

Faiz Ali Shah

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Brief Research Statement

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My research vision is to advance software engineering by creating intelligent, trustworthy, and autonomous systems that ensure the quality and reliability of complex software. I aim to move the field beyond manual, reactive maintenance by developing AI-driven solutions that can proactively test safety-critical autonomous systems, autonomously repair software defects, and enable systems to self-heal in real-time.

Research Interests

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Artificial Intelligence for Software Engineering (AI4SE), Software Maintenance and Evolution, Software Testing, and Empirical Software Engineering.

Education

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PhD – Computer Science

Institution	University of Tartu, Tartu, Estonia
Grade (coursework)	4.85/5.00
Sponsorship	Full research scholarship
Period	01 September 2015 – 05 March 2020
Thesis	“Extracting Information from App Reviews to Facilitate Software Development Activities”
Examiners	Dr. Sebastiano Panichella (Zurich University of Applied Science, Switzerland) Dr. Alessandra Gorla (IMDEA Software Institute, Madrid, Spain)

Master of Science (MSc) – Computer Science / Software Engineering

Institution	University of Central Punjab (UCP), Lahore, Pakistan
Grade	3.15/4.00
Period	01 September 2009 – 20 June 2012

Employment

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Lecturer (Assistant Professor) of Software Engineering	<i>01 August 2022 – Present</i>
Institute of Computer Science, University of Tartu, Tartu, Estonia	
Assistant Professor	<i>10 March 2020 – 31 July 2022</i>
Department of Computer Science, COMSATS University Islamabad (CUI), Pakistan	
Junior Research Fellow of Software Engineering	<i>01 December 2018 – 29 February 2020</i>
Institute of Computer Science, University of Tartu, Tartu, Estonia	
Lecturer	<i>01 March 2010 – 31 August 2015</i>
Department of Computer Science, COMSATS University Islamabad (CUI), Pakistan	
Software Developer	<i>01 March 2006 – 21 December 2009</i>
Emcentrix Private Limited, Islamabad, Pakistan	

Teaching

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I dedicate 50% of my annual workload (≈ 875 hours/year) to teaching at the University of Tartu (UT). Before joining UT, I taught courses at COMSATS University Islamabad (CUI). Roles: **T** = Teacher, **CR** = Course Responsible, **E** = Examiner.

University of Tartu

- **T**: *LTAT.05.006* – Software Testing (BSc, Lab Coordinator & Practice Sessions), Spring 2026
- **CR-T-E**: *MTAT.03.295* – Agile Software Development (MSc Software Engineering), Fall 2025

- **T:** *MTAT.03.295* – Software Engineering (BSc, Practice Sessions), Fall 2025
- **T:** *LTAT.05.006* – Software Testing (BSc, Lab Coordinator & Practice Sessions), Spring 2025
- **CR-T-E:** *MTAT.03.295* – Agile Software Development (MSc Software Engineering), Fall 2024
- **T:** *MTAT.03.295* – Software Engineering (BSc, Practice Sessions), Fall 2024
- **T:** *LTAT.05.006* – Software Testing (BSc, Lab Coordinator & Practice Sessions), Spring 2024
- **T-E:** *MTAT.03.295* – Agile Software Development (MSc Software Engineering), Fall 2023
- **T:** *MTAT.03.295* – Software Engineering (BSc, Practice Sessions), Fall 2023
- **T:** *LTAT.05.005* – Software Project (Mentor), Fall 2022

COMSATS University Islamabad (CUI)

- **CR-T-E:** – Natural Language Processing (MSc), Spring 2022
- **CR-T-E:** – Software Testing (BSc Software Engineering), Fall 2021
- **CR-T-E:** – Software Testing (BSc Software Engineering), Fall 2020
- **CR-T-E:** – Data Science (BSc), Spring 2020
- **CR-T-E:** – Web Engineering, Fall 2014
- **CR-T-E:** – Design Patterns, Spring 2014 & Spring 2015
- **CR-T-E:** – Object-Oriented Programming, Spring 2010 – Spring 2013

