www.smart-farming-welt.de

Smart Farming

Research project

Source: ©Grimme

nPotato

Smart Services in agricultural crop production: Real-time crop optimization

Supported by:

Federal Ministry for Economic Affairs and Energy

on the basis of a decision by the German Bundestag

DLR Project Management Agency

Smart Service Welt

nPotato

Harvest optimization with Smart Services

Source: © Grimme

Description of the use case

To optimize the potato harvest, an electronic data-collecting potato (nPotato) is integrated into the harvesting process. The preconditions for this are that the harvesting machine, in this case the potato harvester, is in use and that the nPotato is planted in the field and ready to use as well. Usually, the harvesting process is monitored visually on screens inside the potato harvester to detect any potato damage. If there are defects on the produce and the cause of them can be determined, the machine`s harvesting process can be optimized via machine settings. If the cause cannot be identified, the nPotato is put to use. It is treated like a regular potato and follows the entire harvesting process while measuring dynamic parameters, analyzing them and sending out raw data as well as error notifications in real-time to the farm management, the service provider or the farmer himself, so that the harvesting process and vehicle operation can be optimized to limit damage to the potatoes. Intelligent services, so-called „Smart Farming Services", are used to answer management-related questions for the relevant stakeholders in real-time.

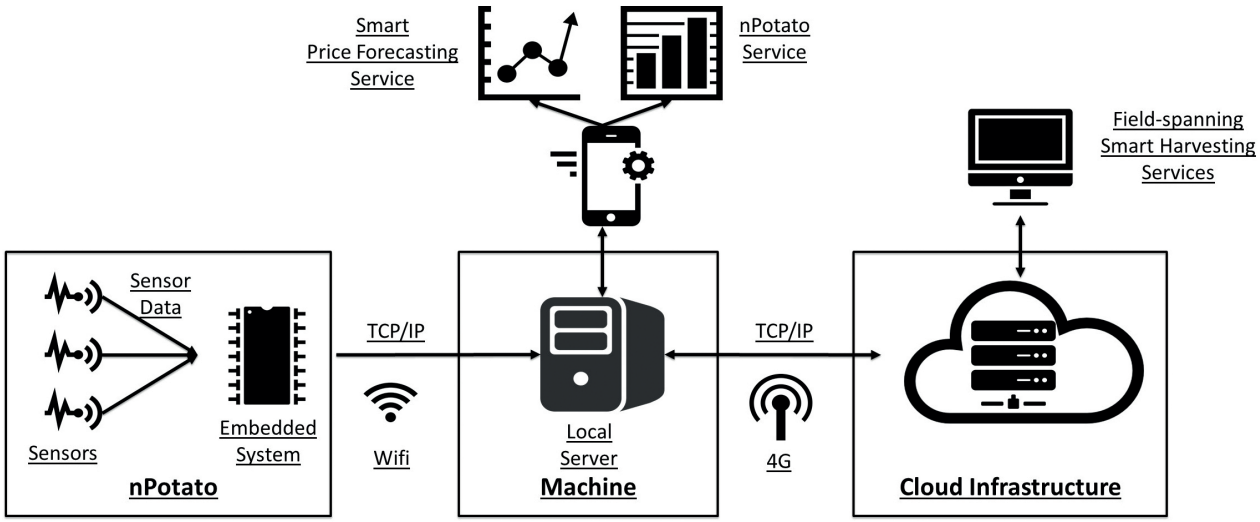
Stakeholders

Smart Farming Services can be traded on digital marketplaces and linked to machines. They inform the farmer or the machine driver during his work on the field and inform the control office of where and how potatoes are damaged during the harvesting process with the potato harvester – for example due to shocks or rotations. Because of this, Smart Services offer great potential for the optimization of harvesting processes. In addition to this, they can contribute to the creation of innovative business models which are used to explore new business areas.

