Agricultural robots and autonomous vehicles – the next level of smart farming?

Dr. Thomas Engel, Manager Technology Innovation Strategy
GNSS-based Automatic Steering Solutions

- Highly adopted by customers
- Integration of Headland Management
- Trend towards higher accuracy (RTK)
Is this the future?
Field Robots

Source: Deepfield Robotics

Source: University of Helsinki

Source: Robotics Business review

Source: Hochschule Osnabrück
Trend towards fully autonomous (driverless) tractors?

Source: CNHI

Source: AGCO/Fendt

Source: Kubota
Autonomous Tractors in Test
Drivers for autonomous vehicles

- Shortage and cost of educated labor
  - Large arable farming vs. specialty crops
- Cost reduction of unmanned machine
  - No cab needed
- Soil compaction reduction
  - Controlled traffic farming vs. light weight robots
- Reduction of input cost through precise placement/single plant treatment
- Autonomous cars & trucks
  - Strong cost reduction of safeguarding sensors
  - Facilitates legal approval discussion
- Educational focus on robotics
- Strong focus of venture capital and startup companies on agricultural robotics
Challenges for autonomous vehicles

- Product liability
- Legal situation
  - Driving on public roads
- Safeguarding sensors
  - Challenging environment (dust, dirt, fog, vibrations)
- Monitoring of other machine functionality
- Logistics
  - Handling of harvested material or inputs (seed, fertilizer)
  - Transport to/from field
- Complete re-design of machines
  - Optimal machine size depends on application
- Development of totally new cropping systems
- Availability of robotics/AI engineers
Applications - Weeding

Source: FarmWise

Source: Naio Technologies

Source: EcoRobotix

Source: Carré
Applications - Spraying

Source: SwarmFarm Robotics

Source: GUSS

Source: Jacto
Applications - Harvesting

Source: FFRobotics

Source: Harvest CROO Robotics

Source: HandsFree Hectare
Summary & Outlook

• GNSS-based steering solutions are mainstream.

• Growing interest and research in fully autonomous (unmanned) vehicles.

• A lot of drivers towards autonomous vehicles, but a lot of challenges still ahead of us.

• Field robots will be introduced first in specialty crops due to labor cost and labor shortage.

• Swarm technologies and alternative energy concepts seem to be necessary for introduction in large arable farming.
Thank You!