Student Supervision

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PhD Supervision

- Mr. Bernard Michal Szeliga – “Detecting security vulnerabilities using Agentic AI,” Institute of Computer Science, University of Tartu, Estonia. September 2026. *Formal Supervisor*. **(Starting Fall 2026)**
- Mr. Sander Sats – “AI-powered methods for detecting and explaining security vulnerabilities in code,” Institute of Computer Science, University of Tartu, Estonia. September 2024. *Formal Supervisor*. **(Ongoing)**
- Ms. Maj-Annika Tammisto – “A digital data twin for the testing of services using the Estonian X-tee ecosystem,” Institute of Computer Science, University of Tartu, Estonia. September 2023. *Formal Co-Supervisor*. **(Ongoing)**

MSc Supervision at UT (10 Defended)

- Jan Erik Konksi (Fall 2025), UT: “Impact of Issue Quality and Bug Taxonomy on LLM Agent Repair: An Industrial Case Study.” **(Ongoing)**
- Naveen Kumar (Fall 2025), UT: “A Comparative Evaluation of Language Models for Feature Similarity Detection in App Reviews.” **(Ongoing)**
- Siddiga Gadirova (Fall 2025), UT: “A Multi-Task Learning Approach to Sarcasm and Intent Classification via Knowledge Distillation.” **(Ongoing)**
- Nika Mgaloblishvili (Fall 2025), UT: “An Empirical Study of LLM Agents in Restoring Executability to Machine Learning Replication Packages.” **(Ongoing)**
- Leive Turi (Fall 2023), UT: “Exploring LLMs for Generating Synthetic Test Data.” **(Ongoing)**
- Hashika Marasinghe (Spring 2024), UT: “Few-shot Prompt-Tuning of Language Models for App Review Classification: An Evaluation Study.” **(Defended)**
- Tehmeena Bibi (Fall 2020), CUI: “Detecting Sarcasm and Irony in App Reviews.” **(Defended)**
- Mehtab Afzal (Fall 2020), CUI: “Is Computer Users’ Personality Predictable from Keyboard and Mouse Interaction Data?.” **(Defended)**
- Shalva Avanaashvili (Spring 2018), UT: “Opinion-Driven App Recommender System (ODARS).” **(Defended)**
- Yevhenii Sabanin (Spring 2016), UT: “Aspect/Feature-based Evaluation of Competing Apps.” **(Defended)**

BSc Supervision (8 Defended)

- Rasmus Lille (Fall 2025), UT: “A Comparative Case Study of Performance and Maintainability Trade-offs for TSP Solvers.” **(Ongoing)**
- Ander Saarniit (Fall 2025), UT: “A Mobile App for GNSS-free Autonomous Vehicle Localization.” **(Ongoing)**
- Andrei Kuzmin (Spring 2025), UT: “Evaluating the Effectiveness of Large Language Models in Auto-

mated Test Case Repair.” (**Ongoing**)

- Moomna Ajmal (Spring 2022), CUI: “Mining Quality Aspects in User Reviews.” (**Defended**)
- Zohaib Arshad (Spring 2021), CUI: “Transfer Learning for Predicting Sentiments in App Reviews.” (**Defended**)
- Fazul-ur-Rehman (Spring 2021), CUI: “Extracting App Features from App Description using Supervised Learning Approaches.” (**Defended**)
- Saira Bibi (Fall 2020), CUI: “Testing the Robustness of Text Classification Models.” (**Defended**)

Research Grants

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- None awarded to date; currently preparing proposals for national and EU-level funding calls.

Awards & Honours

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- Recognised as the **Best-Performing Test Selection Tool** for Autonomous Driving Cars at the *ICST Tool Competition 2025*. [[Best Tool Paper Certificate](#)]
- Scholarship award from the Higher Education Commission, Pakistan (Master of Computer Science).
- Secured **2nd place** in a software competition organised by LMKR for Final Year Project, 2006.

