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## DLT restores trust in the internet **Bosch enables the “things” on the IoT to talk to each other**

May 15, 2019

PI 10919 RB khb/Bär

- ▶ Connectivity for mobility, industry, and life
- ▶ Ecosystems and open platforms create an economy of things
- ▶ First Digital Trust Forum with international experts
- ▶ Bosch CEO Denner: “We need secure, open platforms and an internet in which users have the power to decide for themselves.”

**Press embargoed  
until  
May 15, 2019**

Stuttgart and Berlin, Germany – Bosch has reached the next milestone on the road to becoming a leading global IoT supplier. The company’s first step was to give cars, machines, buildings, and other everyday objects connectivity – millions of times over. Bosch sold 52 million web-enabled products in 2018 alone, over a third more than in the previous year. Using its open-source-based Bosch IoT Suite, the company has already connected more than 10 million devices from various manufacturers. Bosch is now working with partners to enable these things to communicate and interact in secure ecosystems. The leading supplier of technology and services is offering a glimpse into the future of connected mobility, industry, and life at Bosch ConnectedWorld 2019 (BCW19) in Berlin, an industry gathering featuring the tagline “From the internet of things to the economy of things.” Distributed ledger technologies (DLT) such as blockchain may well become the key technology in these domains. “By merging the physical and digital realms, we are making people’s everyday lives easier,” said Bosch CEO Dr. Volkmar Denner at BCW19, where he addressed some 5,000 technology buffs from the political, business, scientific, and public arenas. “In the future, things will not just be connected in order to communicate, they will do business together.”

### **DLT as key technology for the economy of things**

Bosch is taking a strategic interest in these technologies, as they will usher in the “economy of things,” which will enable things to communicate independently with other connected things, and even enter into smart contracts on their own. In the

mobility domain, for example, this could help expedite routine procedures. Services of all kinds could result, such as automatically billing vehicle owners for the use of toll roads, parking spaces, and charging stations.

### **A car that negotiates with charging stations**

Bosch is working with the energy supplier EnBW on a prototype that uses blockchain technology to improve the e-car recharging process. The idea is to streamline and tailor the entire process to customers' needs, so they can select, reserve, and pay for recharging services as they see fit. For example, the operator could combine the software developed by Bosch for cars with a smart charging-station manager to offer customers transparent pricing models, with the options varying in real time according to the availability of charging stations and green electricity sourced from renewables. The entire transaction – reservation and payment – is a fully automated blockchain operation. This service can factor other customer preferences into the equation. For example, a customer who has small children and likes coffee could opt for a charging station with a playground and cafés nearby. Initial trials with this new system are underway.

### **A car that pays its own parking fees**

Bosch and Siemens are jointly developing a second application, a smart parking-management system based on blockchain. In the future, DLT will make parking considerably less of a chore. Cars will communicate directly with parking facilities in their vicinity and negotiate the best terms. As soon as the car reaches the entrance to the chosen parking garage, it will identify itself at the entry barrier, which will then be raised without the driver having to remove a ticket from the dispenser. The driver will also be able to leave the parking garage without further ado, since the vehicle will have already communicated with the exit barrier and settled the parking fee in a virtual transaction. Drivers will no longer have to keep small change at the ready or worry about losing their parking ticket. The two companies have installed a prototype at Bosch's Renningen research campus and at the Siemens campus in Munich.

### **Distributed structures to restore trust in the internet**

Distributed structures across the internet are at the core of DLT. Rather than a few platform providers storing data in their data centers, it is spread across numerous servers. "To build trust in digital ecosystems, we need open platforms and an internet in which users have the power to decide for themselves," Denner said. This will bring real benefits to people. If users are "captive," a web platform provider can change its terms of use at will. By gaining independence from the big internet players, users no longer have to blindly accept such changes. "We are building trust in internet platforms with these distributed structures. They enable many players to participate," said Bosch board of management member and

CDO/CTO Dr. Michael Bolle. Distributed platforms operated by an ecosystem encompassing numerous equal partners are also better protected against external attacks.

### **Leading the IoT with three T's – things, technology, trust**

At Bosch's initiative, representatives from leading international associations and organizations including the Institute of Electrical and Electronics Engineers (IEEE), Digital Europe, ETSI, the Eclipse Foundation, Trustable Technology, Plattform Industrie 4.0, the Industrial Internet Consortium (IIC), and the Trusted IoT Alliance will be meeting at the first Digital Trust Forum in Berlin on May 16, 2019. The main focus of the gathering is the question of how to build and safeguard trust in digital systems. By 2020, global IoT market volume is expected to rise to 250 billion U.S. dollars, an annual increase of 35 percent. "We cannot accept a situation in which the overwhelming reaction to digital innovations is mistrust and fear. For this reason, the aim of the Digital Trust Forum is to initiate open dialogue among experts to discuss the trust-related issues raised by the internet," Bolle said.

