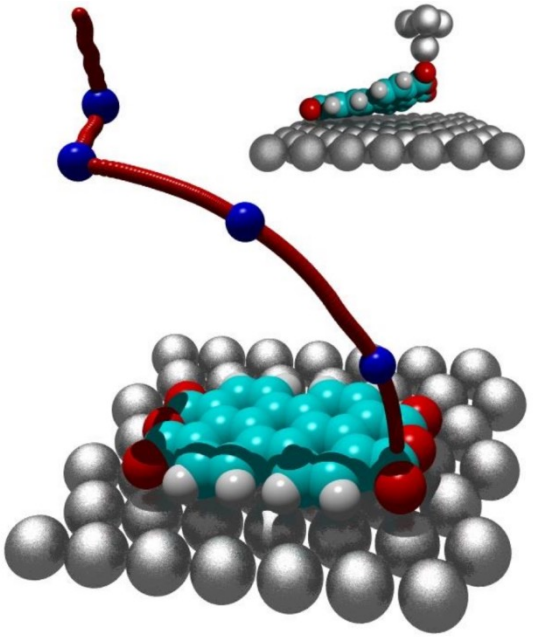
Path Planning for Molecular Manipulation

TECHNISCHE UNIVERSITÄT DARMSTADT

Proposal for a Master's Thesis Project

A collaboration with the Research Center Jülich deals with the topic of molecular manipulation, in which individual atoms and molecules are moved in a controlled manner with the tip of an atomic force microscope. This could enable the individual assembly of materials at the nanoscopic scale and manufacturing of nano-size objects, e.g., for electric circuits. So far, however, mostly manually operated manipulations have been conducted. For automated operation, automatic path planning is an important aspect, which is the topic to be investigated in this master thesis.

Within the scope of this master thesis, the first step is to familiarize with the general topic and the available simulation model of a prototype system. Subsequently, different approaches of path planning algorithms will be researched and their applicability to the molecular system will be evaluated, e.g., the formulation and solution as an optimal control problem. Promising approaches will be implemented and evaluated in simulations.



The following prerequisites will be useful for the project:

Experience with / knowledge about:	Optimization, optimal control,
Programming skills:	Matlab or Python
Language:	German or English

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CCPS Control and Cyber-Physical Systems