Welcome to SERC

The ENCS Software Engineering Research Center is part of the Faculty of Engineering and Computer Science at Concordia University located in downtown Montreal. The center participates in the knowledge-based economy through innovative, cutting-edge research and active industry and government engagement.
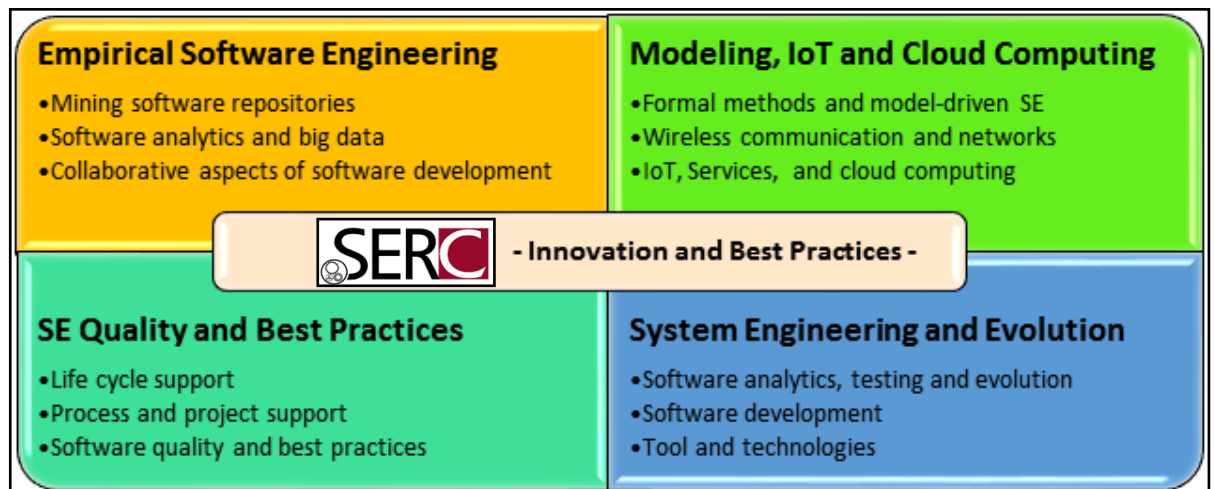
> "Software publishing in Québec generates annual revenues of over $1.7- billion. Québec's software-publishing industry is dominated by cutting-edge Québec-based SMEs targeting often specific niches. "
>
> IQ invessement Quebec www.investquebec.com/

Our mission is to:

- ✓ Provide knowledge exchange and technology transfer between academia, industry and governmental bodies.
- ✓ Become a leader in innovative software engineering technologies.
- ✓ Foster global research for innovation and collaboration.

Our core areas of expertise

Empirical Software Engineering
- Mining software repositories
- Software analytics and big data
- Collaborative aspects of software development

Modeling, IoT and Cloud Computing
- Formal methods and model-driven SE
- Wireless communication and networks
- IoT, Services, and cloud computing

SERC - Innovation and Best Practices -

SE Quality and Best Practices
- Life cycle support
- Process and project support
- Software quality and best practices

System Engineering and Evolution
- Software analytics, testing and evolution
- Software development
- Tool and technologies

We hope you find something of interest in this brochure.

Juergen Rilling
(SERC Director)

Empirical Software Engineering

Applied software engineering research with a strong empirical component based on studies that usually involve the collection and analysis of data and experience that can be used to characterize and reveal relationships between software development deliverables, practices and technologies.

Empirical results form a body of knowledge leading to accepted and well-formed theories, which will advance state-of-the-art software engineering as well as impact current industry best practices.

