Active steering assistance in a long timber vehicle

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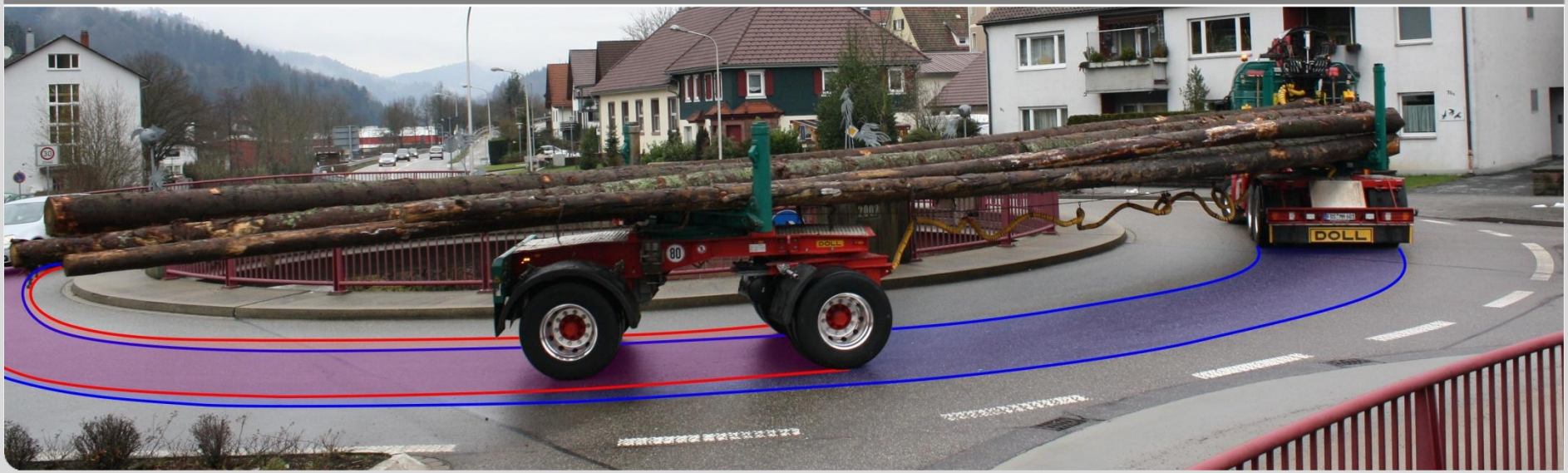
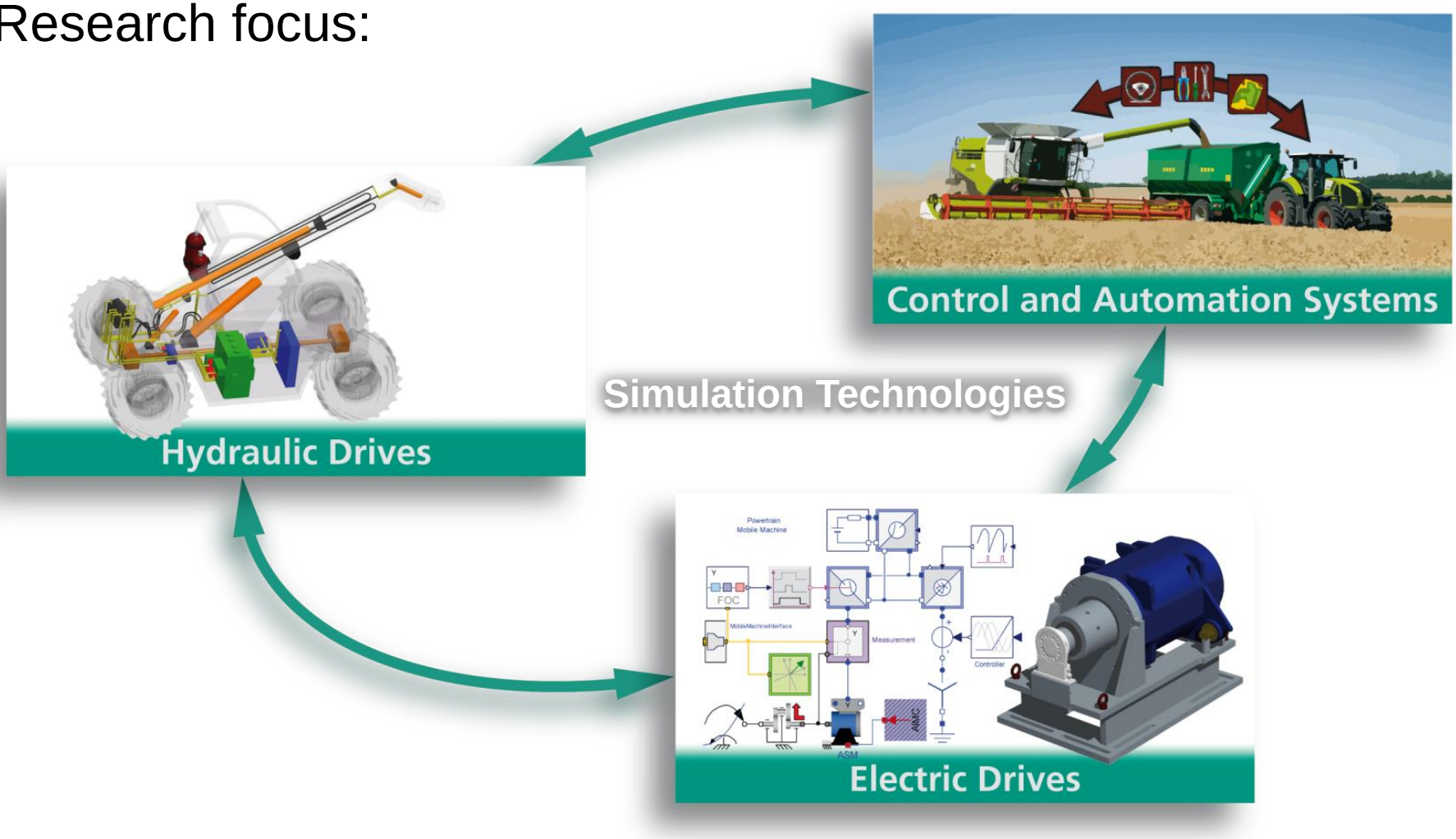


