# Containerizing ROS: Efficient Deployment and Management of Robotic Applications

Description

We are searching for talented Bachelor's and Master's students to join our team and work on containerizing ROS. With the rapid growth of robotics and automation, virtualization technologies are becoming increasingly important to enable efficient and scalable deployment of robotic applications. Cloud native approaches such as containerization represent a more flexible and lightweight option for deploying software in distributed systems. When ROS applications are deployed in containers, they become more portable and can be easily moved across different devices or environments. In our previous work, we investigated this topic for ROS applications in the robotics and autonomous driving domain. The aim of this thesis is to continue this investigation and develop automatic deployment strategies for ROS-based solutions.
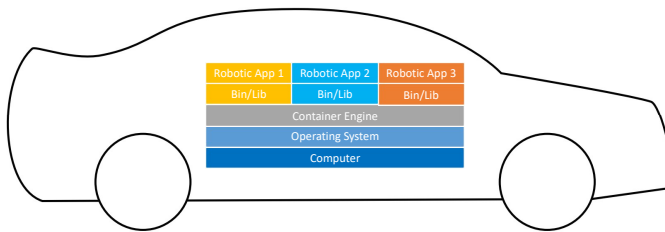
Tasks

As a thesis student, you will have the opportunity to work with our team and investigate the potential benefits of containerization in ROS. Building on our previous work, you will explore automatic methods to divide ROS-based solutions into smaller components, e.g., the Autoware framework for autonomous driving. Once the ROS applications are containerized, you will use container orchestration tools such as Kubernetes to deploy them across multiple hosts and log the launch time of different containers as well as the whole application. Finally, you will conduct a thorough comparison of the launch time and resource utilization between the containerized and bare-metal deployment approaches. This research has the potential to provide valuable insights into the effectiveness of containerization in ROS and contribute to the development of innovative solutions for deploying and managing ROS-based applications. We look forward to working with you on this exciting project!

Technische Universität München

TUM School of Computation, Information and Technology

Lehrstuhl für Robotik, Künstliche Intelligenz und Echtzeitsysteme

Supervisor:
Prof. Dr.-Ing. Alois Knoll

Advisor:
Long Wen, M.Sc.

Research project:
MANNHEIM-CeCaS

Type:
BA/MA

Research area:
cloud-native architectures, virtualization, software engineering, automotive, robotic

Programming language:
C++ or Python

Required skills:
Programming skills in C++ or Python (must have); Experience with ROS (must have); Familiarity with containerization technologies such as Docker and Kubernetes (nice to have).

Language:
English

For more information please contact us:

E-Mail: long.wen@tum.de

Internet: www.ce.cit.tum.de/air