

Bildquelle: VDI Wissensforum GmbH

81st International Conference on Agricultural Engineering

## **LAND.TECHNIK 2024**

The Forum for Agricultural Engineering Innovations

## The following topics will be discussed:

- Vehicle Guidance, Assistant and Safety Concepts
- Sensor Technologies, Standardization
- Networking and Automation, Process Automation, Data Integration in Agricultural Engineering, Digital Innovation
- Harvesting Technologies, Parameter Measurement in Farming, Cultivation
- Innovative Technologies, Innovations through AI Technologies
- Sustainable Energy and Irrigation Systems, Energy Solutions and Ergonomics Assessment

- + Land.Technik Get-together
  5. November 2024
  - + Exhibition
  - + In cooperation with



**Scientific Chairman** 

Prof. Dr. Henning Meyer, Technische Universität Berlin, Germany

#### **Eve of the Conference**

Tuesday 5<sup>th</sup> November 2024

### **LAND.TECHNIK Get-together**

The Agrotech Valley Forum is a leading innovation cluster of internationally successful companies and scientific institutions in agricultural systems technology. In this research association, which focuses on the economic region of north-west Germany, corporate partners from the fields of agricultural technology, sales and service, software development and leading research institutions are working across the boundaries of business, science and administration to address the challenges of agriculture.

This pooling of expertise in the digital transformation of the farming and food industry, particularly in the area of agricultural systems technology, has made the Agrotech Valley Forum an internationally significant incubator for sustainable food production.

Date: 5th November 2024, 18:00-22:00

Adress: Aula, Schloss Osnabrück, Neuer Graben 29, 49074 Osnabrück



The LAND.TECHNIK Get-together takes place with generous support by the agricultural engineering industry.

Register for the free LAND.TECHNIK Get-together with the Registration form or with your online registration for the conference at www.vdiconference.com/ageng

Quette. i u i ii

#### 1st Conference Day

Wednesday, 6<sup>th</sup> November 2024

08:00 Registration



**Plenary Session** (Kongress Saal)

10:00 Welcoming Address and Opening Remarks: VDI MEG

Dr. Markus Demmel, Chairman of Max Eyth Society for Agricultural Engineering (VDI-MEG), Freising, Germany

10:30 Agrotech Valley: Shaping the future of Agricultural Engineering

Dr. Henning Müller, Chairman of the Board, Agrotech Valley Forum e.V., Osnabrück, Germany

→ 11:00 Coffee Break



Vehicle Guidance (Kongress Saal)

Moderation: Prof. Dr.-Ing. Cornelia Weltzien, Head of Department and Chair at University, Leibniz Institute for Agricultural Engineering and Bioeconomy (ATB), Potsdam, Germany

11:30 Track Planning - an implements point of view

Moritz Roeingh B. Sc., Head of Product Management and Marketing, Competence Center ISOBUS e.V., Osnabrück, Germany

Combine Harvester (Room 8)

Moderation: Dr.-Ing. Thomas Göres, Vice President SF Advanced
Development, CLAAS Selbstfahrende Erntemaschinen GmbH, Harsewinkel,
Germany

Modelling two-dimensional separation approach for rotor units of combine harvesters

**Marvin Barther M. Sc.**, Development Engineer, CLAAS Selbstfahrende Erntemaschinen GmbH, Harsewinkel, Germany

12:00 Guiding principles and challenges in the context of environment perception and geofencing in the agricultural application domain

**Alexander Grever M. Sc.,** Team Leader for software development, Maschinenfabrik Bernard Krone GmbH & Co. KG, Spelle, Germany, **Alexander Tauber M. Sc.,** Lemken GmbH & Co. KG, Alpen, Germany

Digital Twins in Agricultural Engineering: Benefits in Developing New Combine Harvester Concepts

**Benedikt Thy M. Sc.,** Research Assistant, Prof. Dr.-Ing. Hubert Korte, Faculty of Agricultural Sciences and Landscape Architecture, University of Applied Sciences Osnabrück, Germany