Chair of Mobile Machines

Research focus:



Project partners

DOLL Fahrzeugbau AG

High-tech specialist for transport solutions

- Timber transport
- Heavy haulage
- Ground support equipment

Weiss Mobiltechnik GmbH

- Software solutions for machine control systems
- Diagnostic and maintenance software
- Commissioning and upgrading of mobile machines

www.weiss-can-sps.de

Structuring

- The drivers influence to the working process
- Challenges in the long timber haulage
- Driver support by function automation
- Impact of a driver assistance system in a long timber vehicle

The drivers influence to the working process

- Operation expenses
  - Fuel consumption
  - Wear
- Duration
- Quality of work

Example:

Holländer [1] compares drivers of a crawler excavator

8,6 % fuel savings (l/t)

30,9 % increase in productivity (t/h)

The drivers influence to the working process

- Operation expenses
  - Fuel consumption
  - Wear
- Duration
- Quality of work

Example:

Kirchbeck [2]: fully automatic control of the discharge chute

- Higher fill factor of the trailer
- Better focus on the harvesting process

The drivers influence to the working process

Economic interest to enable the driver to deliver best performance

- Avoid overstrain or subchallenge
- Focus on the main task
- Automation of incidental tasks

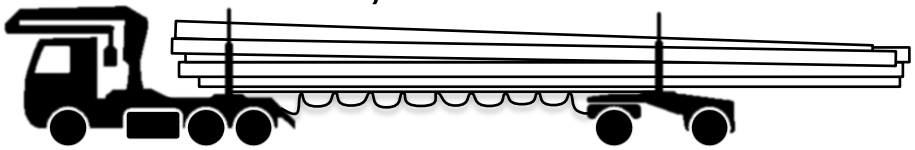
Challenges in the long timber haulage

- Overall lenght

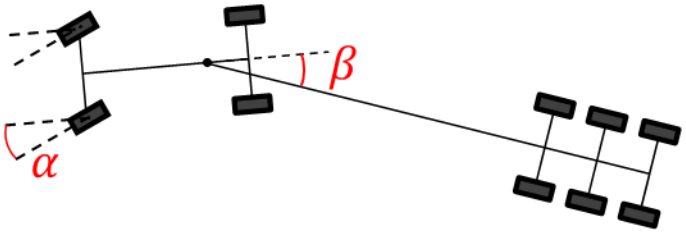
16,50 m

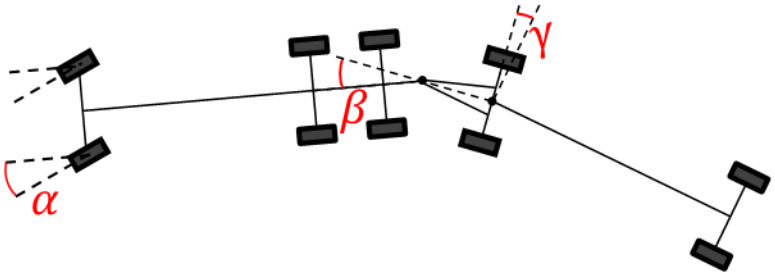
18,75 m

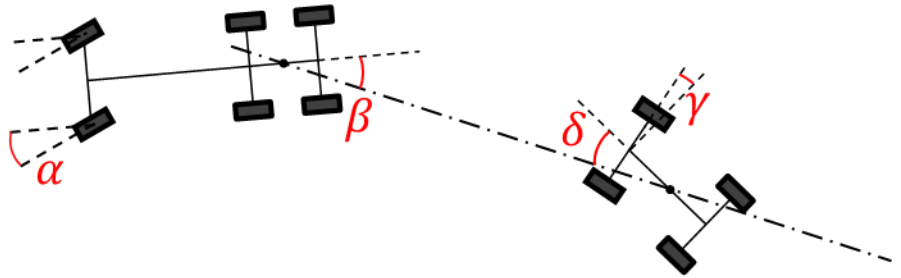
27,00 m



- Steering elements

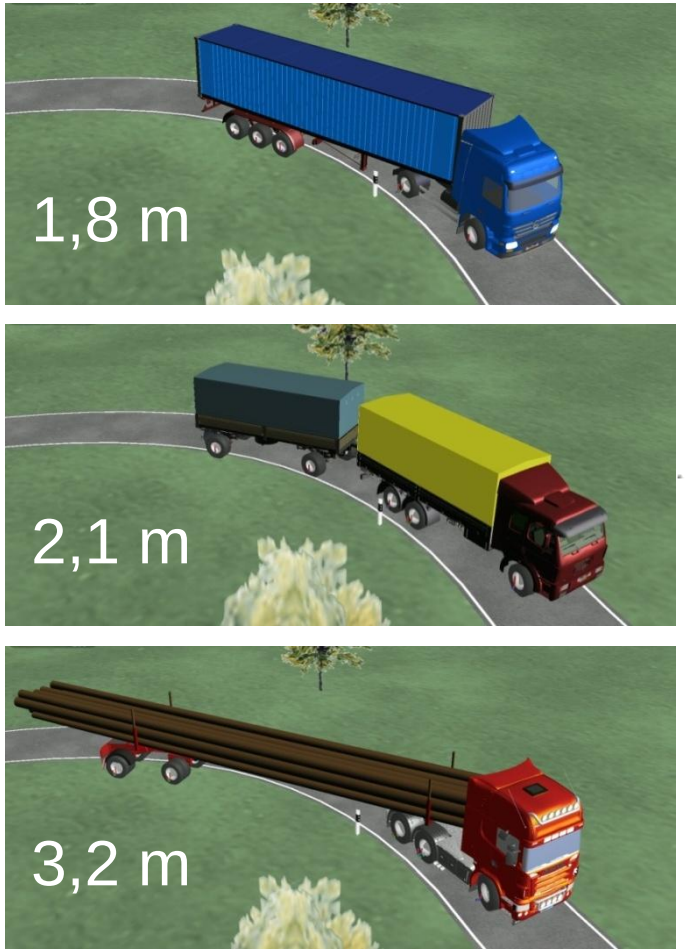




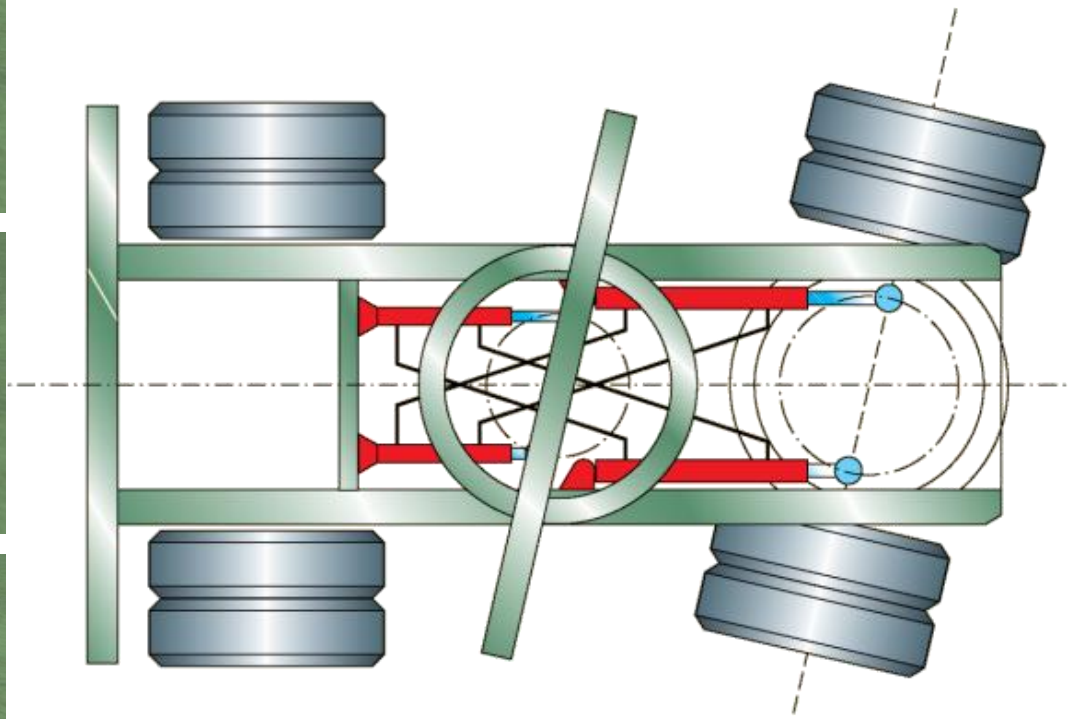


Challenges in the long timber haulage

- Track offset



- Kinematic coupling



Challenges in the long timber haulage

- System meets the road traffic regulations
- Manual steering to adjust to the real needs
- Manual setting of the trailers track

