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Smart industrial tools

Bosch is driving torque behind first European testbed for the Industrial Internet Consortium

Connected industrial tools improve quality in the factory

February 12, 2015
PI 8793 RB Res/SL

- ▶ Collaborative effort with Tech Mahindra and Cisco
- ▶ Better quality and higher efficiency in manufacturing
- ▶ Major potential for industry as a whole
- ▶ First announced testbed for the Industrial Internet Consortium

Collaborating to achieve the highest quality standards in the connected manufacturing of the future: three international companies are working to ensure that industrial tools automatically do what needs to be done at the right location.

Stuttgart – A collaborative effort between Bosch and two international companies, all members of the Industrial Internet Consortium, is driving forward tool connectivity with the aim of improving quality and efficiency in industrial manufacturing. The first outcome of their collaboration on the “Track and Trace” project is the ability to determine the position of a cordless nutrunner on the shop floor with extreme precision, among other applications. This positioning information is used to automatically select the correct torque for the respective task, making it possible to tighten safety-relevant bolts with exactly the required torque, for example. It is also possible to automatically document these settings to ensure and test product quality. Open standards are set to enable the seamless integration of industrial power tools used to drill, tighten, measure, and solder into an overall system of networked tools in the future. The potential applications of connected hand-held nutrunners, riveting tools, and measuring equipment include the construction and maintenance of engines and aircraft. “There is no other solution like this out there; it harbors major potential for industry as a whole,” says Dirk Slama, the project manager at Bosch. The supplier of technology and services is cooperating on “Track and Trace” with Indian IT company Tech Mahindra and U.S. IT company Cisco. This effort is the first European testbed for the Industrial Internet Consortium (IIC).

Innovative solution for increased efficiency and competitiveness

The new solution is made possible by connecting the tools with each other and with the production data for the products to be manufactured. Thanks to the tool's positioning information and the precisely determined location of a component, such as an aircraft on the shop floor, the user knows that the tool is currently located at the vertical stabilizer, for example. Backend software automatically sends instructions that specify the torque needed to tighten bolts there.

"Connected tools contribute not only to product quality and safety, but also to making production more efficient, which improves competitiveness," Slama says. There are additional benefits to "Track and Trace." For instance, the constant collection of tools' data provides companies with a detailed overview of the conditions of their tools at all times. This can enable the automation of a number of routine tasks, such as the replacement of wear parts on power tools after a specified number of rotations or hours of operation.

Avoid errors, increase safety

The design and assembly of complex industrial and consumer goods requires exacting work. Machinery, vehicles, and aircraft necessitate the highest standards of quality. Often, bolts must be tightened with precisely the right amount of torque. In aircraft construction, for example, there are precise regulations that specify the kind of screw and the amount of torque that must be used to join specific parts. Joints on the wings require a different amount of torque than those on a window. When it comes to passenger aircraft, there are thousands of such bolts that must be tightened and precisely documented. Connected tools speed up this time-consuming task. "We are able to record the torque used to tighten hundreds of thousands of bolts, for example, and store that information in a database. The information makes it possible to quickly identify any discrepancies, and it provides users with clues as to the possible causes of faults," Slama explains. As a result, connected tools also aid in troubleshooting and error avoidance. If a worker tries to use a tool mistakenly for the wrong task or at the wrong place, the tool powers itself down, preventing errors from occurring in the first place. This contributes to improving safety, quality, and productivity.

Open standards ensure universal use

Thanks to open standards, this system of connected tools can be used universally. Industrial power tools used to drill, tighten, measure, solder, and rivet fit seamlessly into an overall system of connected tools, regardless of the brand or type of tool. A computer system is used to manage and regulate the tools. The testbed highlights several key aspects of digitally connected manufacturing. One of these aspects is cross-industry cooperation on equal footing among

companies who are working to create open standards for the purpose of data exchange. Hardware, software, localization technology, backend integration, and safety features are all integrated in the solution architecture. This results in a number of new options, such as data analysis.

International cooperation advances connectivity

The testbed partners are each lending their different areas of expertise to the project: Bosch is supplying the Nexo cordless nutrunner, while Bosch Software Innovations is contributing the software necessary to gather and evaluate data in the form of their Bosch IoT Suite. The Nexo collects and stores tightening data and transmits it wirelessly. Tech Mahindra is responsible for the application programming. Cisco is providing the nutrunners' precision location identification feature (triangulation) by evaluating wireless signals. Tests are underway at Bosch Software Innovations in Berlin and at Tech Mahindra in Bangalore, India, to determine how the components interact with each other. Plans call for the first pilot applications with new industrial users in 2015.