12:30 Automatic track guidance in high-standing maize crops

**Robert Konradt M. Sc.,** Research Assistent, Institute of Mobile Systems, Otto von Guericke University Magdeburg, Germany

#### Study on the use of DEM for the threshing process

**Dr.-Ing. Christian Korn,** Chair of Agricultural Systems and Technology, TU Dresden, Germany, Kenneth Düring Jensen, AGCO A/S – Innovation Center Randers, Denmark

13:00 Lunch Break





#### **Eve of the Conference**

Tuesday 5th November 2024

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10:30 Agrotech Valley: Shaping the future of Agricultural Engineering

Dr. Henning Müller, Chairman of the Board, Agrotech Valley Forum e.V., Osnabrück, Germany

11:00 Coffee Break



**Cultivation** (Room 9)

**Moderation: Dr. Max Bouten**, Product Director, Kverneland Group Mechatronics B.V., Nieuw-Vennep, The Netherlands

11:30 CF-Plough – an innovative solution for climate protection, soil fertility and yield security

**Dipl.-Ing. Fabian Fröming,** Development Engineer, LEMKEN GmbH & Co. KG, Alpen, Germany, **Marisa Gerriets,** Research Assistant, Leibniz Centre for Agricultural Landscape Research (ZALF), Müncheberg, Germany

12:00 Potential for increasing the efficiency of active soil tillage in crops, which are cultivated in ridges

**Dipl.-Ing. (FH) Kai Dernjac,** Development Engineer, Ansgar Lange gen. Detert, Grimme Landmaschinenfabrik GmbH & Co. KG, Damme, Germany

12:30 A new approach of in-row-weeding sugar beets – using GNSS-localization of crops high pressure water jets weeding

**Daniel Mayer M. Sc.,** Research Assistant, Prof. Dr.-Ing. Albert Stoll, Hochschule für Wirtschaft und Umwelt Nürtingen – Geislingen (HfWU), Nürtingen, Germany

13:00 Lunch Break



#### **Standardization** (Kongress Saal)

**Moderation: Johann Witte M. Sc.,** Head of Advanced Development Process Automation, CLAAS Selbstfahrende Erntemaschinen GmbH, Harsewinkel, Germany



**Niklas Niebrügge M. Sc.,** Development Engineer, ANEDO GmbH, Barnstorf Eydelstedt, Germany, Dennis Schäfer B. Eng., Motec GmbH, Hadamar, Germany

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#### **Networking and Automation** (Room 8)

Moderation: Dr. Nicolas Hummel, Digitization expert for Agricultural Machinery, VDMA e. V., Agriculture Machinery, Frankfurt, Germany

Radio technologies for infrastructureless M2M communication for Ag applications around the world

Heikki Keränen M. Sc., Head of Technology, Satel Oy, Salo, Finland

#### 14:30 Introducing the AEF Autonomy in AG Project

**Alexander Grever M. Sc.,** Team Leader for software development, Maschinenfabrik Bernard Krone GmbH & Co. KG, Spelle, Germany, Ph.D., Ryan Abel, CNH Industrial, Sioux Falls, USA

Human-centred scenario analysis for highly automated swarm systems: Future work roles and user interface requirements for field robotics

**Dipl.-Ing. Helge Wanta,** Dipl.-Ing. Sebastian Lorenz, Chair of Industrial Design Engineering, Technische Universität Dresden, Germany

# 15:00 Integrating High-Speed Data Communication via Automotive Ethernet with a Service-Oriented Architecture Established using SOME/IP in Agricultural Machinery

Andreas Lohmann M. Sc., Embedded Software Engineer, Maschinenfabrik Bernard Krone GmbH & Co. KG, Spelle, Germany

Field Trials and Evaluation Methods for Sensors used in Perception Systems for Autonomous Machinery with Respect to SOTIF

**Christoph Krause M. Sc.,** Researcher, Deutsches Forschungszentrum für Künstliche Intelligenz GmbH, Osnabrück, Germany Dr. Sebastian Röttgermann, LEMKEN GmbH & Co. KG, Alpen, Germany

