Implementation of Informed Hybrid Zonotope-based Motion Planning Algorithm on JetRacer Platform

Chair of Cyber-Physical Systems (CPS), TUM Heilbronn

BildungsCampus 2, 74074 Heilbronn

We are looking for motivated Master's or Bachelor's students to join our research project on motion planning, supervised at the **Chair of Cyber-Physical Systems (CPS), TUM Heilbronn**.

The project is based on our recent work: Informed Hybrid Zonotope-based Motion Planning Algorithm (HZ-MP)

About the Project

- We propose **HZ-MP**, an informed Hybrid Zonotope–based Motion Planner.

- The method decomposes obstacle-free space and performs low-dimensional face sampling guided by an ellipsotope heuristic.

- It avoids excessive and unreachable sampling that limits planners like AIT* and EIT*.

The thesis will focus on implementing HZ-MP on a **JetRacer autonomous car platform**, bridging theoretical advances and practical robotic applications.

Requirements

- Strong proficiency in **C++** and **Ubuntu/Linux**

- Basic hardware knowledge and ability to port/adapt code to embedded systems

- Interest in **motion planning, robotics, and optimization**

- Ability to work independently and solve problems effectively

- Good communication skills (English)

We Offer

- Opportunity to work on **cutting-edge motion planning research**

- **JetRacer robotic hardware**

- Guidance and supervision from our CPS research team

- Potential for research collaborations and publications

Supervision

- Supervisor: Professor Amr

- Project Assistance: Peng Xie

- Contact: p.xie@tum.de

If you are interested, please send your **CV, transcript, and a short motivation statement** as a whole PDF to: p.xie@tum.de and alanwar@tum.de