

Research Directions in the Software Department

The Software Department is one of the vital departments in the College of Computing, focusing on the development of efficient, secure, and high-quality software systems that meet the needs of society and the labour market. With the rapid changes in technology, the department's research directions continue to evolve in line with the latest developments in industry and scientific research.

1. Artificial Intelligence in Software(AI for SE)

- Utilizing AI techniques to improve code quality and software testing.
- Automated code generation and bug detection.
- Integration between machine learning engineering and Software(MLOps).

2. Mining Software Repositories (MSR)

- Analyzing development data from GitHub, JIRA, and others.
- Predicting software failures and monitoring code quality through historical pattern analysis.

3. Software Testing and Verification

- Developing effective techniques for automated software testing.
- Testing safety-critical systems.
- Formal verification of system correctness.

4. Requirements Engineering

- Extracting and analyzing requirements using Natural Language Processing (NLP).
- Ensuring completeness and consistency of requirement documents.

5. Cloud-based Software Engineering

- Designing cloud-native software.
- Integration with DevOps and CI/CD platforms.
- Enhancing performance and efficiency in cloud computing environments.

6. Secure and Dependable Software

- Developing systems resilient to attacks.
- Embedding “privacy by design” principles into the software development lifecycle.

7. Self-Adaptive Software Systems

- Designing software capable of autonomously adapting its behaviour based on environment or requirements.
- Using intelligent algorithms for self-monitoring and control.

8. Model-Driven Engineering (MDE)

- Generating code from high-level engineering models.
- Enabling early validation and reducing design errors.

9. Green and Sustainable Software

- Developing tools to measure and optimize energy consumption in software applications.
- Promoting environmentally friendly software practices.

10. Human-Centered Software Engineering

- Integrating user experience (UX) principles into design and development stages.
- Studying user interaction with systems to improve usability.

The department is committed to staying aligned with these research directions by encouraging graduation projects, postgraduate research, and industry collaboration ensuring high-quality outcomes that positively impact digital society development.