Internet:

Details about the Industrial Internet Consortium:

<http://www.iiconsortium.org>

Details about Industrial Internet Consortium testbeds:

<http://bit.ly/1DQ6SX4>

Details about the Industry 4.0 platform:

<http://bit.ly/1w1NLz9>

Details about the Nexo cordless nutrunner from Bosch Rexroth:

<http://bit.ly/1GuvKBE>

Details about the Bosch ConnectedWorld Conference in Berlin from February 17-18, 2015

<http://bit.ly/1zkBMTv>

Press photo:

1-RB-20818 (infographic on connected tools)

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Bosch Software Innovations GmbH, the Bosch Group's software and systems house, designs, develops, and operates innovative software and system solutions that help our customers around the world both in the Internet of Things (IoT) and in the traditional enterprise environment. We place particular focus on the topics of mobility, energy, manufacturing, and building. Our IoT platform – the Bosch IoT Suite – allows the interaction of devices, users, companies and partners on a centralized platform. This enables the development of innovative and future-oriented solutions for new business models.

With some 550 associates worldwide, Bosch Software Innovations has locations in Germany (Berlin, Immenstaad, and Stuttgart), Singapore, China (Shanghai), and the United States (Chicago and Palo Alto).

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International industry conference
Bosch ConnectedWorld 2015 in Berlin

February 17, 2015
PI 8799 RB Res/SL

Bosch CEO Denner warns: “The connected world is not some distant dream. It’s already here.”

Internet of things and Industry 4.0 offer huge opportunities

- ▶ Proper understanding of connected solutions is decisive for success
- ▶ Solutions have to focus on users
- ▶ Partnerships and open standards are also required
- ▶ Support for start-ups and innovative business models needed
- ▶ Single European digital market an urgent priority

Berlin – “Connectivity is an all-encompassing trend, one that will affect all walks of life. Especially for a strong economy like Germany, this connectivity offers major business opportunities,” said Dr. Volkmar Denner, the Bosch CEO, at Bosch ConnectedWorld 2015, an international conference in Berlin.

At the two-day industry conference, Bosch and companies including Cisco, Volkswagen, Trumpf, GE, and Daimler are presenting a range of new solutions in areas such as connected industry and connected mobility. Roughly 800 experts are meeting to discuss business models and technical solutions, and to exchange experience. Industry 4.0 (connected industry) in particular offers Germany a historic opportunity to improve its competitiveness as an industrial location. “However, this opportunity will pass us by if German companies are too slow to take action. Germany has to quickly meet the requirements for connected industry; otherwise, the country will be squandering the competitive advantage its strengths currently give it over other regions,” Denner said.

Success depends on systemic understanding

Around the world, engineers are developing solutions for the internet of things. “At present developments are very much driven by technology. But in an area like this, technological know-how and excellent work alone are not enough. We have found that the right systemic understanding is decisive for the internet of things,” Denner said. When developing connected solutions, therefore, Bosch takes three levels into consideration: the first is connected things, which use sensors to collect data and in this way help create a virtual image of the real

world. The second is secure software platforms that connect these things with the internet and with each other, that analyze data, and that make new services possible. The third is the applications and services that are developed on the software platforms and create value-added for customers.

Users in focus

In Denner's view, customer focus and customer benefit are critical for successful solutions on the internet of things: "Any connected solution has to focus constantly on users and their problems, and less on products or technologies." For this reason, he said, a company's first thought when developing new solutions should always be its customers and their wishes. "We have to offer our customers solutions and functions that make their lives safer, more secure, and more convenient." In Denner's view, a consistent user focus is crucial if connectivity is to succeed. Moreover, he added, alliances involving different companies are an important driver of connected solutions. Joint projects and "eco-systems" need uniform standards and open platforms as a basis, Denner said, since only then can fully compatible solutions deliver the greatest benefit for customers and consumers. In Denner's opinion, it is precisely this cooperation among companies, even those in different industries, that forms one of Germany's major strengths. "For example, we have to build broad clusters for Industry 4.0 in order to pool expertise, knowledge, and resources," Denner said.

