LOCATION

Germany

PARTNERS

Fraunhofer IESE

JOHN DEERE

2.1

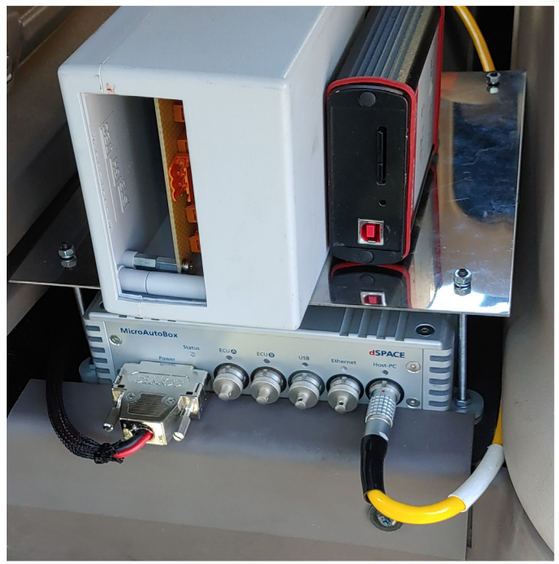
In-Service Condition Monitoring of Agricultural Machinery

CHALLENGE

Using onboard sensors for in-service monitoring of engine data as well as data of the exhaust gas after treatment decreases the need for PEMS (Portable Emissions Measurement System). Storing and analysing selected data as well as providing defined information to legal institutions helps to monitor that machines follow the regulations and offers the possibility to use the collected data for further improvements (e.g. optimising machine and simplify maintenance).

AIM

This pilot aims at demonstrating the potential application of onboard sensors for in-service monitoring, as well as testing the legal applicability of existing After Treatment (AT) sensors as an alternative to PEMS, while considering aspects of data management, privacy and integrity.



HOW

Using data from existing sensors, algorithmically ensuring high quality of continuous data streams, and analysing the data in real-time by making use of the most appropriate algorithms and technologies, will allow monitoring, documentation, and the use of the analysed results for further actions.

BENEFIT

Using the collected data will result in better knowledge of machine and engine conditions. On the one hand this can be used to simplify maintenance and thus reduce costs and machine down time. On the other hand, when in-service condition monitoring is mandatory this approach helps to fulfil regulations.

LOCATION

Germany

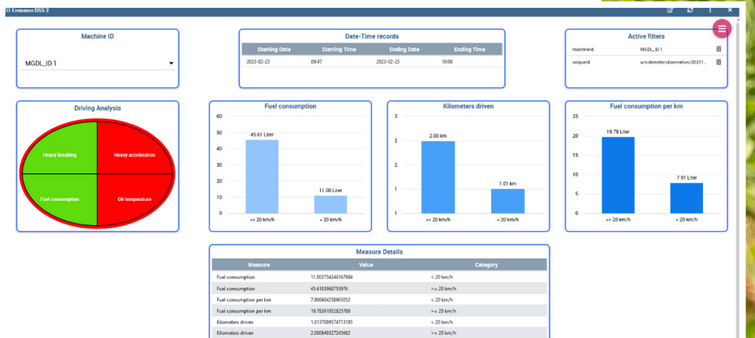
PARTNERS

Fraunhofer IESE

JOHN DEERE

DEMETER Integration

The pilot tracks and analyses tractor machinery data with a data logger which is cooperating with a number of DEMETER components. First, the pilot uses the “Data Quality Assessment” (DQA) enabler for structured data for the data analysis pipeline to ensure adequate quality of data is gathered and monitored. A second DEMETER component is the decision support system (DSS) DEMETER 4.D.1 “Emission DSS 1” which assesses the criticality of different engine and after-treatment parameters. Another decision support component, the DEMETER 4.D.1 “Emission DSS 2”, has been developed collaboratively across DEMETER work packages and is used on the gathered data for performing a driving analysis on road sections which is also rated based on previous weighted analysis. By means of the DEMETER AIM, these assessments are integrated into the DEMETER Adaptive Visualization Framework to have a visualized dashboard based on Knowage.



Feedback From Farmers

Throughout the project, there was a regular exchange of feedback and interaction between agricultural experts and the pilot members. The DEMETER 4.D.1 Emission DSS 1 component was seen as beneficial regarding time and expenses for checking machine conditions. This can help in the case of identifying malfunctions or even help to prevent them. Additionally, the DEMETER 4.D.1 Emission DSS 2 could be useful for farms with many contractors to have a better understanding of how the machines are used. This can also be used to show rookie drivers how they drive and how they could improve their driving behaviour. Farmers value both the impact and being part of the process of digitalising agriculture.

Outcomes

The data logger in combination with the data analysis tools provide a holistic view on the machine condition and field works. In addition, by giving the farmer visual feedback on the condition of the machine, time spent checking the machine, and time and money spent on maintenance can be reduced. The use of the solutions developed can improve the efficiency, environmental impact of agricultural machinery, safety, and overall experience of the farmer. Providing the output data in a DEMETER AIM compliant format makes it possible to visualize the results of the analysis using the DEMETER Adaptive Visualization Framework and also increases interoperability for future applications. In summary, the data from the logger along with its visualisations and analyses provide a simple and intuitive overview of the machine’s condition.