

### Motion simulator (Moving Dome®)

In this project, a Kuka robot KR500 TÜV is adapted such that it can be used as a motion simulator, which requires the design of optimal robot trajectories for reproducing real motion sensations and perception. The project is based on a RoboCoaster from the Kuka Roboter GmbH, which was equipped with a roller coaster seat certified for passenger transport. Several other security measurements have been taken in order to guarantee the safety of the passenger.

The main advantage of using a KR500 as a motion simulator is the larger orientation workspace compared to hexapods. This allows for the simulation of manoeuvres such as vehicle roll-over and the generation of roller coaster acceleration profiles. In order to generate different trajectories with the robot, a control system is developed, consisting of a robot controller, security electronics and a PC which computes the inverse kinematics of the robot to generate appropriate inputs for the robot axis control.



The simulation is complemented with a visualization of the ride in order to generate a more realistic and immersive perception of the motion. In a first step, the visualization will be displayed on a head mounted display. In addition, the installation of a projector and a semi-spherical screen for wide-angle stereo projection is planned (Moving Dome®).

The following applications of the motion simulators are considered:

- simulation of roller-coaster rides
- simulation of driving dynamics such as the so called Elk tests
- simulation of the operation of heavy weight machinery (e.g., heavy load mining baggers) or helicopters

#### Contact

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