### **5,000 attendees, 80 exhibitors, 150 speakers**

At this year's Bosch ConnectedWorld, more than 80 exhibitors are demonstrating how rapid advances on the internet of things are creating new opportunities at work and in everyday life. Some 5,000 people are expected to convene at STATION Berlin, a venue with 14,000 square meters of floor space, on May 15 and 16. The lineup of more than 150 speakers includes Bosch CEO Volkmar Denner, Munich Re CEO Dr. Joachim Wenning, Vattenfall CEO Magnus Hall, and HTML inventor and world wide web founder Sir Timothy Berners-Lee. Some 700 programmers, startup associates, and designers will take part in a hackathon to come up with new ideas for connected solutions for everyday life, mobility, manufacturing, and logistics. 2019 is the sixth time Bosch ConnectedWorld has taken place. It is one of the world's largest international conferences devoted to the internet of things.

Press materials: Text, images, videos, and other press materials will be available starting 9:30 CEST on May 15, 2019, at [www.bosch-press.com](http://www.bosch-press.com)

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*The Bosch Group is a leading global supplier of technology and services. It employs roughly 410,000 associates worldwide (as of December 31, 2018). The company generated sales of 78.5 billion euros in 2018. Its operations are divided into four business sectors: Mobility Solutions, Industrial Technology, Consumer Goods, and Energy and Building Technology. As a leading IoT company, Bosch offers innovative solutions for smart homes, smart cities, connected mobility, and connected manufacturing. It uses its expertise in sensor technology, software, and services, as well as its own IoT cloud, to offer its customers connected, cross-domain solutions from a single source. 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 Bosch Group comprises Robert Bosch GmbH and its roughly 460 subsidiary and regional companies in over 60 countries. Including sales and service partners, Bosch's global manufacturing, engineering, and sales network covers nearly every country in the world. The basis for the company's future growth is its innovative strength. At nearly 130 locations across the globe, Bosch employs some 68,700 associates in research and development.*

*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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## Open Innovation: Bosch honors best start-up collaboration

### Open Bosch Award for Code Intelligence and Hesai Photonics Technology

May 16, 2019

PI 10933 RB MK/Bär

- ▶ Open Bosch Award values the importance of open innovation
- ▶ Bosch CDO and CTO Dr. Michael Bolle: "Collaboration increases the likelihood of success"
- ▶ Several hundred partnerships between start-ups and Bosch in 2019

Berlin, Germany – The Bosch Group recognizes [Code Intelligence GmbH \(Code Intelligence\)](#) and [Hesai Photonics Technology Co., Ltd. \(Hesai\)](#) with the "Open Bosch Award" for best start-up collaboration. This marks the first time the supplier of technology and services honors outstanding performance in open innovation between Bosch and start-ups. Code Intelligence, a start-up based in Bonn, Germany, provides automated security-testing solutions for software. Hesai is a Shanghai-based start-up that designs and manufactures sensor technology that allows automated vehicles to see their surroundings in 3D with high resolution. "Partnerships are vital in a connected world," emphasizes Dr. Michael Bolle, chief digital and technology officer at Bosch. "With the Open Bosch Award, we honor the best start-up collaboration worldwide."

Studies show that open innovation approaches boost efficiency in innovation processes by 60 to 90 percent. That is why partnerships are the key success factor in the ongoing digital transformation as the recent BCG study "The most Innovative Companies 2018" underlines. Currently, Bosch is running several hundred start-up collaborations across all business areas, the majority of these focusing on the mobility sector.

For the Open Bosch Award, the main criteria are mutual benefit for all parties involved, best practice character in terms of set-up, approach and commitment, as well as outcome in means of measurable impact. The awards ceremony took place at the Bosch Connected World in Berlin.

### **Partnerships increase likelihood of success**

The ability to rapidly and continuously innovate is a core competency of Bosch. In a technology-fueled world with accelerating innovation cycles, Bosch is fusing ideas and competencies beyond company borders to best serve its customers. Start-ups play an important role as they are also often first-movers, taking high risks and being equipped with significant resources. At the same time, leading start-ups can benefit from Bosch assets and competencies, e.g. industrialization, market access or branding.

