

Connected sensors and smart algorithms

Bosch Deepfield Connect products for agriculture 4.0

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- ▶ Deepfield Connect Asparagus, Field, and Milk Monitoring solutions and apps enable farmers to keep a watchful eye on their crops and dairy produce
- ▶ Weather and other scientific data serve to calculate plant growth models
- ▶ Smart algorithms recommend ways to use resources such as water and fertilizer efficiently, assure quality, and boost yields

Stuttgart. While the world's population continues to grow, the per capita area of arable land is shrinking. "Our aim is to maximize yields and use resources more purposefully and thus more efficiently," says Dr. Bojan Ferhadbegović, head of the Deepfield Connect product family at Bosch Software Innovations. In keeping with the idea behind agriculture 4.0, he and his team are working on connected sensor systems and smart algorithms to make life easier for hardworking farmers.

No unwelcome surprises with smartphone fruit-and-veg monitoring

The Deepfield Connect Field Monitoring system transmits temperature and humidity data directly from the field to the farmer's smartphone, at any time and to any place. The app is available for iOS version 11 or later and for Android version 5 or later. A customizable alert gives farmers a heads-up when readings reach critical levels. Featuring temperature, air humidity, and soil moisture sensors, the system comes in four versions that provide a conventional weather station's key climate data. This information keeps users up to date on how their crops are faring in the field, the warehouse, or the seed-priming room. It also clues them in on how to improve their storage, foil management, and irrigation practices. "What's more, the Deepfield Connect product family is very easy to install and use. Anyone can set up the systems on their own in five minutes and start using them straightaway," says Ferhadbegović.

Black or white side up? Asparagus bed sensors answer that and more

Another option alongside the Field Monitoring system features special sensors for growing asparagus. Improper foil management can compromise quality and cost farmers up to 30 percent of their crop. The Deepfield Connect Asparagus Monitoring system minimizes this risk with sensors measuring at four depths in the asparagus bed to gauge temperature. The app's customizable alert warns farmers before it gets too hot or cold, while a weather forecast specific to that field helps the farmer decide when to turn the foil. The temperature sum helps farmers predict the best time to start harvesting.

Always take the weather with you – in the app

"One of the great risk factors in farming is the weather. We can't influence it, but our sensor systems and the Deepfield Connect app help farmers work with the weather to best support their crops' growth," says Ferhadbegović. The Deepfield Connect app comes with plant growth models for selected standard and specialty crops. The Bosch IoT Suite's smart algorithms combine weather data with the science behind the growth models to keep farmers informed. They can consult the app at any time to gain insight into their plants' current growth phase and in future get the right recommendations for each development stage. "For example, we can use our models to calculate which nutrients the plant has theoretically absorbed from the soil by the time it completes a given development stage. We can also use the weather forecast to recommend the best time to apply fertilizer, so this isn't done when the soil is too dry or when rain would wash it right back out again," says Ferhadbegović, pointing out another of the algorithms' advantages. In near future, the app will also help farmers comply with documentation regulations, for example by providing an audit trail tracking fertilizer use.

Accurate forecasting with the right data from the right spot

"The Internet of Things (IoT) offers great potential for agriculture. Bosch can draw on its extensive expertise in software, sensor technology, and services to tap that potential. The bigger the database, the better the outcomes achieved with algorithms and artificial intelligence," says Ferhadbegović. Even without the Deepfield Connect sensors, every app user enjoys free access to the weather data calculated for a given field. It is based on information from independent weather services and other sources. Users can order sensors right there in the app to obtain even better data and recommendations that are even more in tune with local conditions. "Then the exact readings taken in the user's field will be factored into the calculations. Particularly frost and soil moisture vary in intensity from one location to the next and can never be calculated accurately from general weather data. And if farmers grow the crop in tunnels, external sources won't yield reliable calculations anyway," explains Ferhadbegović.

Keeping tabs on the tank via an app to maximize milk quality

The Deepfield Connect Milk Monitoring system is the latest product to join this family. A sensor measures the temperature directly in the milk and takes other readings to track the tank's functionality. This data is sent to the app on the smartphone. An alert warns the dairy farmer or tank truck driver when readings take a critical turn. "For example, the cooling system may be tailored precisely to the dairy's specifications and thereby save energy," says Ferhadbegović. Installation is an exercise in plug-and-play convenience: simply lower the sensor chain into the milk tank and attach the transmitter and warning lamp to the agitator respectively the tank. Independent bodies such as the Fraunhofer Institute for Manufacturing Engineering and Automation IPA have verified that the system is safe for food.

Farm #LikeABosch – everything for the farmer in one app

Ferhadbegović and his team are already thinking ahead. They want to add interfaces for manufacturing partners so that farmers have access to many important topics at one single point. "What we have in mind are interfaces to irrigation and other control systems, but also for suppliers." The team at Bosch Software Innovations also wants to offer special sensors as modular add-ons – for example to measure hydrostatic leaf pressure – alongside the model already available for asparagus beds. With its digital solutions for agriculture, Bosch Software Innovations is carrying on a tradition that started with founder Robert Bosch, who was a farmer himself in the 1920s. His old farmstead at Mooseurach near Munich still stands today. "We are perpetuating this legacy by making life a little easier for the hardworking farming community by delivering smart solutions that achieve higher quality with more efficient, resource-friendlier practices. That's what Farm #LikeABosch is all about," says Ferhadbegović.

To learn all about the products and the app, visit www.deepfield-connect.com

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Contact person for press inquiries from specialist press:

Thomas Vollmer

Phone: +49 711 97 893-13

bosch-si@cc-stuttgart.de

Contact for the general press:

Katharina Hogh-Binder

Phone: +49 711 811-92571

Katharina.hogh-binder@de.bosch.com

Twitter: @ka_hoghbinder

Bosch Software Innovations has been active in the Internet of Things for more than ten years. The team of IoT consultants, software developers, solution architects, project managers, UX designers, business model innovators, and trainers brings IoT ideas from strategy to implementation. With its domain-specific, software, and organizational know-how, Bosch Software Innovations supports companies digitally transforming themselves. The company has designed, developed, and operated more than 250 international IoT projects in agriculture, smart homes and buildings, retail, energy, mobility and manufacturing. Its cloud-based Bosch IoT Suite currently connects more than 10 million sensors, devices, and machines with their users and enterprise systems. With over 700 IoT experts worldwide, Bosch Software Innovations has locations in Germany, Bulgaria, Singapore, China and Japan.

More information can be found at www.bosch-si.com, www.bosch-iot-suite.com, www.twitter.com/BoschSI, www.blog.bosch-si.com.

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The company was set up in Stuttgart in 1886 by Robert Bosch (1861-1942) as "Workshop for Precision Mechanics and Electrical Engineering." The special ownership structure of Robert Bosch GmbH guarantees the entrepreneurial freedom of the Bosch Group, making it possible for the company to plan over the long term and to undertake significant upfront investments in the safeguarding of its future. Ninety-two percent of the share capital of Robert Bosch GmbH is held by Robert Bosch Stiftung GmbH, a charitable foundation. The majority of voting rights are held by Robert Bosch Industrietreuhand KG, an industrial trust. The entrepreneurial ownership functions are carried out by the trust. The remaining shares are held by the Bosch family and by Robert Bosch GmbH.

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