

VI-MotionCueing

In order to fully perceive the dynamics of each vehicle model and its variants on a dynamic driving simulator, it is crucial to accurately reproduce the driver's feelings. VI-grade, in collaboration with the University of Padova, has developed a new motion cueing strategy through an innovative algorithm which, given vehicle translational accelerations and rotational velocities, converts them into admissible movements of the driver's seat, for any motion platform architecture.

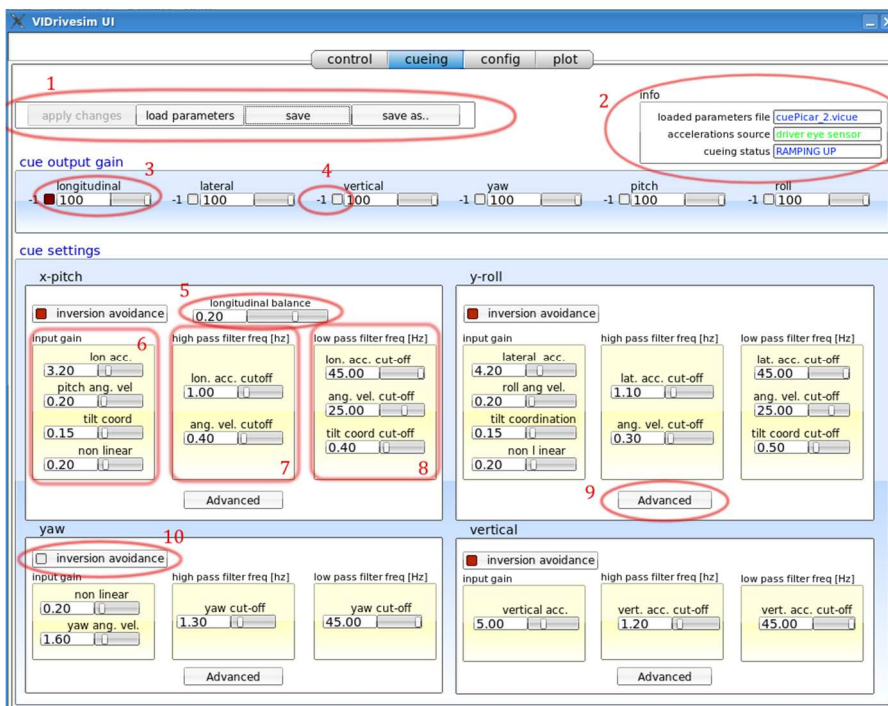
In most dynamic simulators, motion cueing algorithms are based on a "classical" approach that shows several shortcomings, among which the lack of consistency between real vehicle dynamics and platform movements; the inability to take into account the hard constraints of the platform (displacements, velocities, acceleration); the inability to perform prepositioning; the generation of opposite sign acceleration (motion inversion); and - last but not least - the necessity of empirical tuning.

Applications

- Realistic motion platform movements (on all types of motion platforms)
- Algorithm based on model predictive control that minimizes motion sickness
- Better driver experience

Benefits

- Effectively handles limits of the working space
- Anticipates platform positioning based on vehicle dynamics prediction
- Overcomes the problem of motion inversion
- Respects the physics of the vehicle chassis motion without introducing empirical filters
- Reduces motion sickness



VI-MotionCueing is based on Model Predictive Control, a methodology which allows to implement a mathematical model of the vestibular motion perception. VI-MotionCueing can be tuned by modifying a set of parameters to achieve a satisfactory trade-off between best perception and the respect of the working area. Among them, it is possible to choose the weights for each direction of motion, the length of prediction horizon, the range of dynamics within which the algorithm operates.

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