risk management (see below for more information).

Upcoming event: Launch of Fuzzy Risk Analyzer©

Several industry partners of the IRC program have been using Monte Carlo simulation for risk analysis, but they noted several drawbacks to this process, including lack of historical data, difficulty developing probabilistic distributions, and large time investments to reach consensus on how to quantify risks. In addition, Monte Carlo simulation does not allow the use of natural language in assessing risks and does not explicitly account for opportunities.

The IRC team therefore developed Fuzzy Risk Analyzer© (FRA©), which is fast, accurate, easy-to-use software that can help users determine contingency for construction projects and which overcomes the drawbacks of Monte Carlo simulation and other traditional risk analysis techniques. With FRA©, users can express the probability and impact of both risks and opportunities using linguistic terms. The software then calculates the severity of each risk and opportunity for each work package and determines an overall cost contingency for the project.

The IRC team is pleased to announce that pilot testing with an IRC industry partner is under way for FRA©, and a launch is anticipated for early 2020. Please contact Dr. Robinson Fayek at aminah.robinson@ualberta.ca for more information.

Academic conferences

Over the spring and summer, Dr. Robinson Fayek, students, and postdoctoral fellows presented six refereed conference papers at four different academic conferences. PhD student Hamed Fateminia's paper "Evaluating Risk Response Strategies on Construction Projects Using a Fuzzy Rule-Based System" was presented by co-author Dr. Nima Gerami Seresht, postdoctoral fellow, at the 36th International Symposium on Automation and Robotics in Construction, held in Banff, AB, from May 21 to 24. Dr. Robinson Fayek is also a co-author of the paper.

PhD students Nebiyu Kedir and Yisshak Gebretekle travelled to Montreal, QC, to present their papers at the CSCE 7th International Construction Conference, held jointly with the ASCE Construction Research Congress 2019 from June 12 to 15. We are pleased to announce that Yisshak Gebretekle's paper "Framework to Establish the Relationship Between Factors Influencing Construction Productivity Using Fuzzy Interpretive Structural Modeling," co-authored by Dr. Gerami Seresht and Dr. Robinson Fayek, won Best Student Paper (see page 9). Nebiyu Kedir presented "Application of Fuzzy Analytic Hierarchy Process in Front-End Planning," co-authored by PhD student Maedeh Taghaddos (supervised by Dr. Simaan AbouRizk), postdoctoral fellow Dr. Mohammad Raoufi, and Dr. Robinson Fayek. At this conference, Dr. Robinson Fayek accepted the Peurifoy Construction Research Award and spoke about her career studying fuzzy logic and fuzzy hybrid techniques for construction engineering and management and their applications in industry, the development of this area of study, and challenges to the implementation of research-based solutions to real-world problems (see pages 9 and 3).

Nebiyu Kedir then travelled to Atlanta, GA, to present his paper "Integrating Fuzzy Agent-Based Modeling and Multi-Criteria Decision-Making for Analyzing Construction Crew Performance" at the 2019 ASCE International Conference on Computing in Civil Engineering. The paper is co-authored by Dr. Raoufi and Dr. Robinson Fayek.

Finally, PhD candidate Getaneh Tiruneh and Dr. Robinson Fayek attended the FUZZ-IEEE 2019 International Conference on Fuzzy Systems in New Orleans, LA, from June 23 to 26. Getaneh Tiruneh presented his paper "Feature Selection for Construction Organizational Competencies Impacting Performance" (co-authored by Dr. Robinson Fayek), and Dr. Robinson Fayek presented "Consensus Building in Group Decision-Making for the Risk Assessment of Wind Farm Projects," which she also co-authored; first and second authors are MSc student Yajie Hao, who is under the supervision of Dr. Witold Pedrycz, and Nebiyu Kedir, respectively. Dr. Gerami Seresht and Dr. Pedrycz are also co-authors.

In addition to the refereed conference papers, the IRC team was also represented at the 2019 Future Energy Systems (FES) Research Symposium at the University of Alberta, which took place on May 6 as part of the university's Energy Week. Dr. Gerami Seresht participated in the session Improving Environmental Performance, where he spoke about IRC research on non-electric infrastructure. Dr. Robinson Fayek is principal investigator on the project "Decision Support Systems for Improved Construction and Maintenance of Non-Electrical Infrastructure for Energy," which is supported by Dr. Gerami Seresht and MSc student Sahand Somi, as well as other professors and students in the Faculty of Engineering. The FES team, which also includes Drs. Witold Pedrycz, Simaan AbouRizk, and Ming Zuo, is developing a decision support system that practitioners can use to aid decision-making during the processes of construction, operation, and maintenance of energy infrastructure. Because these projects involve weather-related challenges, unproven technology, and unknown stakeholder interests, among other risks, and because data on such projects may be limited or unavailable, decision-making often takes place in an environment of considerable uncertainty. The decision support systems developed through this research project will help practitioners address these challenges. For more information, visit the Future Energy Systems website. ■

