Quantitative Driving Assistance for Everyday Use

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SPATIAL COGNITION
**T2-[Rolland]**

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

Promotional demonstrator

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

v_{right}

v_{left}
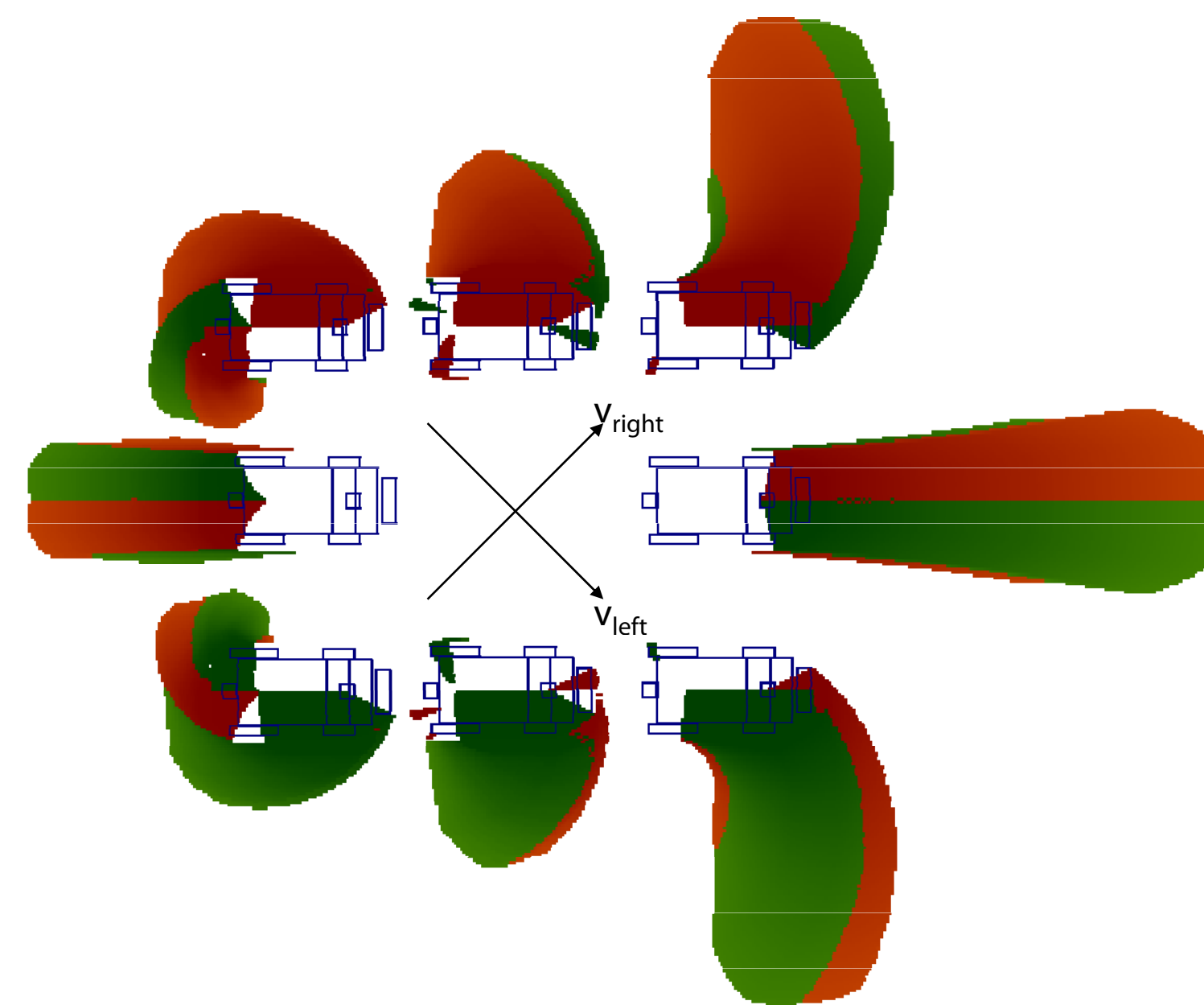
Safety regions for different directions

Prototype for experimental evaluation

Experimental Evaluation   I3-[SharC]