## 15:30 ISOBUS Migration From CAN to Ethernet - Doing it Right From the Beginning

**Dipl.-Ing. (FH) Peter Fellmeth,** International Strategic Customer Consultant, Dipl.-Inf. Martin Schlodder, Vector Informatik GmbH, Stuttgart, Germany

Operation and investigation of adaptive mesh networks to increase the connectivity of agricultural machinery

**Dipl.-Ing. Julian Hagert,** Research Assistant, Prof. Dr.-Ing. Habil. Thomas Herlitzius, Chair of Agricultural Systems and Technology, Technische Universität Dresden, Germany

#### 16:00 Coffee Break



Innovations through Al Technologies (Kongress Saal)
Moderation: Dr. Henning Müller, Research Department Plan-Based
Robot Control, German Research Center for Artificial Intelligence (DFKI),
Osnabrück, Germany

#### **Process Automation** (Room 8)



Moderation: Christoph Stumpe M. Sc., Research Associate, Fundamentals of Agricultural Engineering, Institute of Agricultural Engineering, University of Hohenheim, Stuttgart, Germany

#### 6:30 Green Revolution: AI for Precise Weed and Pest Control

**Prof. Dr.-Ing. Dipl.-Math. Katja A. Rösler,** Professor for automotive engineering, Kevin Szelechowicz, University of Appied Science, Mülheim, Germany

SpeeDiFlow - Non-invasive measurement of air speed and direction

**Dipl.-Ing Andi Günther,** Chair of Agricultural Systems and Technology, Technische Universität Dresden, Germany, Sebastian Müller, miunske solutions GmbH, Großpostwitz, Germany

#### 17:00 Accelerating the AI lifecycle with the AgriGaia-Platform

**Prof. Dr. Heiko Tapken**, Tobias Wamhof M. Sc., Faculty of Engineering and Computer Science, University of Applied Sciences, Osnabrück, Germany

Field evaluation insights of a novel optical sorting approach suitable for mobile operation on a potato harvester

**Markus Brinkmann M. Sc.,** Development Engineer, Julian Roß M. Sc., GRIMME Landmaschinenfabrik GmbH & Co. KG, Damme Germany

#### 17:30 Distributed Edge-Cloud Intelligence and AI for Large-scale Agricultural Production Systems

**Alexander Wagner M. Sc.,** Intelligent Solutions Group, John Deere GmbH & Co. KG, Kaiserslautern, Germany, Dipl. Ing., Andreas Locatelli, TTControl GmbH, Wien, Austria

Tillage Quality Measurement: Surface Roughness Analysis using Height Profiles

Marina Graf M. Sc., Project Engineer, AGCO GmbH, Marktoberdorf, Germany

#### ▶18:00 Short Break



Plenary Session (Kongress Saal)



#### 18:15 Awarding of the VDI-MEG Prizes



#### Get-together



At the end of the first day of the event, we invite you to a Get-together. Take advantage of the relaxed atmosphere to expand your network and to have in-depth discussions with other participants and speakers

### **Exhibition & Sponsoring**

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E-Mail: schreiner@vdi.de

#### **Exhibitor**

- Bosch Engineering GmbH
- dSPACE GmbH
- ITK Engineering GmbH (2024, June)







#### **Innovative Technologies** (Room 9)

Moderation: Dipl.-Ing. Herbert Coenen, Uniparts India Ltd./Noida, India

#### 14:00 V-Model Approach for Developing Safe Environment Perception Systems for Autonomous Machinery

Magnus Komesker M. Sc., Research Assistant, University of Applied Science Osnabrück, Germany, Dr.-Ing. Christian Meltebrink, SICK AG, Waldkirch, Germany

### 14:30 Precise trunk localization using the example of in-row weeding in vineyards

**Dipl.-Ing. Tobias Blume,** Project Engineer, AGCO GmbH, Marktoberdorf, Germany, Max Rasumak M.Sc., Program Manager Off-Highway Vehicle, ITK Engineering, Lollar, Germany