External International Collaboration

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- **Generating and Evolving Real-life Like Synthetic Data:** Dr. Daniel Rodríguez García (University of Alcalá, Madrid, Spain) and Dr. Rudolf Ramler (Software Competence Center Hagenberg, Austria), .
- **Digital Data Twin for Predictive Maintenance:** Dr. Sabah Suhail and Dr. Kieran McLaughlin, Centre for Secure Information Technologies, Queen’s University Belfast, UK.

Service to the Research Community

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Journal Reviewing

- Journal of Empirical Software Engineering
- Journal of Information and Software Technology
- PeerJ Computer Science
- *e-Informatica* Software Engineering Journal
- IEEE Access

Conference Organisation & Reviewing

- Member, Tools and Datasets Committee, ASE 2026
- Member, Short Papers and Posters Committee, PROFES 2025
- Reviewer, 40th ACM/SIGAPP Symposium on Applied Computing (SAC), 2024
- Member, Short Papers and Posters Committee, PROFES 2024
- Reviewer, International Conference on Frontiers of Information Technology, 2023
- Reviewer, Asia-Pacific Software Engineering Conference (APSEC), 2022
- Reviewer, International Conference on Evaluation and Assessment in Software Engineering (EASE), 2020
- Student Volunteer, FSE Conference Organisation Committee, University of Tartu, 2019
- Member, FIT Conference Organisation Committee, CUI, 2021–2022

PhD Internal Reviewer

- Alejandra Duque Torres – “Classifying, Constraining, and Ranking Metamorphic Relations,” Institute of Computer Science, University of Tartu.
- Mahmoud Shoush – “Prescriptive Process Monitoring Under Uncertainty and Resource Constraints,” Institute of Computer Science, University of Tartu.

Administration & Management

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- Member, Master’s (Software Engineering) Admission Review Committee, University of Tartu, 2022–2026
- Member, PhD Student Interview Committee, University of Tartu, 2023

- Member, Thesis Evaluation Committee, University of Tartu, 2022 – present
- Member, Faculty Hiring Committee, CUI, 2020–2022
- Head, Final Year Project Evaluation Committee, CUI, 2020–2022
- Member, Final Year Project Evaluation Committee, CUI, 2010–2015

Publications

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Metric	All time	Since 2020
Citations	705	531
h-index	11	10
i10-index	12	11

Source: Google Scholar, accessed 2026-05-08

Open-Access Datasets (2)

- App Review Datasets with review category and app features annotated. [\[Download\]](#)
- Dataset for Regression Testing of Self-Driving Cars. [\[Download from Zenodo\]](#)

Peer-reviewed Papers in Scientific Journals (10)