Collaboration with start-ups and establishment of a venture capital scene

The Bosch CEO is concerned that established industries are increasingly being challenged by new providers with clever business ideas. It was for this reason that Bosch set up the IoT Lab with the University of St. Gallen in 2012. On a scientifically sound basis, this joint "think-tank" explores and tries out new business models for the internet of things. "German industry is still technologically innovative. But to hold its own on the internet of things, it also has to create new, innovative business models," Denner said. One thing that might help here would be if traditional industrial companies were to collaborate more closely with internet start-ups. For their part, internet start-ups need more financial support as they scale their business ideas up to the relevant market size. "Europe has waited long enough for a functioning venture capital industry rich in financial resources," Denner said. If they cannot be assured investment, German or European start-ups will never be as big or successful as their U.S. counterparts.

Single digital market and responsible use of data

Denner sees a further crucial disadvantage for European companies in the extremely fragmented European market, which is the result of differences in data and consumer protection regulations. "We need a single digital market in Europe.

This will allow us to launch connected solutions just as successfully in our home market as U.S. or Chinese companies can in theirs,” Denner said. In this connection, he called for rapid introduction of the EU’s General Data Protection Regulation. Denner, who is also responsible for research and advance engineering on the Bosch board of management, underscored how important data protection is to society’s widespread acceptance of connected solutions. “The internet of things can become a reality only if people put their trust and confidence in it.” That’s why Bosch is committed to making the handling of customer data extremely transparent. Denner continued: “We are completely open about how we use our customers’ data. We will tell our customers what data we want to use for what purpose, and we will ask them for their express permission.”

Bosch saw the internet of things coming years ago

The Bosch Group’s strategic objective is to create solutions for a connected world. For many years, the company has been preparing systematically for the connected world, not least by expanding its own software competence. Bosch Software Innovations GmbH is the Bosch Group’s software and systems unit. In the form of its Bosch IoT Suite, it provides all Bosch divisions, as well as external customers, with a versatile software platform for the internet of things. Moreover, Bosch is the leading supplier of MEMS sensors (microelectromechanical systems), which are a key technology for the internet of things. On its path to the connected world, Bosch is linking its expertise in the “world of things” and the “world of software.” In doing so, the supplier of technology and services is relying on both products and new business models, such as connected fleet management or proactive maintenance of manufacturing facilities.

Bosch ConnectedWorld – where industries meet to discuss tomorrow's world

The Bosch ConnectedWorld event is an annual conference on the subject of the internet of things. This year, some 800 international experts are meeting in Berlin to talk about current areas of application and new business models. In addition to the Bosch CEO Dr. Volkmar Denner, the conference speakers include Ulrich Grillo, president of the Federation of German Industries, and Dr. Richard Mark Soley, CEO of the Industrial Internet Consortium.

Internet:

Details about the Bosch ConnectedWorld Conference, February 17-18, 2015

<http://bit.ly/1zkBMTv>

Bosch Software Innovations blog – What established companies can learn from start-ups

<http://bit.ly/1JWRdTC>

Press photos: 1-RB-20866; 1-RB-20867;

1-RB-20863: Infographic: drivers of Industry 4.0

1-RB-20864: Infographic: timeline of Industry 4.0

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The internet of things

Bosch acquires middleware specialist ProSyst Software for smart homes, mobility, and connected industry

February 16, 2015

PI 8820 RB Res/af

- ▶ ProSyst employs around 110 associates in Cologne, Germany, and Sofia, Bulgaria
- ▶ Software enabling device connectivity over internet of things
- ▶ Established Java and OSGi specialist for gateway software and middleware

Berlin, Stuttgart – Bosch Software Innovations GmbH, a wholly-owned subsidiary of the Bosch Group, intends to acquire the company ProSyst. Agreements to this effect were signed on February 13, 2015. ProSyst employs some 110 associates in Cologne, Germany, and Sofia, Bulgaria. The company specializes in the development of gateway software and middleware for the internet of things. These facilitate the interaction between connected devices in the smart home, connected industry, and mobility segments. The company's customers include leading appliance manufacturers, automakers, and chip vendors, as well as telecommunications and energy service providers. The acquisition is subject to approval by the antitrust authorities. It has been agreed that the purchase price will not be disclosed.

Device management for the internet of things

ProSyst's solutions are built on the Java programming language and OSGi technology. "On this basis, the company has been developing successful gateway software and middleware that serves as a link between devices and the cloud for more than ten years. This link is essential for interconnecting buildings, vehicles, and machines," said Rainer Kallenbach, the president of Bosch Software Innovations. "In Bosch, we have a strategic partner with a strong global sales network. This alliance means that we can play a bigger role in the growing market for the internet of things and decisively expand our global position," said Daniel Schellhoss, the founder and managing director of ProSyst. Applications for Java and OSGi include the smart home and industrial manufacturing segments. Software that is written in Java and combined with OSGi technology

can be automatically installed, updated, and uninstalled remotely without the need to reboot the device each time. This remote access is frequently realized via gateway software, which also ensures that devices can be intelligently controlled. For example, the software can receive and assess information on electricity prices or weather forecasts, and then pass it on to the central heating system to increase its operating efficiency.