PhD students Yisshak Gebretekle (left) and Nebiyu Kedir (right) with Dr. Robinson Fayek at the CSCE 7th International Construction Conference in Montreal

ASCE 2019 Peurifoy Construction Research Award

The American Society of Civil Engineers (ASCE) recognized Dr. Robinson Fayek with the Peurifoy Construction Research Award for her work over the past three decades advancing the use of fuzzy logic theory and practice in construction engineering and management. The award is the top construction research award of the ASCE, "given for outstanding contributions to the advancement of construction engineering through research and development of new technology, principles, or practices." It was presented at the ASCE Construction Research Congress in Montreal, QC, which was held jointly with the CSCE 7th International Construction Conference from June 12 to 15. Dr. Robinson Fayek accepted the award with a presentation on the evolution of her career, the evolution of fuzzy logic applications for construction, and future directions for research and dissemination. The ASCE writes, "Robinson Fayek is in a distinct class of academic civil engineers who have successfully bridged the gap between academic theory and engineering practice to exert real change within the construction industry," as industry partners of the IRC program know well. "Her exploration of novel approaches for decision-making in construction has been consistently groundbreaking, resulting not only in the creation of software solutions that have been embraced by industry, but also in the development of new data collection and process modeling techniques that have considerably advanced academic research within and beyond her field of study," states the ASCE. For more information on Dr. Robinson Fayek's Peurifoy Award acceptance, please see the Message from the Chair on page 3.

Congratulations, Dr. Robinson Fayek!

Two-time award-winner Yisshak Gebretekle

In his first year as a PhD student in the IRC program, Yisshak Gebretekle has been honoured twice for his outstanding work on construction project productivity modeling.

At the Construction Owners Association of Alberta 27th annual Best Practices Conference on May 7–8, eight students from the IRC program and three students from the Centre for Project Management Excellence at the University of Calgary Schulich School of Engineering presented posters showcasing their research. Conference attendees considered the technical merit, industry applicability, and quality of presentation of each poster and voted for the one they believed best addressed all criteria. Yisshak's poster "Modified Construction Productivity Model Using Fuzzy System Dynamics" detailed his work on the development of a predictive model for multifactor productivity that will help practitioners track changes in productivity over time, predict resource consumption and productivity, and test potential strategies for improving productivity.

From June 12 to 15, Yisshak attended the CSCE 7th International Construction Conference in Montreal, QC, held jointly with the ASCE Construction Research Congress. He presented his paper "Framework to Establish the Relationship Between Factors Influencing Construction Productivity Using Fuzzy Interpretive Structural Modeling," co-authored by Dr. Gerami Seresht and Dr. Robinson Fayek, for which he won Best Student Paper. The paper discusses how the interrelationships between factors that affect productivity can be captured using a technique that combines fuzzy logic with interpretive structural modeling, which is important for improving productivity modeling and prediction.

Congratulations on both awards, Yissak!

Dr. Robinson Fayek (third from left) accepting the Peurifoy Construction Research Award

AXA Pacific Insurance Company of Canada Graduate Travel Award

Congratulations to PhD student Nebiyu Kedir on receiving the AXA Pacific Insurance Company of Canada Graduate Travel Award! This competitive award is given to a graduate student to support the dissemination of their research by providing funds for travel to academic conferences. This past summer, Nebiyu presented papers at the CSCE 7th International Construction Conference in Montreal, QC, and the 2019 ASCE International Conference on Computing in Civil Engineering in Atlanta, GA. The IRC team is looking forward to seeing where he goes next! ∎

Project highlight: Organizational competencies

The objectives of this study are to (1) develop a comprehensive set of criteria and measures to evaluate organizational competency and performance and (2) develop a fuzzy hybrid model that relates construction organizational competencies to performance, facilitates the evaluation and analysis of organizational competencies, and identifies those competencies that have the greatest impact on organizational performance. This model will help organizations focus on the organizational competencies that can be enhanced to maximize performance and profitability and boost competitiveness.

A comprehensive list of organizational competency and performance criteria and measures was identified from past studies, and the IRC held an industry focus group workshop to verify the list for organizations working in construction. Data collection forms were developed incorporating feedback from the focus group and were further validated with a pilot survey. The IRC is now collecting data to develop the fuzzy hybrid model and is seeking additional companies operating in the construction industry, including owners, consultants, and contractors, to participate in this study.

Participating companies will receive the validated data collection forms, which provide a systematic approach for measuring competencies and performance. They will also receive an in-depth analysis of their organizational competencies and performance. Data collected in this study will be combined to develop and test the fuzzy hybrid model, which will enable users to capture and analyze organizational competencies and predict organizational performance. The model will also allow organizations to identify the competencies with the greatest impact on performance so they can focus their efforts on improving those competencies. ∎