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Press release

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PI 9368 RB DH/Na

Industry 4.0: Bosch and SAP combine expertise
Collaboration in software and cloud technologies

- Long-term strategic technology partnership for increased customer benefit
- SAP adds its HANA database platform to Bosch IoT Cloud
- Bosch makes its IoT microservices available to SAP on the HANA cloud platform
- Bosch has expertise in device connectivity, SAP in IoT applications
- Both drive standards as part of the IIC and the Germany-based Plattform Industrie 4.0

Walldorf/Stuttgart – Stronger together than apart: Bosch and SAP have agreed to form a strategic partnership for the internet of things (IoT) and Industry 4.0. Both companies want to expand their collaboration on cloud technologies and software solutions. Their joint approach promises to speed up manufacturing and logistics processes and to increase the safety and quality of products and services for customers. “In order to make even better use of the major potential that connected industry holds, international companies must cooperate more closely than before, and they must base that cooperation on open standards,” said Bosch CEO Dr. Volkmar Denner at the signing of the relevant memorandum of understanding. Bernd Leukert, member of the SAP Executive Board responsible for products and innovation, added: “New solutions that offer a high degree of customer benefit will appear only when companies concentrate on their strengths and their core competencies while also pooling their respective strengths.”

Customers benefit from new, smart solutions

To this end, there are plans to enable customers to use the SAP HANA database platform in the Bosch IoT Cloud. The aim is to process large quantities of data for IoT applications in real time. In addition, Bosch and SAP will work to combine their software and cloud expertise in the future. Bosch IoT microservices will be made available on the SAP HANA cloud platform, as a way to connect different

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devices and components. This includes enabling secure and more efficient connectivity for vehicles, manufacturing machinery, or tools with various, and preferably open platforms. The aim is always to offer customers new, smart services. For instance, connected cordless screwdrivers can report their location down to the nearest centimeter to the production system, which can then select the torque appropriate to each screwdriver's task. The result is increased efficiency in production. Fast databases such as SAP HANA are a prerequisite for saving, processing, analyzing, and presenting large quantities of data from connected industry. All the systems both Bosch and SAP develop are focused above all on data security and privacy. Both companies protect customer data with state-of-the-art technology. Customers can decide themselves whether to make personal data available and when it should be deleted.

Industry 4.0 calls for standardized conditions

"To get IoT and Industry 4.0 solutions implemented universally, we need standards and reference architectures," Denner said. On the topic of standardization, Denner and Leukert expressed their support for close coordination with the internationally oriented Industrial Internet Consortium (IIC) and with the Germany-based Plattform Industrie 4.0. The aim is to institute a set of standardized conditions that will support the interoperability of machinery in the world of industry. "Joint testbeds are a tried and trusted approach toward that aim, with partners working together to test the interplay of sensors, machinery, software, and cloud technology, and to derive standards from that," Leukert said.

Reduced outlay, increased efficiency

One specific example of cooperation between the two international companies is positional data for forklifts, increasing the transparency and efficiency in logistics. In an existing IIC-coordinated testbed known as Track&Trace, it is now possible to determine the location of forklifts in large warehouses, aircraft hangars, or industrial sites in real time and to the nearest centimeter. Zeno Track, a start-up founded by Bosch, pinpoints the forklifts using cameras, GPS, laser scanners, radio, and connected motion sensors. The location data is transferred via the Bosch IoT Cloud to the SAP Vehicle Insights fleet management system. As a result, vehicle fleets can be managed intelligently and in a way that best supports the planning and fulfillment of transport orders or maintenance schedules. This reduces outlay and increases efficiency. The cooperation between Bosch and SAP shows how the interplay of sensors and software enables the creation of new services that go beyond individual companies.

Platform technologies are building blocks for the internet of things

Moreover, the two companies aim to develop further solutions in areas such as automated and connected driving. These always produce great quantities of data

that must be evaluated quickly and reliably. “Databases and platform technologies are fundamental building blocks for new solutions in the internet of things and Industry 4.0. We would like to put these at the disposal of customers, partners, and users worldwide,” Leukert said. Denner continued: “Bosch can draw on extensive sensor systems experience in the areas of mobility, manufacturing, consumer goods, and connectivity. By combining all this, we aim to help our customers generate new sales.”

First IIC meeting in Germany September 19-24

Bosch and SAP are leading European members of the IIC. This international network of companies and universities is driving the implementation of the internet of things in several areas, including industrial manufacturing. The IIC is holding its first ever meeting in Germany from September 19-24. SAP and Bosch support cooperation between the IIC and the Germany-based Plattform Industrie 4.0.

Press photographs and graphs: Photos of Dr. Denner and Mr. Leukert at the event as well as graphs will be made available for download at 13:00 CEST on September 21 from www.bosch-presse.de and https://www.sap-tv.com/stockfootage/medialist/1456.