→ High demand on the drivers concentration to steer truck and trailer simultaneously

Driver support by function automation

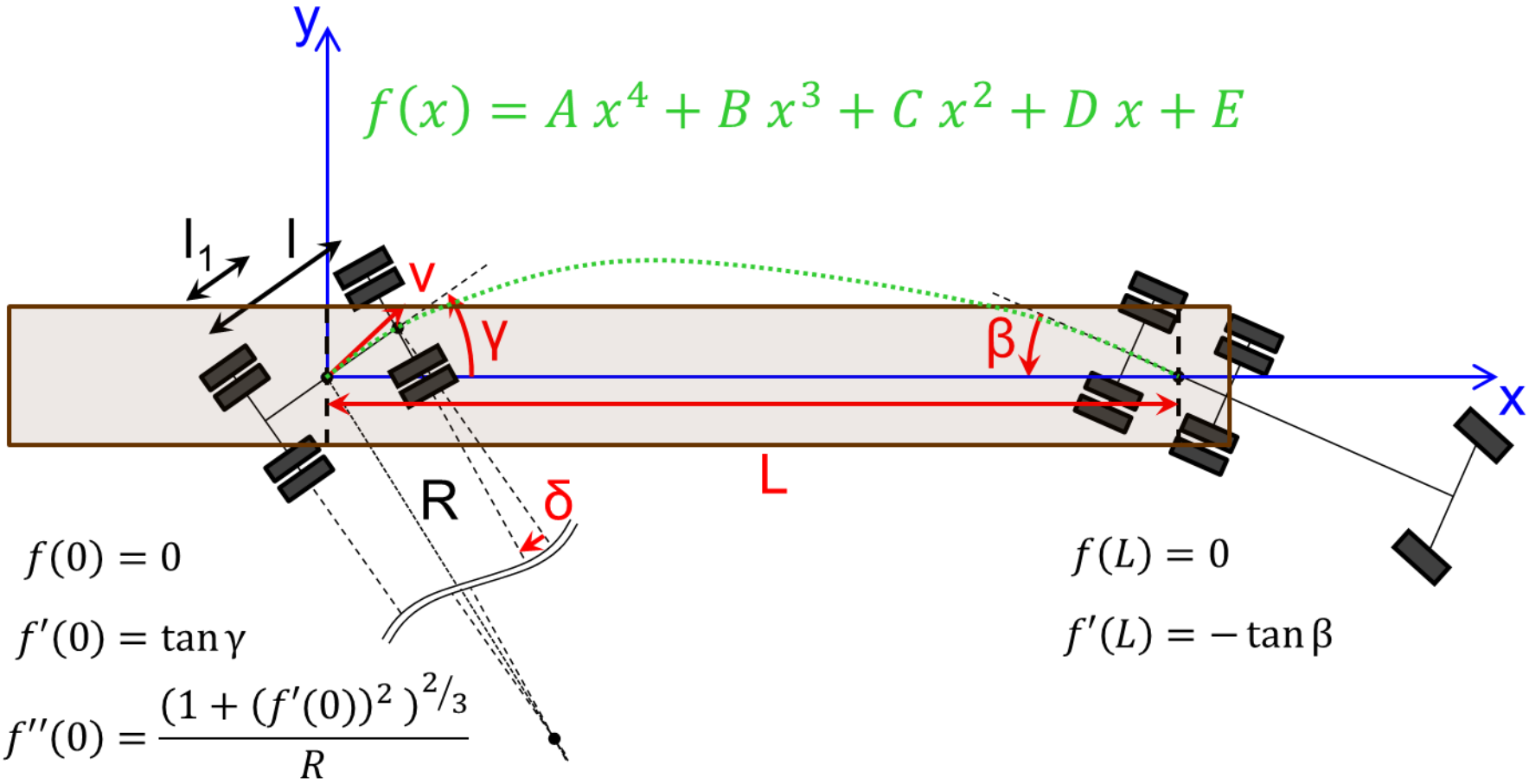
- Reduction of manual trailer steering events by an automated steering control

setting	Common state	Project aim
Curvaceous and narrow lanes	large track offset; manual steering	Trailer follows the track of the tractor automatically
Shunting backwards	Instable characteristics like a drawbar trailer	characteristics like a semi-trailer