#### 15:00 Field Path Detection for Tractors - Based on Acceleration Measurements and Multibody System Simulations

**Dipl.-Ing. Dr. techn. Gernot Jedinger-Pauschenwein,** Senior Analysis Engineer, Dipl.-Ing. Dr. techn. Wilhelm Fuchs, AVL List GmbH, Graz, Austria

## 15:30 Implementation of a real-time plant detector for a selective grassland weeding machine using high-pressure water jets

**Ingo-Leonard Haußmann M. Sc.,** Research Assistant, Prof. Dr.-Ing. Albert Stoll, Hochschule für Wirtschaft und Umwelt Nürtingen-Geislingen, Germany

#### 16:00 Coffee Break



#### Sustainable Energy and Irrigation Systems (Room 9)

**Moderation: Dr. rer. agr. Dipl.-Ing. Thomas Hoffmann,** Head of System Process Engineering, Leibniz Institute for Agricultural Engineering and Bioeconomy (ATB), Potsdam, Germany

#### 16:30 Production and utilization of methane from cowshed gas on farms

**Christina Gerdes M. Eng.,** Research assistant, Felix von Arnim M. Sc., Institute Mobile Machines at the Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany

## 17:00 Draft force evaluation of a deep ploughing technology for the installation of geothermal collectors under arable land

**Dipl.-Ing. Jakob Münch,** Research Assistant, Béla Burkert, Chair of Agricultural Systems and Technology, Technische Universität Dresden, Germany

## 17:30 Holistic concept of technical solutions for subsurface drip irrigation of major crops in humid central European growing conditions

**Dr. rer. nat. Wolfram Strothmann,** General Manager, Christian Scholz, SLS Systementwicklungen GmbH, Osnabrück, Germany

#### ▶18:00 Short Break



Plenary Session (Kongress Saal)



#### 18:15 Awarding of the VDI-MEG Prizes



#### Get-together



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### **Official Conference Language**

The official language of the conference will be English. Simultaneous translation will not be available.



#### Young Professionals meet VDI-MEG (Room 2)

Join us for an informational and networking afternoon session "Young Professionals meet VDI-MEG".

The program will describe various VDI-MEG activities and gives the unique opportunity to meet members from VDI-MEG.

Max Eyth Society for Agricultural Engineering (MEG) represents a technical division of the Association of German Engineers (VDI).

The short presentations will be followed by an informal **social networking** session.

Learn more about VDI-MEG and find out how you can get involved with this organization who are promoting the profession of Agricultural Engineering and the people who serve it.

#### 2<sup>nd</sup> Conference Day

Thursday, 7<sup>th</sup> November 2024



09:00

Data Integration in Agricultural Engineering (Kongress Saal) **Moderation: Noack** 



Parameter Measurement in Farming (Room 8)

Moderation: DI Dr. Peter Riegler-Nurscher, Area Manager, Josephinum Research, Wieselburg, Austria

Facilitating seamless collaboration: Secure decentralized group management in interoperable wireless in-field communications

Dr.-Ing. Daniel Steinmetzer, Lead Engineer, Dr.-Ing. Milan Stute, ITK Engineering GmbH, Rülzheim, Germany

Fusing SAR and Weather with Physics-Inspired ML for Improved Soil **Moisture Estimation** 

Titli Das M. Sc., PVV Engineer, Reliability, John Deere GmbH & Co. KG, Mannheim, Germany

Current situation of automatization standards in farm machinery and FMIS from dealer perspective

> Dr.-Ing. Steffen Wöbcke, Head of Aftersales, Agrartechnik Vertrieb Sachsen GmbH, Ebersbach, Prof. Dr.-Ing. Habil. Thomas Herlitzius, Technische Universität Dresden Germany

Systematic Data Selection for Enhanced Nutrient Prediction and Monitoring in Manure Using NIR

Leonard Friedrich M. Sc., Research Assistant, Institut für Theoretische Elektrotechnik und Mikroelektronik (ITEM), Universität Bremen, Germany

10:00 Decentral and Central Technologies combined to one DataXChange System - a technical view

> Dr. Johannes Sonnen, Managing Director, Dipl.-Inf. Oliver Rahner, DKE-Data GmbH & Co. KG, Osnabrück, Germany

