Universität Stuttgart
Institut für Systemtheorie und Regelungstechnik
Prof. Dr.–Ing. Frank Allgöwer

Open Project (MA, Hiwi)

Solving hard control problems on a quantum computer

Description:

Many control problems are difficult to solve using existing computational resources. In fact, much research has been devoted to showing that certain problems are NP-hard, i.e., can (most likely) not be solved in polynomial time on a standard computer.
Quantum computing provides a promising alternative to overcome the limitations of classical computing and solve problems that were previously intractable. Recent years have seen significant progress in building larger quantum computers and developing algorithms that can potentially outperform classical ones.
The idea of this project is to exploit the power of quantum computing to solve control problems that are hard to solve on a classical computer. To this end, the student needs to identify both promising quantum algorithms as well as control problems that are, possibly after some reformulation, solvable on a quantum computer. The goal of the project is to implement the solution in simulation as well as on a real quantum computer (accessible via cloud).

Prerequisites:

- Strong background in control theory and mathematics
- Interest in theoretical problems and programming
- Lecture: *Konzepte der Regelungstechnik*

Supervisor:

Julian Berberich
Room 2.235

Area:

Control theory
Quantum computing

Properties:

Type: **MA, Hiwi**

40% literature
30% theory
30% implementation

Beginning:

now

Weitere Informationen: www.ist.uni-stuttgart.de/lehre/bama

Aushang vom 29. August 2023