The combination of a start-up and the industrial power of Bosch results in a benefit for all parties involved: customer, start-up and Bosch. A partnership can create new challenges as well: “Sometimes start-ups pivot and sometimes Bosch innovation projects change their direction. However, we realize that a great collaboration significantly increases the likelihood for success for everyone involved,” says Bolle.

### **Code Intelligence: Preventing cyber attacks**

One of the awardees is Code Intelligence, a German start-up based in Bonn in combination with a team from Bosch Corporate Research. Code Intelligence demonstrated its expertise by developing a scalable approach to automate security tests for connected products based on coverage-based fuzzing. The close collaboration enabled the team to produce tangible results within a very short time frame of only two months.

“Such software security testing approaches have uncovered vulnerabilities in open source projects. The connectivity based products of the future need such measures and Bosch’s embracement of them is an example of how we proactively ensure security in our products,” explains Rakshith Amarnath, project leader at Bosch Corporate Research. Dr. Henning Perl, CTO of Code Intelligence, points out the benefits. “Through the cooperation we gained valuable insights on industrial requirements and received a unique entry point into the automotive and the connected industry divisions of Bosch.” The team continues to cooperate on automating software-security tests.

### **Hesai Photonics Technology: Realizing Automated Driving**

Another awardee is Hesai together with a team from Bosch in the field of automated driving. In 2017, Hesai successfully participated in the [Bosch AI in Auto accelerator in China](#), which helped to deepen the relationship and align interests. From the very beginning, both parties shared a common vision. “We constantly scan the market for solutions that serve best our efforts of making automated driving a reality. In this case, we now also use Hesai’s technology in our development vehicles to approach this challenge”, states Jumana Al-Sibai, Executive Vice President at Bosch Chassis Systems Control. “We are very

fortunate to have the privilege of working with the world's largest automotive supplier at an early stage and we have benefited tremendously from Bosch's valuable insights", adds David Li, the CEO and co-founder of Hesai.

### **About the award**

The Open Bosch Award values the importance of open innovation through close collaboration between start-ups and Bosch. The award is organized by [Robert Bosch Venture Capital GmbH \(RBVC\)](#). RBVC invests in start-ups and also connects them to the Bosch group. To support early engagement RBVC established a venture client unit called "Open Bosch" that systematically enables partnerships.

**Press photo:** #1451449

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About the Bosch Group:

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About Robert Bosch Venture Capital GmbH:

*Robert Bosch Venture Capital GmbH (RBVC) is the corporate venture capital company of the Bosch Group, a leading global supplier of technology and services. RBVC invests worldwide in innovative start-up companies at all stages of their development. Its investment activities focus on technology companies working in areas of business of current and future relevance for*



*Bosch, above all, automation and electrification, energy efficiency, enabling technologies, and healthcare systems. RBVC also invests in services and business models that are relevant to the above-mentioned areas of business.*

*Further information is available at [www.rbvc.com](http://www.rbvc.com)*

**About Code Intelligence GmbH:**

*Code Intelligence is a developer of an application security testing technology intended for automated vulnerability detection of software. The company's state-of-the-art technology automatically automates a large number of software attacks by pseudorandomly changing inputs under real operating conditions, enabling companies to strengthen the security and reliability of their software.*

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**About Hesai Photonics Technology Co., Ltd.:**

*Hesai specializes in designing and manufacturing laser sensors for different industries, including LiDARs (3D scanners for self-driving vehicles and robots) and natural gas leak sensors for the energy industry. Hesai was founded in 2013 in Silicon Valley and is now headquartered in Shanghai, with 500+ employees and 2 manufacturing centers.*

*Hesai builds both mechanical and solid-state LiDARs and has served pioneering autonomous driving companies worldwide. The company's latest solid-state LiDAR, with its extended range, enhanced resolution, and proprietary interference rejection technology, offers market-leading performance for autonomous driving applications.*

*Further information is available at [www.hesaitech.com](http://www.hesaitech.com)*



## The internet of 10 million things

### Bosch IoT Suite reaches landmark number of connected devices – and still rising

May 15, 2019

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- ▶ **Advocated:** Customers including HOLMER, MANN+HUMMEL and SMIGHT have opted for the secure and open technology on which to base their IoT applications
- ▶ **Accoladed:** Analysts and users all agree on the positive advantages of the Bosch IoT Suite
- ▶ **Augmented :** In the IoT domain, Bosch adheres to a hybrid-cloud and open-source strategy

From 0 to 10,000,000 in roughly 10 years: What better way to express a landmark achievement by an IoT company than in ones and zeros? In this case it is the number of devices that Bosch Software Innovations and its customers have connected to the Bosch IoT Suite to date, in more than 250 IoT projects around the world. This number went up by around 20 percent between 2018 and 2019 alone.