Detection of Rumex obtusifolius L. in Grassland using Multispectral Images and Deep Learning

Jonathan Heil, Research Assistant, J. Prof. Dr. rer. nat. Anthony, Stein, Artificial Intelligence in Agricultural Engineering, University of Hohenheim, Stuttgart,

10:30 EU Data Act: Data governance as an enabler

Dr.-Ing. Patrick Altschuh, Senior Consultant Data Strategy and Governance, ITK Engineering GmbH, Rülzheim, Germany Dr. Stefan Held, ITK Engineering GmbH, Holzkirchen, Germany

Long term validation for app based chop quality estimation for silage maize

Dr.-Ing. Sven Belau, Development Engineer, CLAAS Selbstfahrende Erntemaschinen GmbH, Harsewinkel, Germany

11:00 Coffee Break



### **Energy Solutions and Ergonomics Assessment**

(Kongress Saal)

Moderation: Dr. Magnus Schmitt, Deputy Managing Director, VDMA e. V., AG Machinery, Frankfurt, Germany

**Digital Innovation** (Room 8)

Vloderation: Dr. Thomas Anken, Head Digital Production, Sustainability assessment and agricultural management, Agroscope, Ettenhausen, Switzerland

12:00 Fuel cell electric agricultural tractor FCTRAC: operation strategy, homologation, benchmarking, and field testing

Dr. Johannes Konrad, Institut für Fahrzeugantriebe und Automobiltechnik, Technische Universität Wien, Austria, Christian Mayer, M. Sc., Tractor Product Engineer – BEV, CNH Industrial Österreich GmbH, St. Valentin, Austria

Unpacking the opportunities and limitations of data spaces in agriculture

Raghad Matar M. Sc., Software Architect, Dr.-Ing. Rodrigo Falcão, Fraunhofer-Institut für Experimentelles Software Engineering IESE, Kaiserslautern, Germany

Is fast charging relevant and beneficial for agricultural machinery?

Ing. David Mühlgrabner, Technical Expert E/E Powertrain, AVL List GmbH, Steyr, Austria, Dipl.-Ing. (FH) Ronald, Kruth, AVL Deutschland GmbH, Neuss, Germany

Potential of agricultural machinery data for the evaluation of travel times

Lukas Lange M. Sc., Research Assistant, Prof. Dr.-Ing. Henning J. Meyer, Chair Machinery System Design, Technische Universität Berlin, Germany

13:00 Evaluation of adaptive operating concepts on agricultural tractors in a laboratory test rig to assess cognitive and physical ergonomics

Björn-Gerrit Hülle M. Sc., Institute of Agricultural Engineering, University of Hohenheim, Marcel Racs M.Sc., Institute for Construction Technology and Technical Design, University of Stuttgart, Germany

Training neural networks for tramline detection in an autonomous driving tractor using synthetic images

Silko Schulpius M. Sc., Project Engineer, AGCO GmbH, Wolfenbüttel, Germany, Dr.-Ing. Jan Schattenberg, Institute of Mobile Machines and Commercial Vehicles, Technische Universität Braunschweig, Germany

13:30 Short Break



Plenary Session (Kongress Saal)

**Engineering for Tomorrow's Agricultural Ecosystem** 

Deanna M. Kovar MBA, President, Worldwide Agriculture & Turf Division: Small Agriculture and Turf Care, Europe, Africa, and Asia, John Deere, Mannheim, Germany

14:15 Closing Remarks

Prof. Dr. Henning Meyer, Chair Machinery System Design, Technische Universität Berlin, Germany

14:30 Refreshments and conclusion of the conference



#### 2<sup>nd</sup> Conference Day

Thursday, 7th November 2024



#### **Assistant and Safety Concepts (Room 9)**

**Moderation: Dr.-Ing. Tobias Nothdurft,** Manager, Research & Advanced Engineering, Premium Tractors, AGCO GmbH, Marktoberdorf, Germany