Uniform networking for central heating systems, household appliances, and security cameras

The ProSyst software also assumes a kind of “translator” role. If things such as central heating systems, household appliances, and security cameras are to be interlinked in a smart home, they must all “speak the same language.” This is especially difficult when the products are from different manufacturers, use different communication protocols, or are not web-enabled.

“In combination with the Bosch IoT Suite from Bosch Software Innovations and the Bosch Group’s expertise as a leading producer of sensors and appliances, the ProSyst software will enable our customers to launch new applications on the internet of things more quickly and be one of the first to tap into new areas of business,” Kallenbach said. “The ProSyst software is highly compatible with the Bosch IoT Suite, our platform for the internet of things. Above all, it complements our device management component by supporting a large number of different device protocols. This will allow us to achieve an even better market position than before.”

The Bosch Software Innovations subsidiary is a provider of one-stop solutions in the area of the internet of things. Service activities round out the company’s offerings. Its core product is the Bosch IoT Suite. Bosch Software Innovations employs around 550 associates around the globe at locations in Germany (Berlin, Immenstaad, Stuttgart), Singapore, China (Shanghai), and the U.S. (Chicago and Palo Alto).

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BOSCH

Press release

Open software platform for the smart home **ABB, Bosch, and Cisco to Establish Joint Venture** Partner ecosystem planned with appliance manufacturers

December 1, 2014

PI 8762 RB Ho/SL

- ▶ New software platform allows simple exchange of data between different types of devices enabling a new range of services
- ▶ Partner alliance to be open to all appliance manufacturers and service providers

Mannheim/Stuttgart/Munich – ABB, Bosch, and Cisco plan to establish an international joint venture that will develop and operate an open software platform for smart home devices and applications. A shareholder agreement to this effect was signed on November 27, 2014. The joint venture is to be domiciled in Germany. The plan is subject to approval by the antitrust authorities. The companies involved expect that the joint venture will be able to commence operations at the beginning of 2015.

For a home to be “smart,” it is crucial that all the appliances and systems in the home – e.g., washing machine, heating units, lamps or window blinds – can simply and securely exchange data with each other as well as with smartphones and tablets. The aim of the joint venture is to develop and operate an open software platform that will enable this simple exchange of data between different manufacturers’ devices. In the future, therefore, users will not have to worry about technological compatibility when operating their electric and electronic devices at home. The new platform will also make it possible to provide a range of services related to household devices, in areas such as energy management, security technology, and entertainment. This will help enable new business models: Software developers, for example, will be able to create a wide variety of apps for these areas of use.

In addition to developing and operating a software platform, the companies intend to invite appliance electronics manufacturers, home automation vendors, and service providers to join a business ecosystem. The business ecosystem will aim to facilitate collaboration and incorporate a wide range of user requirements when developing the software platform.

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About Bosch

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About ABB

In 2013, ABB Germany generated sales of EUR 3.37 billion with approximately 10,000 employees. ABB is a leader in power and automation technologies that enable utility, industry, and transport and infrastructure customers to improve performance while lowering environmental impact. The ABB Group of companies operates in around 100 countries and employs about 145,000 people.

About Cisco

Cisco (NASDAQ: CSCO) is the worldwide leader in IT that helps companies seize the opportunities of tomorrow by proving that amazing things can happen when you connect the previously unconnected. For ongoing news, please go to <http://thenetwork.cisco.com>.

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MOTION AND MOBILITY



BOSCH

aufgrund eines Beschlusses
des Deutschen Bundestages



Press release

December 16, 2014

PI 8631 Zi/Na

Bosch heads up research project **IT solutions to stabilize connected logistics systems** Using real time data from production and logistics to aid decision making

- ▶ ProvelT project receives funding from German Federal Ministry for Economic Affairs and Energy
- ▶ Focus on developing a software platform for informed manual interventions in connected logistics systems
- ▶ Aim: cost-effective and reliable supply chains

Stuttgart – Industry and commerce now depend more than ever on reliable logistics. In practice, however, supply chains face numerous challenges from disruptions such as traffic jams, technical issues, missing goods, and any number of other unforeseeable circumstances. This then calls for manual correction. In the ProvelT project (production plan based recovery of vehicle routing plans within integrated transport networks), researchers are now developing an IT platform that will give dispatchers the tools they need to make objectively assessed and dependable interventions in connected logistics systems. The aim is to build up reliable, cost-effective supply chains that are not disrupted due to misguided reactions and interventions. Following approval by the German parliament, the research project is receiving funding of 2.8 million euros from the German Federal Ministry for Economic Affairs and Energy. Robert Bosch GmbH is acting as the lead partner.