The open and flexible software platform provides the technological basis for applications in the Internet of Things. The more than ten million connected “things” include gateways in buildings, connected vehicles, and sensors in urban infrastructure or digital agriculture. The Bosch subsidiary’s playing field extends across the following growth areas for digitalization: agriculture, buildings, retail, energy, mobility, and manufacturing. “More than ten million devices is convincing proof that we have come a long way along the road to connecting the physical and virtual world. Bosch will continue this journey together with its customers and partners,” says Stefan Ferber, CEO of Bosch Software Innovations.

#### **Advocated: Market leaders opt for the Bosch IoT Suite**

One of our customers in the agricultural sector is HOLMER Maschinenbau, the world’s leading provider of self-propelled combine sugar-beet harvesters. The company, headquartered near Regensburg in Germany, has developed a remote diagnosis and maintenance package for its machines called EasyHelp 4.0. HOLMER based its solution on Bosch hardware, software, and services. Bosch

IoT Insights, the Bosch IoT Suite's data management service, is a central element of this solution. HOLMER uses it to process machine data and visualize the information on a custom-designed dashboard.

Another customer who has chosen to work with the Bosch IoT Suite is MANN+HUMMEL. This company specializes in filtration technology and develops products and solutions to promote clean air and the sustainable use of water. In Asia, the Bosch IoT Suite helps MANN+HUMMEL to develop applications for monitoring filter systems in the field.

EnBW is an energy provider based in Karlsruhe, Germany. Its SMIGHT initiative was launched to develop solutions for connected urban infrastructures. One of the first products to emerge from this initiative was a multipurpose streetlight with integrated environmental sensors, a charging point for electric vehicles, and a Wi-Fi hotspot. Other SMIGHT projects included developing a system for monitoring the occupation of parking spaces using in-ground sensors, which allows municipalities to assess and optimize their parking facilities. To bring all of these projects together on a single IoT platform, a unique SMIGHT solution was developed based on the Bosch IoT Suite.

The list of customers goes on and on, and includes companies such as Deutsche Telekom, The Yield, Ponsse, Hager, Busch-Jaeger, and Amdocs – as well as numerous group-internal customers including the Bosch Rexroth subsidiary in the U.S. and Bosch Japan.

### **Accoladed: Analysts and users concur on the positive advantages of the Bosch IoT Suite**

Not only users but also analysts rate the platform very highly. PAC, a member of the teknowlogy Group, the leading independent European market research and consulting firm in the IT sector, rated the Bosch IoT Suite as “best in class” for device management. To simulate the widest possible range of IoT scenarios, the Bosch solution supports all common types of device connectivity and communication protocols. In the teknowlogy Group's IoT User Survey 2019, users awarded top marks to the Bosch IoT platform for security and said they were very willing to recommend the software to others.

### **Augmented functionality: Bosch adheres to a hybrid-cloud and open-source strategy**

The services provided by the Bosch IoT Suite are integrated in the cloud environments that most customers prefer for their projects. Apart from the Bosch IoT Cloud, they also include Amazon Web Services (AWS), Microsoft Azure and – in China – the Huawei Cloud. The cloud providers and Bosch work together as

partners to develop scalable IoT business models for their shared customers, with each contributing their respective business and technology skills.

The Bosch IoT Suite is built using open-source software. Bosch is a strategic member of the Eclipse Foundation and participates in numerous open-source projects managed by the Eclipse IoT Working Group. These projects form the technological core around which the Bosch IoT Suite is built. “We firmly believe that open-source communities like the Eclipse IoT Working Group are the key to success in the IoT because a global Internet of Things can only be created on the basis of industry-wide, joint projects,” says Ferber, who represents Bosch on the Eclipse Foundation Board of Directors.

**Press photo:**

#1856471

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*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 8.5 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.*

Additional information is available at [www.bosch-iot-suite.com](http://www.bosch-iot-suite.com), [www.bosch-si.de](http://www.bosch-si.de), [www.twitter.com/BoschSI](https://www.twitter.com/BoschSI), and [www.blog.bosch-si.com](http://www.blog.bosch-si.com).