→ Raising ease of use and system safety

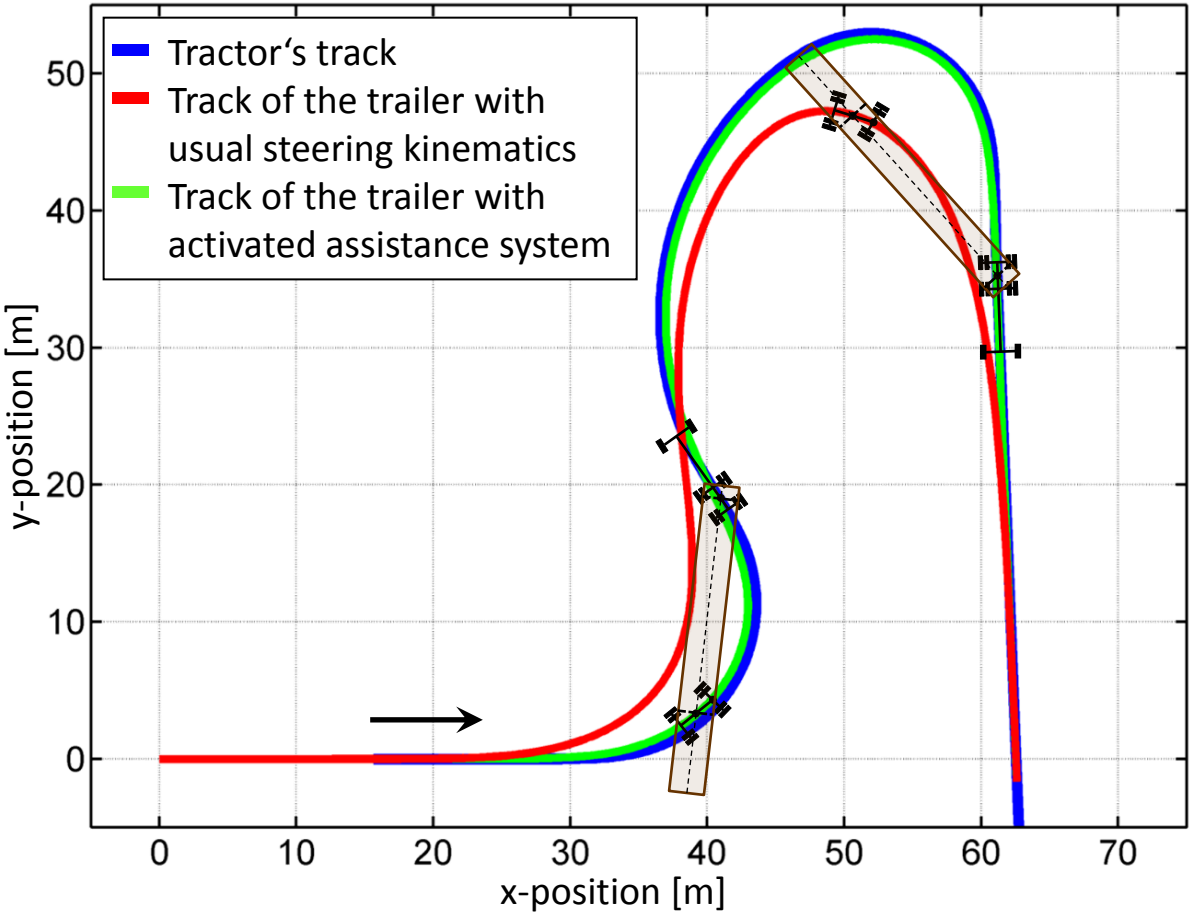
Driver support by function automation

Setting up a polynomial of the geometric arrangement of a long timber vehicle



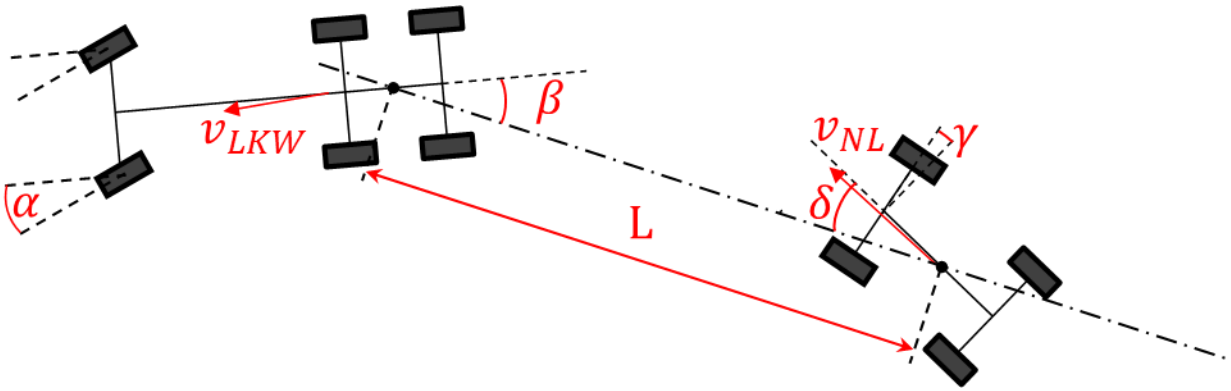
Driver support by function automation

Comparison of simulation results with respect to decrease of the track offset