Internet

Details about Track&Trace:
http://bit.ly/1AfaBfh
Details about Zeno Track:
http://bit.ly/1qmstln
Details about the Bosch IoT Cloud:
http://bit.ly/2cqbI1M
Details about SAP Vehicle Insights:
http://bit.ly/2c0IBFL
Details about the IIC:
http://bit.ly/1m8ohh3

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About Bosch

The Bosch Group is a leading global supplier of technology and services. It employs roughly 375,000 associates worldwide (as of December 31, 2015). The company generated sales of 70.6 billion euros in 2015. Its operations are divided into four business sectors: Mobility

Solutions, Industrial Technology, Consumer Goods, and Energy and Building Technology. The Bosch Group comprises Robert Bosch GmbH and its roughly 440 subsidiaries and regional companies in some 60 countries. Including sales and service partners, Bosch's global manufacturing and sales network covers some 150 countries. The basis for the company's future growth is its innovative strength. Bosch employs 55,800 associates in research and development at 118 locations across the globe. The Bosch Group's strategic objective is to deliver innovations for a connected life. Bosch improves quality of life worldwide with products and services that are innovative and spark enthusiasm. In short, Bosch creates technology that is "Invented for life."

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 up-front 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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About SAP

As market leader in enterprise and application software, SAP SE helps companies of all sizes and industries run better. From back office to boardroom, warehouse to storefront, desktop to mobile device – SAP empowers people and organizations to work together more efficiently and use business insight more effectively to stay ahead of the competition. SAP applications and services enable approximately 320,000 business and public sector customers to operate profitably, adapt continuously, and grow sustainably. For more information, visit www.sap.de

Fact sheet

September 21, 2016
PI 9369 RB DH/BT

Bosch and SAP connect forklifts and goods
Improved efficiency thanks to sensors and software

- Faster goods transport thanks to data mining and the Bosch IoT Cloud
- Overview of vehicles and goods thanks to intelligent software
- Fewer accidents thanks to automatic speed control and collision warning

Vienna/Stuttgart/Walldorf – Bosch's new Zenoway solution offers a complete portfolio of tools for the management of forklift fleets. Zenoway uses smart sensors to monitor and control all a site's logistics processes. It works by collecting, analyzing, and presenting all the relevant vehicle data from connected forklifts, which enables users to monitor goods transport, shorten vehicle routes, and avoid collisions. To ensure in-house logistics run smoothly, Zenoway continuously gathers data and sends it to the Bosch IoT Cloud to be processed. A shared interface with the SAP Vehicle Insights system makes managing even larger forklift fleets easy. This system owes its intelligence to five technological approaches:

1. Locating forklifts indoors and outdoors

In outdoor operating areas such as loading zones or storage areas, the system uses GPS to locate forklifts. Indoors, for instance in warehouses or covered logistics receiving areas, vehicles are located using cameras, laser, or radio. These tools record a vehicle's precise location up to 25 times per second and with an accuracy of just a few centimeters. Basically, relevant data is collected in real time and compared continuously. If two forklifts get too close to one another, their drivers are warned to adjust their speed or bring their vehicle to a halt. If a forklift approaches a doorway, it opens automatically. The doors also close again as soon as the forklift has passed, which reduces the building's heating and cooling costs.

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2. Sensors for vehicles and goods in transport

Bosch shock sensors continuously report any vibrations a vehicle is exposed to. They are more sensitive than any driver and can detect all kinds of collisions. If a vehicle brushes against goods, for instance, or is involved in an accident, the system can tell the nature and location of the damage in real time. As a result, help can be called for quickly and automatically. Since the connectivity between the sensors and the location system is smart, any vibrations that are not a problem, for instance those caused by railroad ties, are ignored. In addition, a pressure sensor fitted to the forklift's hydraulic system determines the weight on the fork. This shows whether the forklift is traveling empty or with a load, and whether it has correctly collected the goods.

3. Driver assistance system for forklifts

The forklift's speed is controlled automatically. This helps the driver comply with speed restrictions and increases the safety of the route. If a vehicle is traveling within a pre-defined area, its speed reduces automatically to a preset value. Once the vehicle leaves this area, it automatically assumes its original speed. The system can store a number of route programs, ensuring that delicate goods are transported slowly and less fragile goods faster.

4. Data analysis for more efficient logistics

Operating data from the forklifts is collected continuously. This data on the vehicles' location, environment, speed, direction of travel, and load status can provide information with which to improve how goods are transported. Fragile goods are transported with particular care, and wear and tear on vehicle parts is continuously monitored. Data can be presented in a number of ways. The system also uses a heat map to visualize traffic volumes, with a view to reducing potential hazards on busy routes. Details on transport numbers and durations are summarized in an easy-to-read table.

5. Tracking goods without scanners

Businesses see daily flows of inbound and outbound goods, as well as movements of goods within warehouses. Generally, to maintain a good overview of inventory, transported goods must be painstakingly scanned with every change of location. The Zenoway solution tracks this movement simply by locating the vehicles, eliminating the need to laboriously scan transport units. Moreover, each storage location is automatically detected as the forklift approaches it. The transport unit can automatically be tracked from the time the driver collects it to the time it is delivered to its destination. Forklift drivers can use a tablet in their cab to identify the goods by code at any time. Another benefit of this system is that it generates a clear overview of inventory levels, while constant stocktaking ensures nothing is lost.

