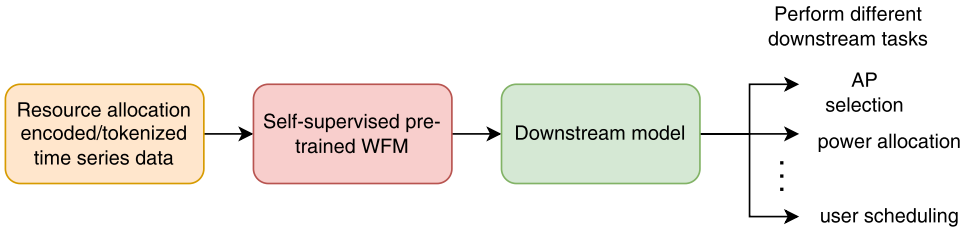
Chair of Information Theory and Data Analytics | RWTH AACHEN UNIVERSITY

Master Thesis

Wireless Foundation Models for Resource Management in Next Generation Wireless Networks

Keywords
wireless foundation models, self-supervised learning, task-agnostic model, transformer architecture, resource allocation, fine-tuning

Description
This thesis explores the growing role of artificial intelligence (AI) in wireless communication systems, addressing challenges beyond traditional methods. It focuses on the development of wireless foundation models (WFMs), inspired by advancements in Large Language Models (LLMs) and vision foundation models (VFMs). The research examines the potential of generalizable models that can adapt to diverse wireless communication tasks. As a task-agnostic model, a large wireless model (LWM) serves as a universal feature extractor for various downstream tasks, enabling complex problem-solving with minimal labeled data and leveraging multi-modal wireless input data.



Goals
Our goal is to leverage pre-trained WFMs and assess their performance in resource allocation within wireless communication systems. Initially, we will evaluate how well these models handle tasks related to resource management under different network conditions. Following this, we aim to fine-tune the pre-trained models using domain-specific, relevant data to optimize their performance for resource allocation and other downstream tasks.

Requirements

- Strong programming skills in Python
- Background in machine learning and wireless communications
- Ability to work independently
- Prior knowledge or experience with foundation models is a plus

Contact

Dr. Shirin Salehi, Room 336 (ICT Cubes), E-mail: shirin.salehi@inda.rwth-aachen.de