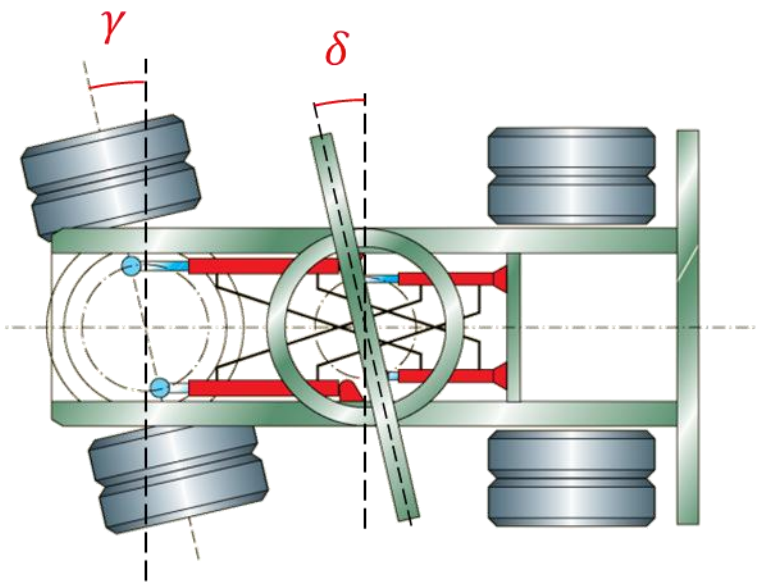
Driver support by function automation

- Sensors
  - Angles
  - Distance between turntables
  - Velocities



- Additional 32 bit controller

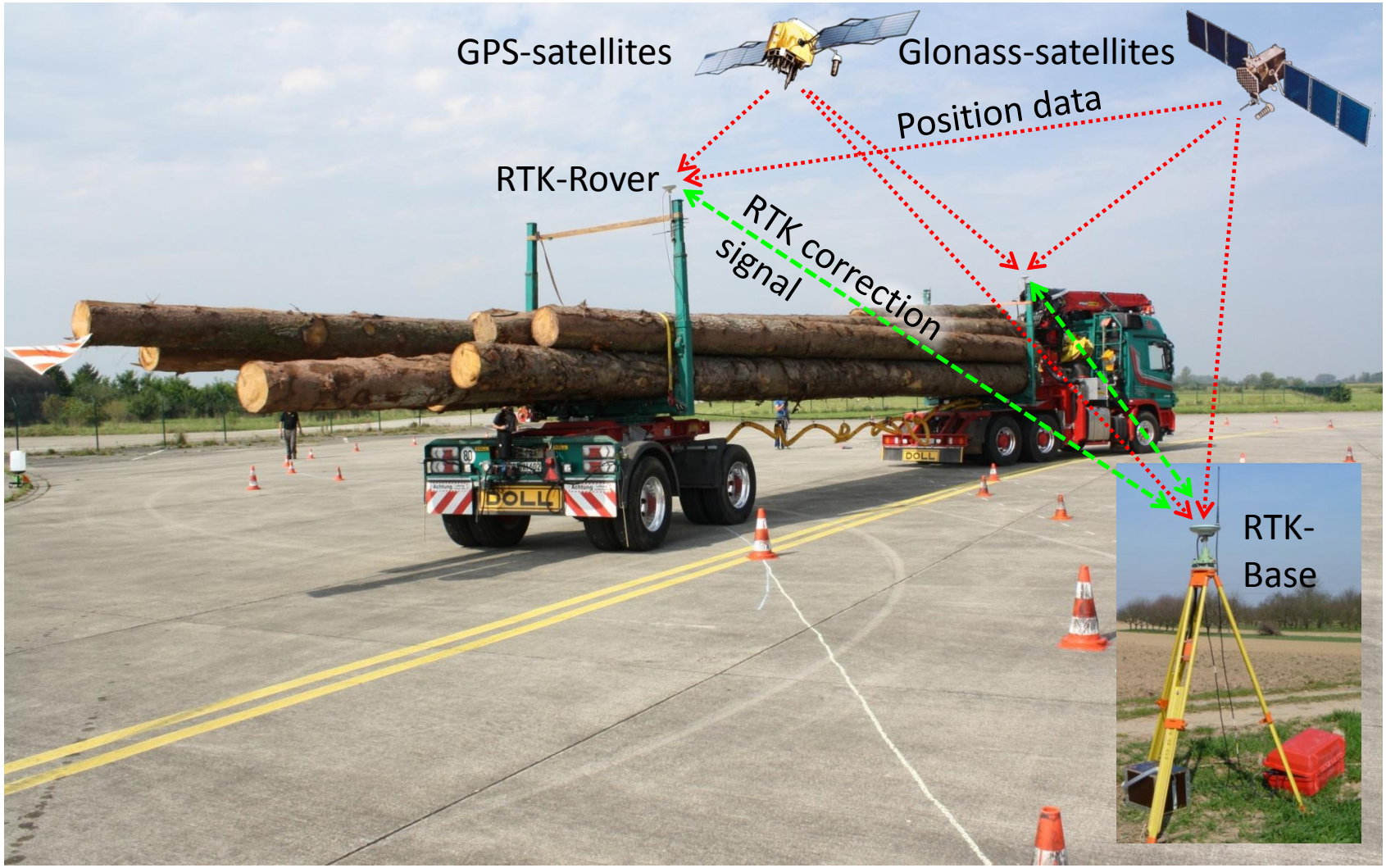
- Execution
  - More powerful hydraulics
  - Proportional valve control



