TECHNISCHE UNIVERSITÄT WIEN

Technische Universität Wien
Institut für Managementwissenschaften

Ausschreibung für eine Wissenschaftliche Arbeit

Typ der Arbeit / Type of work (ankreuzen / tick as appropriate):

☐ Bachelorarbeit
☐ Seminararbeit ☐ Einfache Vergabe ☐ Doppelte Vergabe ☐ Dreifache Vergabe
☐ Projektarbeit ☐ Einfache Vergabe ☐ Doppelte Vergabe ☐ Dreifache Vergabe
☒ Diplom-/Masterarbeit

Vorläufiger Titel DE oder EN (je nach angebotener Sprache / depending on the language offered):

Effective communication of chatbots: analysis of comprehensibility, user acceptance and transparency on the example of knowledge enhanced chatbots

Beschreibung DE oder/or EN (je nach angebotener Sprache / depending on the language offered):

Ausgangslage / Initial situation , Problem statement / Problemstellung

Industrial maintenance refers to the systematic practice of keeping machines and production systems in optimal working condition. Essential to industrial operations, maintenance involves tasks such as inspections, repairs, and replacements necessary to prevent downtime and extend the life of equipment. The annual loss due to lacking maintenance in the USA alone amounts to 220 billion US dollars (Thomas und Weiss 2021). Measures can be taken either reactively, after the occurrence of a damage event, or proactively (prescriptive and predictive) to directly prevent damage from occurring. Advances in Large Language Models (LLMs) are leading to LLMs being used as maintenance chatbots to provide technicians with quick access to complex maintenance data and instructions, increasing efficiency and accuracy in fault diagnosis and repair.

While useful, LLMs do not inherently reference factual data, giving out hallucinations because they are primarily statistical models that generate text based on patterns and associations learned from a vast dataset (Yao et al. 2023). Furthermore, LLMs can only justify the causal-effect-relationship between two or more variables with difficulty, which is why an output is only reliable to a certain degree. Causal AI is crucial for deciphering the cause-effect relationships in maintenance, offering a profound understanding that goes beyond correlation.

In order for causally enhanced chatbots (chatbots with RAG on textdata, knowledge graphs and Bayesian networks) to exploit their full potential, it is imperative to increase acceptance and benefits among maintenance staff. To this end, it is essential to fundamentally prepare how the communication of causal cause-effect relationships must take place in terms of UX design, information flow and other aspects.

Ziele / Objective DE oder/or EN:

Documented Chatbot requirements
Planned study
Results/evaluation of the study
High-level co-authorship of publication (if wanted)

Hauptaufgaben / Main tasks DE oder/or EN:

Contribution to one of the most important research projects in the Fraunhofer-Universe (Fraunhofer EMOTION)

Requirements for information communication of a chatbot (with regard to cause-effect relationships)
Development of a concept based on requirements
Design of a study to validate the benefits of the concept (test person study/survey)
Implementation of the study

Schlagwörter / Tags DE UND/AND EN: (Getrennt durch Schrägstrich / separated by slash) e.g: Industrie 4.0/ Maschinelles Lernen / Industry 4.0/Machine Learning

Chatbot / LLM / Maintenance / Generative AI / Usability / Causal AI

Fachgebiet(e) / Areas of expertise e.g: Knowledge Based Maintenance, Circular Economy:

Knowledge Based Maintenance / Artificial intelligence

Erwartete Studienrichtung des Studenten: (ankreuzen) / Expected field of study of the student: (check)

- ☐ Informatik / Computer Science
- ☐ Informatikmanagement / IT management
- ☐ Maschinenbau / mechanical engineering
- ☐ Wirtschaftsinformatik / Business informatics
- ☒ Wirtschaftsingenieurswesen-Maschinenbau / Industrial engineering-mechanical engineering
- ☐ Sonstige Studienrichtung / Other fields of study:

Sprache / Language: (ankreuzen / check)

- ☐ Deutsch
- ☒ Englisch

Spezielle Fähigkeiten, die der Student mitbringen muss / Special skills that the student must have:

fascination for Generative AI and its possibilities
Ability to learn and being detail-oriented
scientific working
some experience in setting up questionnairs or UX would be of advantage but not necessary

Beginndatum / Start date: 01/10/2024	**Erwartetes Ende / Expected ending:** 01/04/2025

Name des Verfassers / Name of the author: Ruben Hetfleisch

Hinweise für den Verfasser dieser Ausschreibung

Nachdem die Ausschreibung vollständig ausgefüllt wurde, bitte an wiss.arbeitenBTSP@tuwien.ac.at senden.

Falls eine Arbeit vergeben wurde oder nicht mehr benötigt wird, bitte dies umgehend an wiss.arbeitenBTSP@tuwien.ac.at melden!