Business process automation through AI: development and evaluation of virtual assistants powered by Large Language Models

Summary

The overall goal of the project is to experimentally examine the opportunities involved in using large language models and other AI applications in domains of business. The focus is on building virtual assistants to automate various business processes. The effectiveness of such automations is measured by computational methods and by pilot testing in an actual business context. The project resides in the field of business information systems, which is an overlap of software engineering and business administration. The project addresses the following central research question: How can large language models be effectively developed and integrated as virtual assistants to automate and enhance business processes in real-world organizational settings?

Research field:	Business
Supervisors:	Prof. Dr. Karin Reinhold Tarmo Koppel
Availability:	This position is available.
Offered by:	School of Business and Governance Department of Business Administration
Application deadline:	Applications are accepted between June 01, 2025 00:00 and June 30, 2025 23:59 (Europe/Zurich)

Description

Main Supervisor: Associate Professor Karin Reinhold (PhD)

Co-Supervisor: Lecturer Tarmo Koppel (PhD)

The ongoing trend of digital transformation across industries has intensified scholarly and practical interest in the optimization and automation of organizational business processes. Artificial Intelligence (AI), particularly in the form of Large Language Models (LLMs), has emerged as a powerful tool capable of understanding and generating human-like language. This opens new possibilities for developing virtual assistants that can perform complex business tasks. Despite their opportunities, the practical integration and evaluation of LLM-based virtual assistants in real-world business settings remain underexplored.

The research aims to explore the potential of AI applications, particularly LLMs, in business process automation. In this work the candidate develops virtual assistants capable of performing diverse business tasks and evaluate their performance in practical scenarios.

The thesis should address the following questions:

- What are effective methodologies for evaluating AI-based virtual assistants in business contexts?
- What are computational trade-offs between accuracy, efficiency, and cost-effectiveness in AI-driven business solutions?
- What strategies are effective for ensuring the scalability and robustness of AI-powered virtual assistants in dynamic business environments?
- Which business processes are most suitable for automation using virtual assistants powered by LLMs?
- How do user-centered designs influence the adoption and effectiveness of virtual assistants in businesses?
- What best practices can be established for integrating virtual assistants into existing business workflows?

Responsibilities and (foreseen) tasks

- Develop an analytical framework for experimental approaches to applied AI in domains of business.
- Design and develop virtual assistants to address specific business needs.
- Pilot test these virtual assistants in live business environments, iterating based on feedback.
- Collect qualitative and quantitative data and conduct case studies on the selected use cases.

- Contribute to data collection by conducting interviews, surveys and other methods.
- Based on findings, provide actionable recommendations for businesses interested in implementing AI- powered virtual assistants.
- Contribute to the organization of research and practitioner workshops and other topical events.

The candidate is expected to have

- A master's degree in software engineering, business process analysis, data analytics or other area relevant to this project
- A clear interest in the topic of the position
- Good English in communication and writing
- Strong and demonstrable writing and analytical skills
- Capacity to work both as an independent researcher and as part of an international team
- Capacity and willingness to provide assistance in organizational tasks relevant to the project

The following experience is beneficial

- Development of web applications.
- Familiarity with large language models (LLMs) and multimodal models (LMMs), including voice and image processing.
- Knowledge of NLP methods and LLM techniques such as retrieval-augmented generation (RAG) and fine-tuning.
- Programming skills in Python.
- SQL database management.
- Predictive analytics, time-series analysis.
- Statistical analysis.
- Decision-making approaches (e.g., decision trees, reasoning frameworks).

The initial research plan

The candidate should submit a research plan for the topic, including the overall research and data collection strategy. The candidate can expand on the listed research questions and tasks, and propose theoretical lenses to be used.

We offer

- 4-year PhD position (employed as an Early-Stage Researcher at the Department of Business Administration) in a strong team of researchers.
- Opportunities for conference visits, research stays and networking with leading universities and research centres
- All PhD positions are guaranteed a gross income of at least 2300 EUR and Estonian national health insurance.

About the department

TalTech is an international community with 9,000 students and 1,800 employees, making it one of Estonia's largest universities and a leader in EU digitalisation. The university boasts multidisciplinary research, a modern environment, and strong international collaboration. Its green, compact campus includes the Tehnopol Science Park and the Mektory Innovation Center, which supports research funding and business expertise. TalTech values low hierarchy, academic freedom, and work-life balance, offering development opportunities, recognitions, and recreational activities, including a sports club and all-staff events. TalTech as an employer brings together representatives from a wide range of disciplines – engineers and economists, business and biotechnology, and data scientists – with a common mission to develop Estonian higher education and research. Keywords that characterise TalTech today are rapid development, interdisciplinarity, and internationalisation. The university has an international working environment, and the working languages are English and Estonian.

TalTech School of Business and Governance (SBG) offers interdisciplinary education in economics, international business management, and law, fostering innovation in a diverse community with 18% international students from 60 countries. Influential alumni in Estonian politics and business reflect our commitment to quality education. The faculty includes globally recognized researchers and practitioners, with nearly 30% having an international background. SBG, with over 200 employees, conducts research on modern business aspects—entrepreneurship, technology transfer, strategic management, marketing, supply chain, accounting, digitalisation, sustainability, and more—focusing on in-

dividual and organizational performance. Our department is known for its strong team spirit and engaging events, large scale teaching in all levels and growing research activities. In the international ranking of Times Higher Education, TalTech's School of Business and Governance has climbed a hundred places in the last year and is now ranked 301-400 among the world's best in business and economics.

TalTech, as an employer, brings together representatives from a wide range of disciplines - engineers and economists, business and biotechnology, and data scientists - with a shared mission to develop Estonian higher education and research. Keywords that characterise TalTech today are rapid development, interdisciplinarity, and internationalisation. The university has an international working environment; the functional languages are English and Estonian.

TalTech has a green and one of Europe's most compact university campuses, including the Tehnopol Tallinn Science Park. Low hierarchy, academic freedom and a balanced work and family life are valued at TalTech. The university provides individual development and training opportunities, material and non-material tokens of acknowledgement, sporting opportunities at TalTech Sports Club and all-staff activities.

Additional information

For further information, please contact Karin.Reinhold@taltech.ee and Tarmo.Koppel@taltech.ee and visit https://taltech.ee/en/department-business-administration and https://taltech.ee/en/phd-admission

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