09:00 Integration of a safety concept for an autonomous agricultural machine

**Timo Schulte B. Sc.**, Head of Homologation and Product Safety, KRONE Agriculture SE, Spelle, Germany, **Joost Roelse Eng.**, Head of Technical Documentation, LEMKEN GmbH & Co. KG, Alpen, Germany

09:30 Low-Cost, Rapid Development of Object Detectors for Automation of Agriculture

**Frederick Charles Eichhorn M. Sc.,** Product Engineer PhD, Lea Schönland M. Sc., John Deere Europe, Kaiserslautern, Germany

10:00 Applicable Safety Tests for Automated Agricultural Machinery and Robots

**Prof. Dr. Julius Schöning,** Engineering and Computer Science, Hochschule Osnabrück, Germany

10:30 TIM-Ready Trailer for Harvest Operations

**Marc-Alexandre Favier M. Sc.,** Research Assistant, Tim Burgers B. Sc., Yvan Challe M. Sc., Digital Farming, RPTU Kaiserslautern-Landau, Germany

#### 11:00 Coffee Break



Sensor Technologies (Room 9)

**Moderation: Dr.-Ing. Jan Schattenberg,** Deputy Institute Director, Head of Workinggroup Automation and Robot Systems, Institute of Mobile Machines and Commercial Vehicles, Technische Universität Braunschweig, Germany

12:00 Breakthrough in the development of automation functions - Bosch Imaging Radar

**Camille Marbach B. Eng.,** Product Manager Perception Off-Highway, Bosch Engineering GmbH, Abstatt, Germany

12:30 Sensor breakthrough? Detection of invisible damages on potatoes before blackspot develops shown for multiple maturity stages and varieties using a tactile sensing technique

**Judith Langfermann,** Development Engineer, Dr. Wolfram Strothmann, GRIMME Landmaschinenfabrik GmbH & Co. KG, Damme

13:00 Development of a supplement to a test standard for evaluating the guidance accuracy and working quality of sensor-based technologies for weed control by use of AI

**Dr. Oliver Schmittmann,** Paul Steinhausen M. Sc., Institute of Agricultural Engineering, University of Bonn, Germany

#### ▶ 13:30 Short Break



#### Plenary Session (Kongress Saal)

13:45 Engineering for Tomorrow's Agricultural Ecosystem

**Deanna M. Kovar MBA,** President, Worldwide Agriculture & Turf Division: Small Agriculture and Turf Care, Europe, Africa, and Asia, John Deere, Mannheim, Germany

14:15 Closing Remarks

**Prof. Dr. Henning Meyer,** Chair Machinery System Design, Technische Universität Berlin, Germany

14:30 Refreshments and conclusion of the conference

### **Program Committee**

Dr. sc. ETH Thomas Anken, Agroscop ART, Ettenhausen, Switzerland

**Prof. Dr.-Ing. Stefan Böttinger,** Universität Hohenheim, Stuttgart, Germany **Dipl.-Ing. Herbert Coenen,** Uniparts India Ltd., Noida, India

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Dr.-Ing. Magnus Schmitt, VDMA e.V., Frankfurt, Germany

### **Technical Chair**



The Association of German Engineers (VDI) is one of the leading engineer's associations worldwide. The Max Eyth Society for Agricultural Engineering represents a technical division of the VDI. It bears the name of the

founder of agricultural engineering as a distinct discipline in Germany, Max Eyth (1836-1906).

www.vdi.de/meg



The European Society of Agricultural Engineering (EurAgEng) exists to promote the professions of Agricultural and Biosystems Engineering and the people who serve it. The Society is particularly active in conferences, Special Interest Groups, publications, networking, and international lobbying. www.eurageng.net



The VDI Wissensforum organizes and provides seminars and conferences dedicated not only to engineers but also to academics and practicians from widely divers branches of the economy. Our activities are backed by the Verein Deutscher Ingenieure e. V. (VDI), a virtually

inexhaustible fund of know-how constantly attracting new ideas and suggestions.



#### 81st International Conference **LAND.TECHNIK 2024**

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HRS

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OsnabrückHalle, Schlosswall 1-9, 49074 Osnabrück

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