Quantitative Driving Assistance for Everyday Use

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Prototype Platforms
Based on the power wheelchair Xeno by Otto Bock Healthcare, three industrial prototypes have been developed
- Differential drive with steered castors
- Wheel encoders measuring ~2mm/tick
- Two laser range finders Sick S300 sensing ~12cm above ground with 270° opening angle each
- Netbook class controller PC

Quantitative Driving Assistant
Closed loop control correcting commands to prevent potential collisions
- Joystick translates hand movements into translational & rotational velocities
- Alternative head-joystick interprets pitch and roll movements of user’s head as translational and rotational velocities
- Avoidance direction depends on closest obstacle’s position within pre-computed safety region

Experimental Evaluation
Common criteria in different scenarios
- Time of travel
- Driven distance
- Number of collisions
Pilot studies
- Eight healthy subjects; patients from Stiftung Friedehorst
- First results: plausible performance for both user interfaces
Upcoming evaluation will consider
- Functional impairments of subjects
- Training effects
- Critical reviews of experimentees

Experiments at Stiftung Friedehorst
Driving assistance with joystick (solid) and head-joystick (dashed) in FEDPC standardized setting

Prototype Platforms
- Promotional demonstrator
- Prototype for experimental evaluation
- Prototype for development and design