**TUM**

Forschungsinstitut –
Unternehmensführung, Logistik und Produktion
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## Master's theses in the subject area

# Digital Health Interventions & Applied AI in Healthcare: Predicting Overcrowding in the Emergency Department

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| **RQ:** | How does a system for predicting overcrowding in the emergency department affect the mitigation of these situations and the mental strain on doctors? |
| **Start:** | Immediately |
| **Application:** | Please send a short application with CV and transcript to cornelius.born@tum.de |

### Background and Motivation

The emergency department (ED) is a critical yet highly volatile healthcare environment with varying patient volumes and acuity levels (Croskerry & Sinclair, 2001; Kovacs & Croskerry, 1999). One of the most pressing challenges is overcrowding, where the demand for emergency services surpasses the available resources to provide timely care (Affleck et al., 2013; Bernstein et al., 2009; Javidan et al., 2021). Numerous studies have demonstrated the correlation between overcrowding and adverse clinical outcomes, including increased patient morbidity and mortality (McKenna et al., 2019; Rasouli et al., 2019).

Therefore, the ZNAflow project [1] aims to develop an AI-based assistance system that forecasts overcrowding to support clinicians in preparing for and mitigating these situations. The system accesses internal and external data sources, e.g., ambulance, weather, and event data.

At the project's current stage, we have a running prototype and are planning an intervention study for evaluation. At the same time, we are drafting guidelines for integrating ethics and norms in AI engineering in the healthcare sector and developing a concept for transfer to other hospitals.

We offer the opportunity to write a highly relevant and practical thesis that fits your skills and interests.

### Key research objectives (one of the below)

- Design and implementation of a before-and-after intervention study in a German emergency department
- Creation of a guideline on the integration of ethics and norms in AI engineering in the healthcare sector
- Creation of a roll-out concept, including a business model (taxonomy of business models of digital health applications, as well as design principles, functionalities, and individualization aspects of the application)

### General notes

The work will be literature-based or empirical. The start is possible immediately. Rapid implementation is both possible and desirable.

**If you are interested, please send a short application with CV and transcript to cornelius.born@tum.de**