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Logistics chains and the butterfly effect

The logistics sector still lacks this sort of decision aid. As supply chains become more and more complex, covering large areas and running according to tight schedules, any disruption – as well as any reaction to a disruption – has a knock-on effect on the entire logistics network. Without access to a reliable set of data and a high-performance IT platform, it is extremely difficult for logistics employees to assess what corrective action makes sense in any given situation. The ProvelT platform will supply dispatchers with the information they need to respond correctly to disruptions. It is also designed to restore disrupted transport networks to their normal operational state quickly. Reliable logistics networks are also a core component of connected industry (industry 4.0).

Incorporating production data

The project team is drawing on a range of familiar technologies, including vehicle tracking using GPS and software for transport planning. What's new is that production information is also incorporated into the decision making process. How urgently does the auto plant, say, need the materials it ordered? Is it a case of topping up supplies, or will production break down if the materials are not delivered promptly? Big data relating to unit sales of products and the traffic situation can also be incorporated into the platform, which will pool all this information and provide users – both companies and logistics service providers – with a range of services for planning and managing logistical processes. For instance, if actual data begin to depart from target data, the platform will warn users and display appropriate responses. The responses offered will take into account the implications for the whole transport network, considering actions holistically rather than in isolation. To enable the platform to factor in real-time data such as vehicle position or delivery status, the project partners are also developing an application that truck drivers can use on their mobile devices.

Bringing together partners from industry, IT development, and research

Together, the members of the project consortium possess all the expertise needed to develop and run the ProvelT platform. Robert Bosch GmbH is heading the project and, like ZF Friedrichshafen AG, is an industrial user of the platform. The logistics service provider Geis has assumed responsibility for the planning of transport operations and operational implementation. The IT providers LOCOM and PTV are developing system solutions for transport planning and management, while the Research Center for Information Technology (FZI) at the Karlsruhe Institute of Technology (KIT) is overseeing the components used to manage irregularities and disruptions. Responsibility for the global concept and scientific approach lies with the Institute for Materials Handling and Logistics (IFL)

at the KIT. In the first phase of the project, the consortium will build up a common system architecture, which will then be tested and refined in pilot operation.

More efficient logistics

ProveIT won't just benefit industry and its suppliers; commerce and transport companies stand to gain as well. The project provides improved tactical support by stabilizing logistics systems in the event of disruption and bringing them back on schedule. This makes supply chains more cost-effective – the project partners anticipate that ProveIT will be able to reduce total mileage by 5 percent for a given transport volume, with all the savings that brings in terms of energy, costs, and CO₂ emissions. The project is due to run until fall 2016.

Press photo: 1-CR-20360-e

Project partners:

[Robert Bosch GmbH](#)

[ZF Friedrichshafen AG](#)

[Geis Transport und Logistik GmbH](#)

[LOCOM Software GmbH](#)

[PTV Planung Transport Verkehr AG](#)

[Research Center for Information Technology \(FZI\) at the Karlsruhe Institute of Technology \(KIT\)](#)

[Institute for Material Handling and Logistics \(IFL\) at the Karlsruhe Institute of Technology \(KIT\)](#)

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The Bosch Group is a leading global supplier of technology and services. In 2013, its roughly 281,000 associates generated sales of 46.1 billion euros. (NB: Due to a change in accounting policies, the 2013 figures can only be compared to a limited extent with the 2012 figures). 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 360 subsidiaries and regional companies in some 50 countries. If its sales and service partners are included, then Bosch is represented in roughly 150 countries. This worldwide development, manufacturing, and sales network is the foundation for further growth. In 2013, the Bosch Group invested some 4.5 billion euros in research and development and applied for some 5,000 patents. This is an average of 20 patents per day. The Bosch Group's products and services are designed to fascinate, and to improve the quality of life by providing solutions which are both innovative and beneficial. In this way, the company offers technology worldwide 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. 92 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.

Additional information is available online at www.bosch.com, www.bosch-press.com and <http://twitter.com/BoschPresse>