- [J1] Güllü, A.I., **Shah, F.A.**, Pfahl, D.. “ITS4SDC: Intelligent test road selector for self-driving cars.” *Science of Computer Programming*, 2026.
<https://doi.org/10.1016/j.scico.2026.103486>
- [J2] Jilani, M. A., Niaz, I.A., Zafar, S.N., **Shah, F.A.**, Ali, S., Shah, D., Tahir, M.. “Usability Quality Model: An Enhancement of Dromey’s Model.” *Engineering Reports*, 2026.
<https://doi.org/10.1002/eng2.70747>
- [J3] Jilani, M. A., Sheikh, A., **Shah, F.A.**, Saqlain, S. M.. “Usability evaluation of academic library websites: a systematic literature review.” *Information Discovery and Delivery*, 2026.
<https://doi.org/10.1108/IDD-09-2024-0144>
- [J4] Tammisto, M.A., **Shah, F.A.**, Rodriguez, D., Pfahl, D.. “The Challenge of Generating and Evolving Real-life Synthetic Test Data Without Accessing Real-world Data – A Systematic Review.” *Journal of Expert Systems*, 2025.
<https://doi.org/10.1111/exsy.70164>
- [J5] Iqbal, M., Suhail, S., Matulevičius, R., **Shah, F.A.**, Malik, S.U.R., McLaughlin, K.. “IoV-TwinChain: Predictive Maintenance of Vehicles in Internet of Vehicles Through Digital Twin and Blockchain.” *Journal of Internet of Things*, 2025.
<https://doi.org/10.1016/j.iot.2025.101514>
- [J6] Jilani, M.A., Sheikh, A., **Shah, F.A.**, Saqlain, S.M.. “Usability Evaluation of Academic Library Websites: A Systematic Literature Review.” *Journal of Information Discovery and Delivery*, 2025.
<https://doi.org/10.1108/IDD-09-2024-0144>
- [J7] Shah, S.M.S., Farooq, R., Alharbi, A., Alyami, H., Zada, I., **Shah, F.A.**. “Multiobjective Genetic Algorithm for Class Testing Using OCL Class Contract Specifications: A Framework.” *Journal of Scientific Programming*, 2022.
<https://doi.org/10.1155/2022/3708422>
- [J8] Shah, S.M.S., **Shah, F.A.**, Hussain, S.A., Batool, S.. “Support Vector Machines-Based Heart Disease Diagnosis Using Feature Subset, Wrapping Selection and Extraction Methods.” *Journal of Computers & Electrical Engineering*, 2020.
<https://doi.org/10.1016/j.compeleceng.2020.106628>
- [J9] Shah, S.M.S., Malik, T.A., Hassan, S.S., **Shah, F.A.**. “Human Behavior Classification Using Geometrical Features of Skeleton and Support Vector Machines.” *Journal of Computers, Materials & Continua*, 2019.
<https://doi.org/10.32604/cmc.2019.07948>
- [J10] Saqlain, S.M., Sher, M., **Shah, F.A.**, Khan, I., Ashraf, M.U., Awais, M., Ghani, A.. “Fisher Score and Matthews Correlation Coefficient-Based Feature Subset Selection for Heart Disease Diagnosis Using

Support Vector Machines.” *Journal of Knowledge and Information Systems*, 2019.
<https://doi.org/10.1007/s10115-018-1185-y>

Peer-reviewed Papers in Conferences/Workshops (17)