Source: © CLAAS

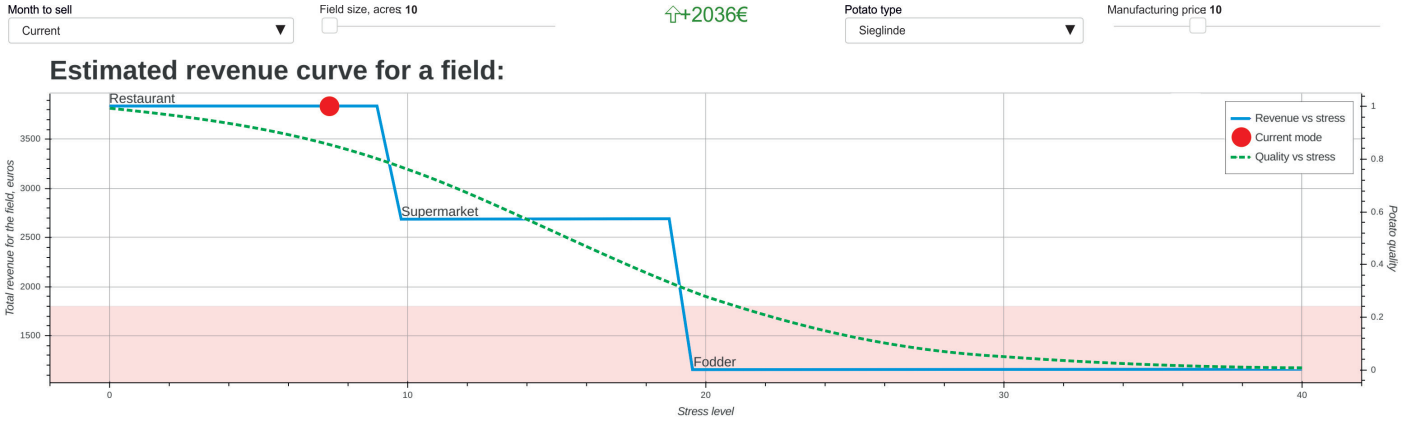
Operating principle

The nPotato is based on the concept of a pain-sensitive object (so-called nociceptive object), which makes it possible to evaluate if and how intensely potatoes are shaken and rotated during the harvesting process. For this purpose, modern methods of machine learning (deep learning) are used as well as technologies of the Internet of Things and communication and linguistics technologies. Machine learning methods such as Long Short Term Memory (LSTM) Neural Networks are used to classify individual impacts effecting the produce and to identify the overall condition of the nPotato. The result is converted into linguistic expressions that are immediately understandable to the operator of the agricultural machine. Additionally, the farmer receives a visualization of all data relevant for his business-management related decisions.
By using the latest available web technologies, Smart Farming Services offered by third parties can be integrated efficiently into open, technological platforms, e.g. the „Real Time Smart Farming Services" platform (RESFAST).



Added value

The idea of the nPotato shows how industry 4.0 can be brought to the field and how collected data can be used to develop innovative agricultural services, such as estimated income curves for a field harvest in real-time (see graph below). The operator of the agricultural machinery can now adjust his machines to the best suitable settings thanks to the precise recommendations for action. The time he needs to finish working on one field is now no longer the only factor influencing his work. The optimized setting of the harvest machine also adds to the quality of the harvested produce. This, in return, increases the yield and saves resources. Overall, this innovation can help to make agriculture more sustainable.



Project target

The aim of the research project is to create a multidirectional interconnection of farming fields and machines and the integration of external data sources (such as weather forecasts) on a shared platform.
The agricultural machinery is included in a network and linked to the platform via a digital infrastructure. Collected data is exchanged, bundled and analyzed to provide data-driven services for end users.

Use cases

During the project, several use cases will be developed to demonstrate the benefits of the platform. These include among others:

Tele Expert:
Repair of machine malfunctions via manufacturer-independent remote diagnosis **Connected Update:**
Updating the machine software via manufacturer remote access
nPotato:
Optimization of harvests due to the use of Smart Services
Fleet Set Connect:
Optimization of the grain harvest due to superordinate fleet control.

Integration of third party developers

The platform enables application developers to make their solutions available to a broad base of users. Do you have an idea for further applications? Please feel free to contact us!

Contact details

Partners who work in the area of agricultural engineering or communications technology and those belonging to leading research institutions are working on the development of a manufacturer-independent service platform for a digitalized agriculture.

Contact persons

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