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Path-finding for triple-axis spectrometers

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As part of our efforts in the field of autonomous instrument control, we present a path-finding algorithm and implementation for triple-axis spectrometers. Due to angular constraints in the instrument space, as well as from obstacles such as walls, not every (Q, E) coordinate point is accessible for the instrument. A careful mapping of the available positions is usually required before each experiment to avoid any collisions. The present algorithm is able to automatically find the optimal path for the instrument, keeping it at the furthest possible distance from obstacles. It does so by calculating the Voronoi bisectors of the instrument's angular configuration space. Of these it creates a mesh of possible paths and finds the shortest path along the bisectors.

This work is part of a thesis supervised by Dr. L. Ma and Prof. Dr. Ch. Icking.

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