From start-up idea to industrial solution

Zenoway was developed by Zeno Track, a start-up that was founded in 2008 and acquired by Bosch in 2015. It is based in Vienna, Austria, and has an office in the Stuttgart region. The company now has some 40 associates.

Press photographs: Zenoway photos, Zenoway info chart

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Press release

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Bosch initiates new machine language for Industry 4.0

Large and medium-sized companies will benefit

- Bosch CEO Denner: “Open standards are one of the fundamental prerequisites for Industry 4.0”
- Barriers to entry for smaller companies removed
- Six SMEs already on board as partners

Stuttgart – Bosch wants to remove one of the biggest barriers for smaller companies seeking to enter connected industry. The company is seizing the initiative and presenting a new, open industry standard it has developed in-house for the exchange of data in connected industry. This will enable interplay between a wide variety of partners in the internet of things (IoT) and in Industry 4.0. Known as the Production Performance Management Protocol (PPMP), the new standard will for instance support the quick, easy, and secure transfer of data from sensors that SMEs supply to manufacturers to the production systems of large companies. The protocol is freely available and free of charge. This removes barriers to entry into connected industry. “Open standards are one of the fundamental prerequisites for making use of the opportunities Industry 4.0 presents. By letting everyone participate in data exchange, they increase interoperability, enable new business models, and enhance the competitiveness of all the companies involved,” said Bosch CEO Dr. Volkmar Denner. “This will help Industry 4.0 to become more widely established more quickly: companies large and small will be able to integrate their products more quickly. Both German industry and the global economy stand to benefit.”

Data improves production management

The new standard developed by Bosch experts supports Production Performance Management (PPM), a process that is central to Industry 4.0. It uses sensors to collect great quantities of data from manufacturing for analysis, with the aim of further improving production processes. Are all the components along a production line really working together as effectively as possible? Is one

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component slowing the process down? Is one piece of equipment drawing an unusually large amount of power? Is a motor overheating and possibly about to fail? A PPM system can answer these and other similar questions – and correct faults. At the same time, PPM makes efficient, comprehensive production management possible.

Bosch creates easy-to-understand machine language

The best possible management of production processes calls for the many sensors and machines in a manufacturing facility to deliver their data to the central PPM software. This is a complicated undertaking, as until now all these machines and sensors have spoken many different languages. It is difficult to get them to communicate with each other, but Bosch has developed the PPMP to enable machines and sensors to communicate better. Like Bosch, many large companies put many components supplied by third parties – frequently specialized SMEs – to work in their manufacturing facilities. These components can be integrated into a production environment quickly, easily, and cheaply. Meanwhile, open standards help SMEs better integrate their products into the manufacturing systems of their large and small customers so both sides benefit. What's more, the PPMP underpins mechanical engineers' ability to connect their machinery directly with software. This means any machine faults can be reported to an app. The person in charge immediately sees the reason for the fault on their smartphone, along with an approach to take to resolve the problem.

Open source helps everyone make progress

The new standard is being further developed in the Eclipse open source community. Initial practical experience with it will also feed into this work, which means anyone can use the protocol free of charge. Several SMEs (Balluff, EGT, Rampf, Cadis, KLW, Schmalz) already support this initiative, which was launched by Bosch. Other companies are expressly invited to get involved. In addition, the shared standard will be used in an innovation project, or testbed, overseen by the Industrial Internet Consortium (IIC) and the Germany-based Plattform Industrie 4.0. Located at Bosch's Homburg plant, the testbed is a collaboration of Tata Consulting, Dassault Systèmes, SAP, and Bosch. Thanks to this new data exchange standard, a production management system there is already receiving data from a variety of different objects, as well as machine data and energy consumption figures. "Many concepts and technologies for the Industry 4.0 era have yet to appear. In order to validate them and bring them to market, testbeds like the one in Homburg involving the IIC are very strategically important," Denner said. "At the same time, they offer smaller companies an opportunity to participate in IoT value chains."

Bosch joins the Labs Network Industrie 4.0

This is also why Bosch recently joined the Labs Network Industrie 4.0. Launched by industry representatives and Germany's Bitkom, VDMA, and ZVEI associations, the network aims to promote German SMEs' implementation of Industry 4.0 technologies. The Labs Network is the first port of call for questions relating to the development of Industry 4.0 solutions.

Related links:

Details about the PPMP at the Eclipse Foundation:

http://bit.ly/2bPLS8d

Details about the testbed in Homburg:

http://bit.ly/2cabkJM

Details about the Labs Network Industrie 4.0:

http://bit.ly/2avZogY

Press photographs: I4.0 sensor kit at the Bosch plant in Homburg, PPMP graph

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