Mining software repositories such as source control systems, archived communications between project personnel and defect tracking systems, are mined to support the maintenance of software systems, improve software design and empirically validate novel ideas and techniques.
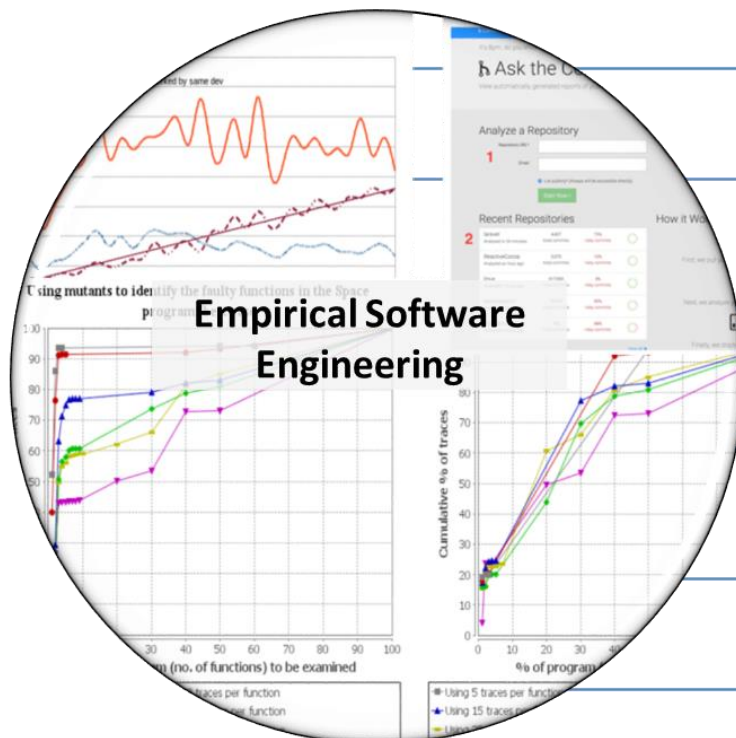
Dr. Emad Shihab

Dr. Peter Rigby

Dr. Weiyi (Ian) Shang

Dr. Abdelwahab Hamou-Lhadj
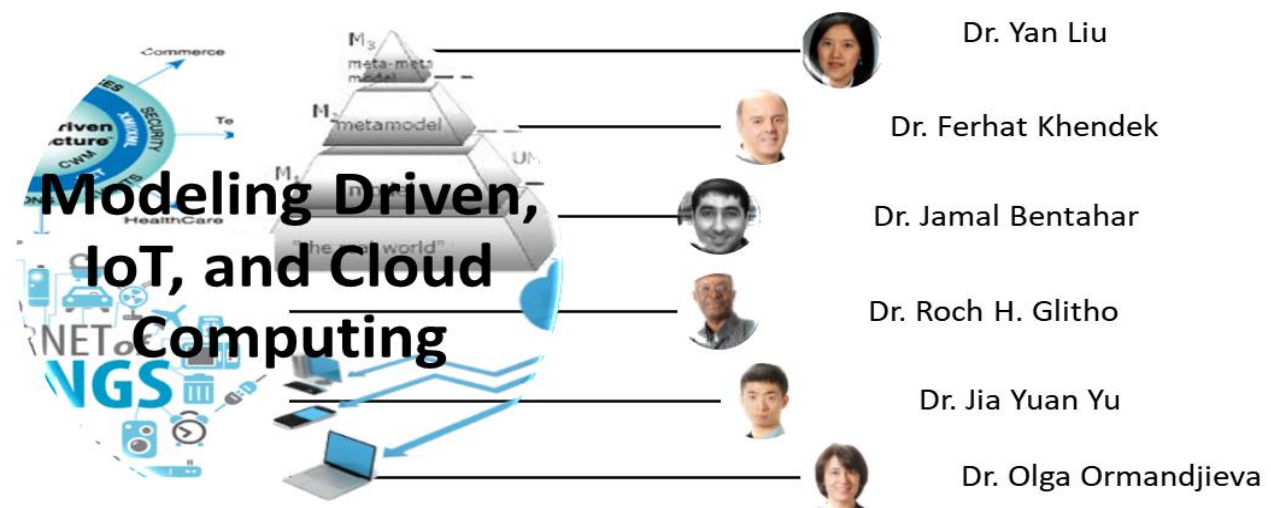
Dr. Nikolaos Tsantalis

Dr. Juergen Rilling

Modeling Driven, IoT, Wireless Communications, and Cloud Computing

Model Driven Development maximizes compatibility between systems via the reuse of standardized models, simplifying the process of design and promoting communication between individuals and teams. Model driven development is an integrated part of new and emerging systems and paradigms such as cyber-security, cyber-physical systems, cloud computing, data analytics, big data, systems engineering, social media, devices and services.