- [C1] Tammisto, M.A., Pfahl, D., **Shah, F.A.**, Rodriguez, D.. “Towards Fully Synthetic Schema-based Tabular Test Data Generation in Estonian E-Government Settings.” *17th International Baltic Conference on Digital Business and Intelligent Systems*, 2026. **[Accepted]**
- [C2] Güllü, A.I., **Shah, F.A.**, Pfahl, D.. “A Robust LSTM-based Test Selection Method for Self-Driving Cars.” *International Conference on Product-Focused Software Process Improvement (PROFES)*, 2025.
https://doi.org/10.1007/978-3-032-12089-2_5
- [C3] Tammisto, M.A., Ramler, R., **Shah, F.A.**, Pfahl, D.. “Obtaining Test Data in the Estonian e-Government Systems: Challenges and Improvement Potential.” *International Conference on Product-Focused Software Process Improvement (PROFES)*, 2025.
https://doi.org/10.1007/978-3-032-12092-2_1
- [C4] Hein, E., Güllü, A.I., **Shah, F.A.**, Pfahl, D.. “Automated Classification of ADS Disengagements Using Convolutional Neural Networks.” *International Workshop on Analytics for Product-Focused Software Process Improvement*, 2025.
https://doi.org/10.1007/978-3-032-12092-2_14
- [C5] Kaasik, E., **Shah, F.A.**, Pfahl, D.. “Lab Package Development as a Means for Educating Software Engineering Students.” *International Conference on Product-Focused Software Process Improvement (PROFES)*, 2025.
https://doi.org/10.1007/978-3-032-12089-2_24
- [C6] **Shah, F.A.**, Sabir, A., Sharma, R., Pfahl, D.. “How Effectively Do LLMs Extract Feature-Sentiment Pairs from App Reviews?.” *31st International Working Conference on Requirements Engineering: Foundation for Software Quality (REFSQ)*, 2025.
https://doi.org/10.1007/978-3-031-88531-0_9
- [C7] Güllü, A.I., **Shah, F.A.**, Pfahl, D.. “ITS4SDC at the ICST Tool Competition – Self-Driving Car Testing Track.” *International Conference on Software Testing, Verification and Validation (ICST) Tool Competition*, 2025. **[Top-performing tool in the competition]**
<https://doi.org/10.1109/ICST62969.2025.10988983>
- [C8] Tammisto, M.A., Pfahl, D., **Shah, F.A.**.. “Generating and Evolving Real-Life Like Synthetic Data for e-Government Services Without Using Real-World Raw Data.” *International Conference on Product-Focused Software Process Improvement (PROFES)*, Cham: Springer, 2024.
https://doi.org/10.1007/978-3-031-78392-0_12
- [C9] Iqbal, M., Zubair, M., Suhail, S., **Shah, F.A.**, Milani, F.. “Blockchain-Driven Secure Auditing of Timber-to-Charcoal Supply Chain.” *International Baltic Conference on Digital Business and Intelligent Systems*, Cham: Springer, 2024.
https://doi.org/10.1007/978-3-031-63543-4_9
- [C10] Arshid, Z., Mustafa, E., Shuja, J., **Shah, F.A.**.. “Using Active and Self-Training to Improve Sentiment Prediction on App Reviews.” *1st International Conference on Innovative Engineering Sciences and Technological Research (ICIESTR)*. IEEE, 2024.
<https://doi.org/10.1109/ICIESTR60916.2024.10798138>
- [C11] **Shah, F.A.**, Sirts, K., Pfahl, D.. “Using App Reviews for Competitive Analysis: Tool Support.” *3rd ACM SIGSOFT International Workshop on App Market Analytics (WAMA)*, 2019.
<https://doi.org/10.1145/3340496.3342756>
- [C12] **Shah, F.A.**, Sirts, K., Pfahl, D.. “Simulating the Impact of Annotation Guidelines and Annotated Data on Extracting App Features from App Reviews.” *ICSOFT*, 2019.
<https://doi.org/10.5220/0007909703840396>
- [C13] **Shah, F.A.**, Sirts, K., Pfahl, D.. “Is the SAFE Approach Too Simple for App Feature Extraction? A Replication Study.” *25th International Working Conference on Requirements Engineering: Foundation for Software Quality (REFSQ)*, Essen, Germany, 2019.
https://doi.org/10.1007/978-3-030-15538-4_2

- [C14] **Shah, F.A.**, Sirts, K., Pfahl, D.. “Simplifying the Classification of App Reviews Using Only Lexical Features.” *13th International Conference on Software Technologies (ICSOFT), Porto, Portugal*, 2018.
https://doi.org/10.1007/978-3-030-29157-0_8
- [C15] **Shah, F.A.**, Sirts, K., Pfahl, D.. “Simple App Review Classification with Only Lexical Features.” *ICSOFT*, 2018.
<https://doi.org/10.5220/0006855901120119>
- [C16] **Shah, F.A.**, Sabanin, Y., Pfahl, D.. “Feature-based Evaluation of Competing Apps.” *International Workshop on App Market Analysis (WAMA)*, 2016.
<https://doi.org/10.1145/2993259.2993267>
- [C17] **Shah, F.A.**, Pfahl, D.. “Evaluating and Improving Software Quality Using Text Analysis Techniques – A Mapping Study.” *REFSQ Workshop*, 2016.
- [C18] Ajmal, M., Ashraf, M.H., Shakir, M., Abbas, Y., **Shah, F.A.**. “Video Summarization: Techniques and Classification.” *International Conference on Computer Vision and Graphics (ICCVG), Warsaw, Poland*, 2012.
https://doi.org/10.1007/978-3-642-33564-8_1

Referees

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Dr. Dietmar Pfahl

Professor of Software Engineering

Institute of Computer Science, University of Tartu, Estonia

Email: dietmar.pfahl@ut.ee Phone: +372 737 5432

Relationship: PhD Supervisor and Leader of the Software Analytics Research Group

Dr. Muhammad Naveed

Associate Professor of Autonomous Driving

Institute of Computer Science, University of Tartu, Estonia

Email: naveed.muhammad@ut.ee Phone: +372 530 00827

Relationship: Senior Colleague