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
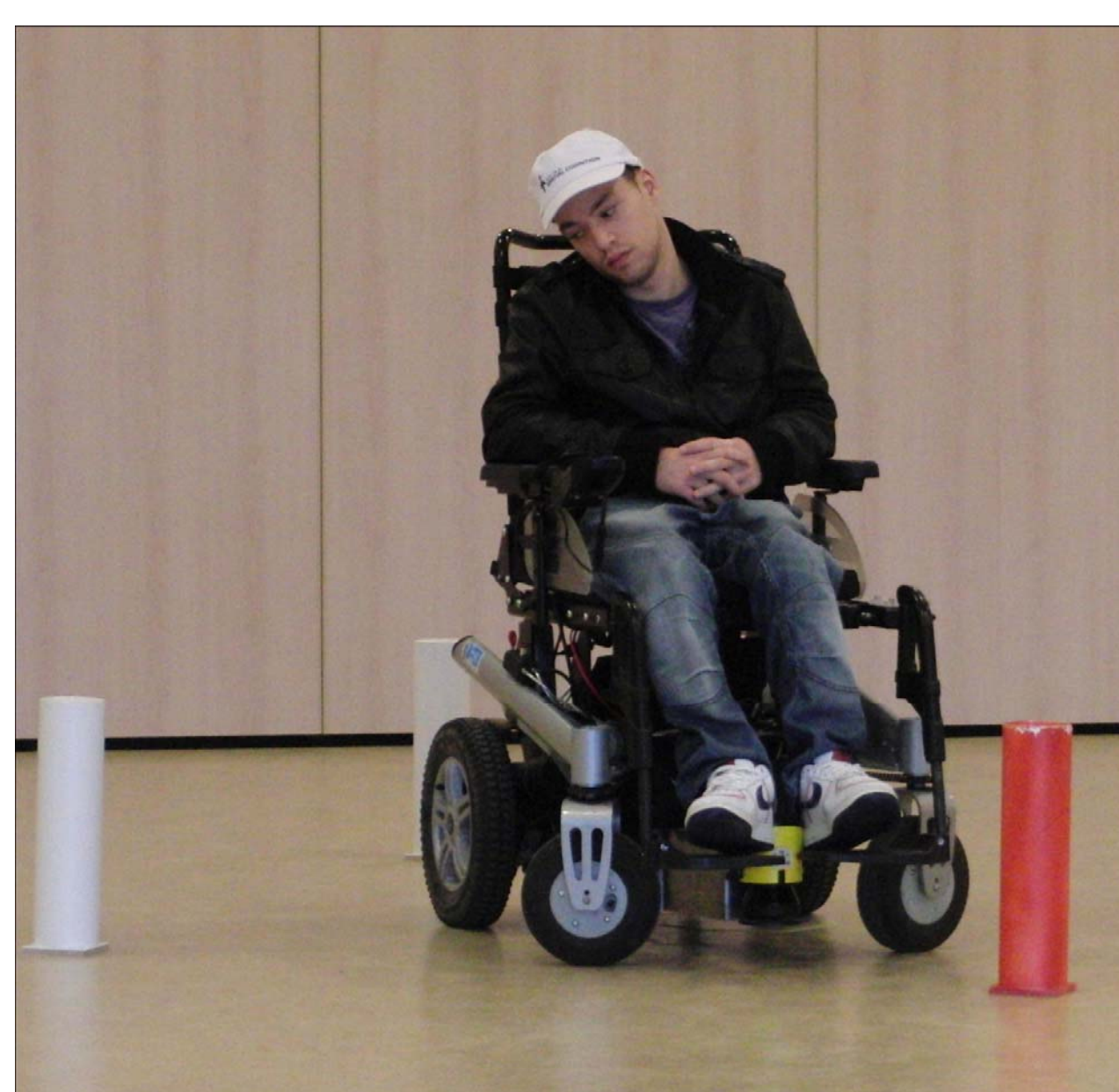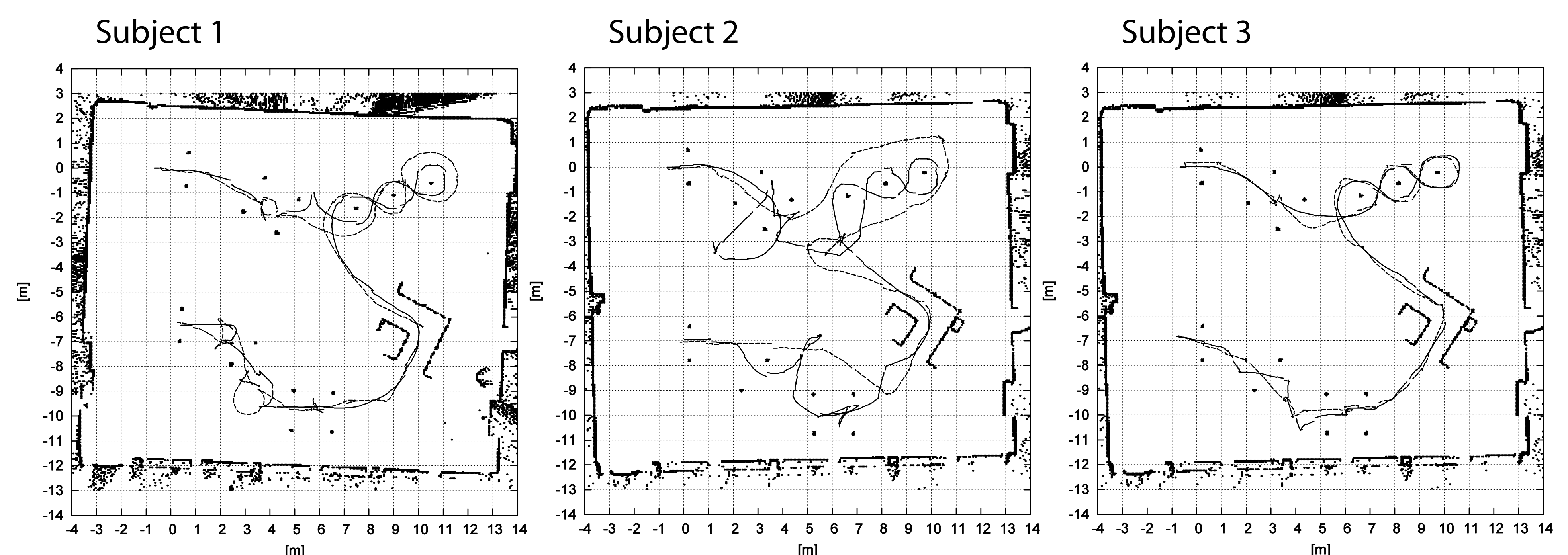- Training effects
- Critical reviews of experimentees

Prototype for development and design

Experiments at *Stiftung Friedehorst*

Subject 1   Subject 2   Subject 3

Driving assistance with joystick (solid) and head-joystick (dashed) in FEDPC standardized setting