



09.12.2022

## PRESSEMITTEILUNG

### **Digital Summit: Chancellor Scholz chooses Phoenix agricultural robot as his favorite**

**AI & robotics from the University of Hohenheim advance environmental protection & sustainability in agriculture / German Chancellor Scholz impressed by potential of Swabian multi-talent robot**

**CURRENT VIDEO on YouTube <https://youtu.be/YZ9JuxO7FS4>**

**PRESSEFOTOS unter [www.uni-hohenheim.de](http://www.uni-hohenheim.de)**

**Very Important Robot: German Chancellor Olaf Scholz brought the University of Hohenheim's agricultural robot "Phoenix" into the spotlight at the Digital Summit as the Chancellor's Exhibit. In a discussion with Hohenheim agricultural scientists, the Chancellor had the researchers explain how the Swabian multi-talent is using its artificial intelligence and robotics to reconcile the agriculture needs of the future with environmental protection and species conservation. Today's meeting between the Chancellor and the machine was one of the highlights at the end of the Digital Summit 2022 in Berlin. For two days, members of the federal cabinet met with representatives from business, science, and society. As a platform for shaping the digital transformation, the German federal government's Digital Summit aims to be an initiator, driver, and showcase for digitalization in Germany and beyond.**

Phoenix made its first appearance on the world political stage in May 2022: As the star of the accompanying scientific program, it impressed the agriculture ministers of the G7 countries who met for the conference at the University of Hohenheim.

Apparently, its reputation has now preceded the robot all the way to Berlin: In the run-up to the Digital Summit, the University of Hohenheim learned that German Chancellor Olaf Scholz wanted to meet Phoenix in person. And that's how the small multi-talented robot from Swabia became the so-called Chancellor's Exhibit.

### **Agriculture 4.0: Precise field work for more environmental protection and species conservation**

In the experimental fields of the University of Hohenheim, the multifunctional robot is already

drastically reducing the use of fertilizers and pesticides. As a lightweight robot with a belt drive that is gentle on the soil, Phoenix protects the soil from compaction. Used in a targeted manner, it can further reconcile agriculture with environmental, climate, and species protection.

This is made possible by the Internet of Things, in which robots and other machines also communicate with each other via the Internet. Artificial intelligence also plays a role, evaluating large amounts of data from agriculture and the food industry, as Prof. Dr. Hans W. Griepentrog explained to the Federal Chancellor.

"In Agriculture 4.0, drones record the condition of fields with cameras and laser sensors. Artificial intelligence assesses where water, fertilizer, or crop protection is needed. Digital technology also controls the robots that work the fields with highly precise accuracy. Farmers save operating resources - the climate, environment, and biodiversity are protected," explained the agricultural scientist from the University of Hohenheim.

### **Current experiments aim to dispense with synthetic pesticides**

Some research projects at the University of Hohenheim also use Phoenix to completely dispense with pesticides. Phoenix brought suitable equipment with it to the Digital Summit.

"Here in the front of the robot is intelligent sensor technology that can distinguish crops from weeds," stated Prof. Dr. Griepentrog. To do this, the robot detects plants using a camera and laser sensors and then evaluates the data in real time using artificial intelligence methods.

At the back are the tools that remove weeds mechanically and without the use of pesticides. "This spares the cultivated plants and, to a large extent, the accompanying flora, which promotes the growth of the crop and provides a habitat for insects," stated Alexander Stana, a doctoral candidate in agricultural engineering at Hohenheim.

### **Soil-friendly use for planting white cabbage**

More jobs for Phoenix: Sowing cereal grains with precision seeding or planting white cabbage in a particularly energy-saving and soil-conserving manner.

To plant cabbage seedlings, heavy tractors with wide plows still tear up the soil. "Superfluous," was the verdict of Nils Lüling, who is currently working on his doctorate under Prof. Dr. Griepentrog. Instead of a rigid coulter, Lüling equipped the Phoenix with a hinged coulter.

When folded, the device makes only a thin furrow in the ground. The coulter opens to full width only every 60 cm. The soil is therefore opened only where necessary. This also means that the device requires less force to pull, which saves energy.

Through a plexiglass tube, Phoenix drops one seedling at a time right into the open ground. A camera controls the distance and position of the plantings.

### **Test application for tree pruning in orchards**

In another research project, the researchers trained the multifunctional robot to recognize

structures of tree crowns in typical Swabian orchards and to assess their condition. In many places, this ecologically valuable cultural landscape is disappearing due to lack of care.

To do this, the scientists equipped Phoenix with a scanner that captures its surroundings as three-dimensional point clouds. Artificial intelligence creates the digital image of the tree, also called the digital twin. With its help, Phoenix should be able to decide where it or untrained personnel should apply the saw.

### **Cost-effective lightweight robot with electricity from solar systems and biogas**

However, Prof. Dr. Griepentrog still sees the main application in the fields. His vision: Swarms of small Phoenix robots that leisurely and autonomously navigate the fields to work more gently and accurately than large and heavy agricultural machinery ever could.