Driver support by function automation

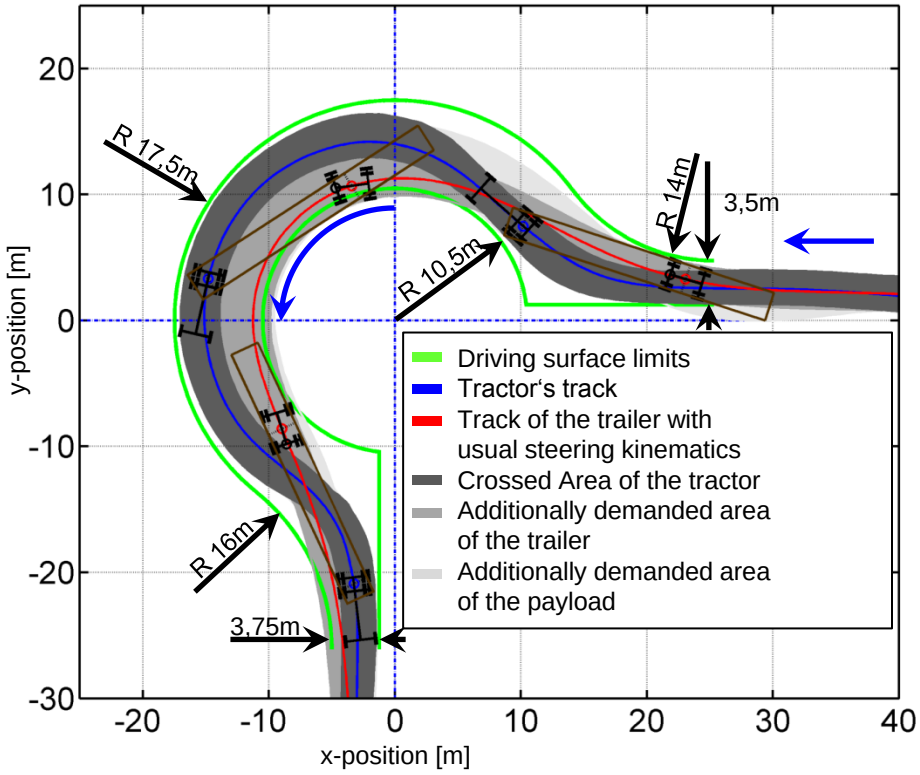
- Operation
  - „Ratio Plus“ Display
  - DOLL control panel
  - Control pad

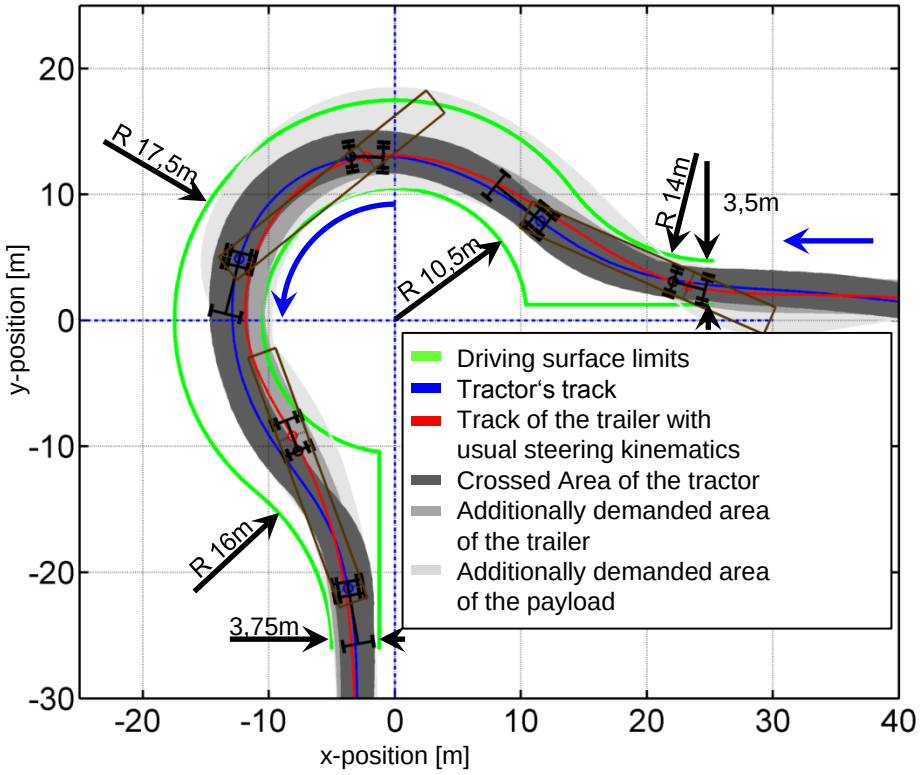
Impact of a driver assistance system in a long timber vehicle