IoT and Cloud Computing as the **Internet of Things (IoT)** evolves across industries new software engineering challenges: high reactivity, scalability, heterogeneity, configurability, resource-constrained systems and robustness. It also requires software architectures that deal with complex interactions, interoperability gaps and data mining for reasoning about the environment and software interactions. Research within the center on **cloud computing** focuses on enhance on demand resource distribution and Improving ubiquitous, on-demand access to a shared pool of configurable computing resources (e.g., computer networks, servers, storage, applications and services), which can be rapidly provisioned and released with minimal management effort.

Wireless communication research within the center spans from ad hoc networks, cognitive networks, error control, coding theory, information theory, multi hop networks and mobility and resource management in wireless networks to name a few.

Dr. Yan Liu

Dr. Ferhat Khendek

Dr. Jamal Bentahar

Dr. Roch H. Glitho

Dr. Jia Yuan Yu

Dr. Olga Ormandjieva

Quality and Best Practices

Software Quality and Measures considers quality as defined in a business context, assessing whether a system complies with or conforms to a given design, based on functional requirements or specifications. Research within the center includes among others, assessing and improving both functional and non-functional qualities of a system to better ensure that a system complies to these requirements.
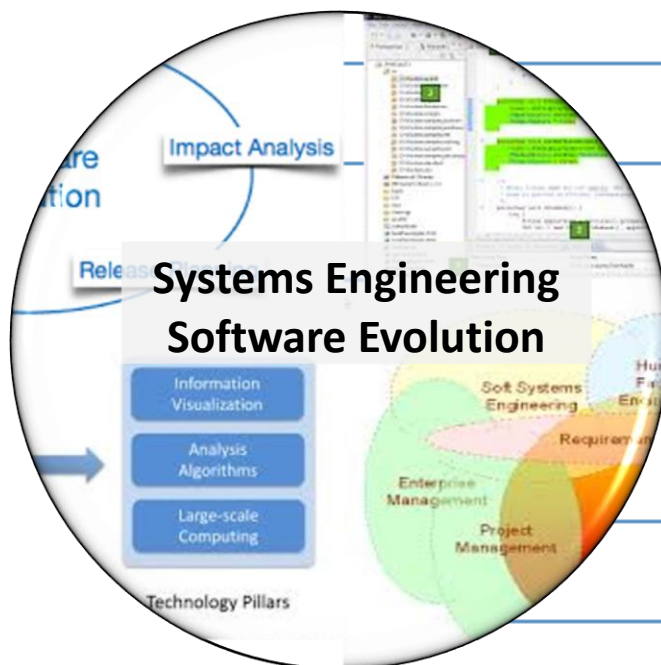
Software Processes and Collaborative SE includes the design, produce and deliver an enterprise's products and services, but also how these processes are instantiated by enterprise/government practices, policies and regulations. Software engineering projects are inherently cooperative, requiring different stakeholders to coordinate their efforts to produce a large software system. Expertise in the center includes on developing a shared understanding of multiple artifacts, each artifact embodying its own model, over the entire development process. Current projects include collaboration embedded within a larger development process as well as artifact-neutral coordination technologies and toolkits.

Systems Engineering and Software Evolution

System Engineering focuses on holistically and concurrently understanding stakeholder needs, exploring opportunities, documenting requirements; and synthesizing, verifying, validating and evolving solutions. It also considers the complete problem, from system concept exploration through system disposal. Software development expertise in the center focuses on developing new tools, includes language front-ends, program analyses and runtime systems, new techniques (such as methodologies, design processes and code organization approaches), new principles (such as formalisms, proofs, models and paradigms), and new evaluations (such as experiments, corpora analyses, user studies and surveys).