"The devices are lightweight and inexpensive. Farmers can produce the electricity themselves using solar systems or in a combined heat and power plant with biogas," said the agricultural scientist from the University of Hohenheim.

His main goal at the Digital Summit: "We want to show that agricultural science is particularly innovative when it comes to digitalization." German Chancellor Olaf Scholz has already gotten this message.

### **BACKGROUND: Digital Summit of the Federal Government**

The German government has named the digitalization of Germany as one of its key issues. The goal is to accelerate and expand digitalization while harnessing its potential for prosperity, freedom, social participation, and sustainability.

The Digital Summit is the central platform for shaping the digital awakening and is divided into seven thematic platforms. In these platforms, representatives from business, science, and society develop projects, events, and initiatives during the year that are intended to advance digitalization in business and society. At the Summit, the results of the work will be presented, trends shown, and digital policy challenges and solutions discussed.

This year's Digital Summit of the German government took place on 8/9 December 2022. It was coordinated by the Federal Ministries of Digital and Transport and of Economic Affairs and Climate Protection. As the Chancellor's Exhibit, agricultural robot Phoenix was ceremoniously unveiled by Federal Minister of Education and Research Bettina Stark-Watzinger and Prof. Dr. Hans W. Griepentrog of the University of Hohenheim.

More information

### **BACKGROUND: Phoenix agricultural robot**

The Phoenix agricultural robot from the University of Hohenheim has smaller dimensions than a car trailer and can be equipped with various sensors and tools depending on the task. The robot weighs approx. 420 kg plus tools and moves on two belt drives that are gentle on the soil. It is powered by a 52 volt battery with 120 Ah. The average working time is 8-12 hours. Three

additional linear motors place the attachments in the optimal position.

The operating system Linux Ubuntu serves as Phoenix's brain. This software controls all functions for navigation, analysis of sensor data, and the entire actuator system. CAN, serial, USB, and ethernet interfaces enable the connection of various cameras and other sensors. The basic variant was developed at the Department of Technology in Crop Production at the University of Hohenheim by its director Prof. Dr. Hans W. Griepentrog with funding from the university. The respective further developments took place in various third-party funded projects such as the projects "NOcsPS" from the BMBF or "DiWenkLa" from the BMEL (see below).

### **BACKGROUND: Consortium project "Agriculture 4.0 without chemical-synthetic plant protection" (NOcsPS)**

The variant of the Phoenix in Berlin shows equipment that is currently being developed specifically for the research project "Agriculture 4.0 without chemical-synthetic plant protection" (NOcsPS). The NOcsPS project started on 1 June 2019 and will run for 4.5 years. The University of Hohenheim is coordinating the project and is working on 16 subprojects in 20 subject areas. Other project partners are the Julius Kühn Institute (JKI) with two subprojects and the University of Göttingen with one subproject. The project is funded by the German Federal Ministry of Education and Research (BMBF) under the "Agricultural Systems of the Future" funding program with just under 5.3 million euros, of which around 4.5 million euros are for the University of Hohenheim. The principal investigator is Prof. Dr. Enno Bahrs from the University of Hohenheim's Institute of Farm Management.

Press release on NOcsPS, 18 June 2019 | [Project homepage](#)

### **BACKGROUND: Consortium project "Digital value chains for a sustainable small-scale agriculture" (DiWenkLa)**

The further development of the Phoenix agricultural robot to plant white cabbage in a soil-friendly manner is being carried out in the consortium project "Digital value chains for a sustainable small-scale agriculture" (DiWenkLa). Eleven departments of the University of Hohenheim and Nürtingen-Geislingen University (HfWU) are involved. In addition, around 20 farms, individual state institutes of the Baden-Württemberg Ministry for Rural Areas, and more than 25 partners from the business community, such as industrial and service companies, are participating.

The research project started on 2 March 2020 with a duration of 3 years. The German Federal Ministry of Food and Agriculture (BMEL) is funding the project through the funding line "Experimentation fields for digitalization in agriculture" with a sum of around 2 million euros for the University of Hohenheim. The total funding amounts to about 4.2 million euros, of which the Ministry of Rural Areas and Consumer Protection is co-financing approximately 0.9 million euros.

Press release on DiWenkLA, 12 May 2020 | [Project homepage](#)

*Text: Klebs*

Media Contact:

PHOENIX agricultural robot

Prof. Dr. Hans W. Griepentrog, University of Hohenheim, Department of Technology in Crop Production, +49 (0)711 459 24551, hw.griepentrog@uni-hohenheim.de

M.Sc. Nils Lüling, Research Associate for Prof. Dr. Griepentrog, +49 (0)711 459 24557, nils.lueling@uni-hohenheim.de

M.Sc. Alexander Stana, Research Associate for Prof. Dr. Griepentrog, +49 (0)711 459 24557, a.stana@uni-hohenheim.de

Projects NOcsPS & DiWenKla

Prof. Dr. Enno Bahrs , University of Hohenheim, Department of Farm Management  
+49 (0)711 459 22566, bahrs@uni-hohenheim.de