Impact of a driver assistance system in a long timber vehicle

- System comparison in a roundabout
  - Reduction of the road demand by 36,6 % [1]
  - 18,1 % increased velocity

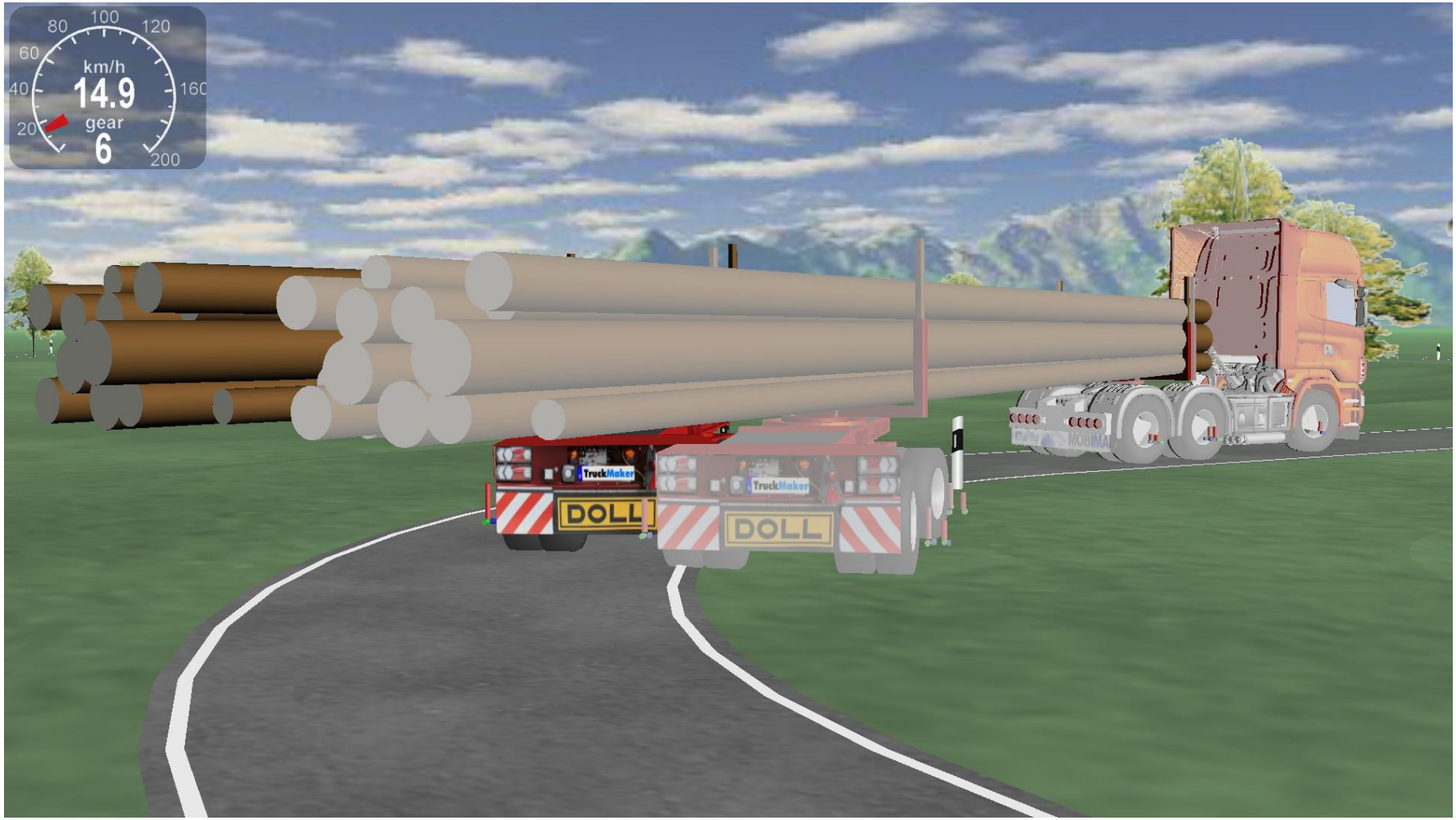




Impact of a driver assistance system in a long timber vehicle

- Enhanced ease of use
  - Additional system information
  - Extra functions
- Higher driving speeds
- Relaxed driver
- Increased driving safety
- kwf innovation award
- Certified by the TÜV SÜD Munich

Impact of a driver assistance system in a long timber vehicle



Literature

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[3] Reich, T.; Zhang, X.; Geimer, M.:
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