Software Evolution expertise within the center involves the theory and practice of recovering information from existing software and systems. Current projects explore of innovative methods of extracting the many kinds of information that can be recovered from software, software engineering documents and systems artifacts. Our researchers are also examining innovative ways of using this information in system renovation and program understanding. Research projects focus on the development of tools and best practices to support software evolution tasks.

Dr. Emad Shihab

Dr. Peter Rigby

Dr. Weiyi (Ian) Shang

Dr. Abdelwahab Hamou-Lhadj

Dr. Nikolaos Tsantalis

Dr. Juergen Rilling

For more information: serc.encs.concordia.ca;
Contact: Dr. Juergen Rilling (Director) E-mail: Juergen.rilling@concordia.ca; Tel. 514-848-2424 x3016

Software Engineering Research Center

SERC Members

	Jamal Bentahar: Intelligent agents and multi-agent systems, formal methods **Web:** http://users.encs.concordia.ca/~bentahar/ **E-mail:** bentahar@ciise.concordia.ca
	Rachida Dssouli: Communication software engineering, QA, conformance testing **Web:** http://users.encs.concordia.ca/~dssouli/ **E-mail:** rachida.dssouli@concordia.ca
	Roch H. Glitho: Architectures for end-user services, Virtualization and cloud computing, IoT **Web:** http://users.encs.concordia.ca/~glitho/ **E-mail: Glitho@ciise.concordia.ca**
	Abdelwahab Hamou-Lhadj: Software tracing, trace-based anomaly detection systems (cybersecurity). **Web:** http://users.encs.concordia.ca/~abdelw/ **E-mail:** wahab.hamou-lhadj@concordia.ca
	Ferhat Khendek: Modeling, Design and Validation ,Service High Availabilit, Next Generation Networks **Web:** http://users.encs.concordia.ca/~khendek/ **E-mail:** ferhat.khendek@concordia.ca
	Yan Liu: Software architecture, model driven development, embedded and cyber-physical systems, **Web:** http://users.encs.concordia.ca/~liu/ **E-mail:** yan.liu@concordia.ca
	Olga Ormandjieva: Formal methods, autonomic and reactive systems, software measures **Web:** http://users.encs.concordia.ca/~ormandj/ **E-mail:** ormandj at cse.concordia.ca
	Peter Rigby: Software analytics, empirical software engineering, release engineering, collaborative SE **Web:** http://users.encs.concordia.ca/~pcr/ **E-mail:** peter.rigby@concordia.ca
	Juergen Rilling: Global software analytics, software traceability, software evolution, knowledge modeling **Web:** http://users.encs.concordia.ca/~rilling/ **E-mail:** Juergen.rilling@concordia.ca
	Weiyi (Ian) Shang: SE for ultra-large-scale systems, performance engineering, empirical SE **Web:** http://users.encs.concordia.ca/~shang/ **E-mail:** shang@encs.concordia.ca
	Emad Shihab: Software Quality Assurance, Software Maintenance, Empirical SE, Mobile Applications **Web:** http://das.encs.concordia.ca/members/emad-shihab/ **E-mail:** eshihab@cse.concordia.ca
	Nikolaos Tsantalis: Empirical software engineering, refactoring recommendation systems **Web:** http://users.encs.concordia.ca/~nikolaos/ **E-mail:** nikolaos.tsantalis@concordia.ca
	Jia Yuan Yu: Data science, decision theory (machine learning, statistics, game theory, operations research) **Web:** http://users.encs.concordia.ca/~jiayuan/ **E-mail:** jiayuan.yu@concordia.ca

For more information: serc.encs.concordia.ca;
Contact: Dr. Juergen Rilling (Director) E-mail: Juergen.rilling@concordia.ca; Tel. 514-848-2424 x3016