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## **Bits and bytes in Berlin: how Bosch is connecting cars, kitchens, and factories**

### Highlights at the Bosch ConnectedWorld 2019

May 2019

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- ▶ Connected mobility: more enjoyment, safety, and efficiency for car drivers.
- ▶ Connected household appliances: less stress and more services around the home.
- ▶ Connected manufacturing: greater flexibility and transparency in logistics.
- ▶ Connected agriculture: larger, better-quality yields in the fields.

Berlin/Stuttgart – The internet of things (IoT) is changing mobility fundamentally, making kitchens smart, and factories more productive. Bosch is showcasing these and other solutions from May 15 to 16 at Bosch ConnectedWorld 2019 in Berlin, where the IoT sector meets to discuss tomorrow's world. Innovative products and services are making everyday life not only more convenient, but also safer and more efficient – at home, at work, and on the move.

### **Move #LikeABosch: products and solutions for connected mobility**

A great recharging experience: The integrated charging and navigation solution Convenience Charging from Bosch offers drivers of electric vehicles precise range forecasts, route planning that factors in any recharging stops needed, and easy charging and payment. With new ge positioning services, Bosch helps drivers make the most of the time spent recharging, actually making the stop something to look forward to. For instance, drivers can use the reservation platform integrated in the route planning software to book within seconds a table at a restaurant near the charging station. A unique feature, the system can suggest suitable eateries, bars, or cafés at new destinations based on the driver's previously saved preferences. In addition, Bosch's Convenience Charging also includes mobile charging services. This allows drivers to recharge their electric vehicle even if there is no charging facility nearby. To this end, Bosch has teamed up with third-party providers such as the Berlin startup

Chargery. The full-service provider [Chargery](#) offers a mobile charging service that uses cargo bikes to take the power directly to where the car is.

Software updates from the data cloud: Cars stay on the road for 15 years or more. To ensure vehicle software is kept up to date, more and more carmakers are implementing cloud-based software updates. As a result, the software of critical control units can be updated as easily as on a smartphone – without any time-consuming visits to a dealership. Bosch has developed all the features required for these wireless solutions in-house. They range from the control units and in-car communication infrastructure to modern encryption technologies and the Bosch IoT cloud. More than five million cars are already updated over the air with Bosch IoT suite software.

Connectivity control unit for V2X communication: For direct [vehicle-to-everything \(V2X\) communication](#), Bosch has developed a smart connectivity unit capable of communicating using all transmission technologies based on Wi-Fi or mobile network-based communications. Equipped vehicles are able to communicate with one another as well as with their surroundings regardless of the vehicle make or the country in which they are used. Bosch is cooperating with the Portuguese startup Veniam to handle the complex task of managing the data connections. The software constantly searches for the best transmission technology for each requirement and switches automatically between the available options. It therefore maintains continuous and seamless vehicle connectivity, ensuring cars can reliably alert one another to accidents, the approaching tail end of a traffic jam, and icy conditions.

Holistic automotive security: Vulnerabilities in the IT security of connected and automated vehicles are by no means just limited to the vehicle itself. Attackers could potentially gain access to vehicle data or cryptographic keys during production. Or cyberattacks could use connected vehicles to target backend systems. Holistic automotive security must therefore combine manufacturing IT security, embedded IT security, and enterprise IT security. The provider of automotive security systems [ESCRYPT](#), a wholly owned Bosch subsidiary, develops integrated security solutions across the entire automotive value chain – from car manufacturing to connected vehicles, and right through to connected backend systems and mobility services.

Rapid assistance with Vivatar drive: [Vivatar](#) is the digital guardian angel for people on the go. Whether on foot or in the car, it makes sure that help arrives quickly when called. To this end, Bosch has combined the Vivatar app with the new Vivatar Telematics plug. The retrofit eCall adapter simply plugs into the car's cigarette lighter and connects with a smartphone app. Vivatar drive detects car accidents and in an emergency automatically calls for help using the Bosch emergency assistant – whether the car is driving along a remote road out in the country or through western Europe. Vivatar drive can thus also be retrofitted in car models that are not factory-equipped with an eCall emergency assistance system.

Augmented reality with Microsoft HoloLens 2: Bosch uses [augmented reality \(AR\)](#) to train mechanics to handle complex repair jobs on vehicles, for example. Available AR training include a training for high-voltage vehicle system. One example is a training program for high-voltage vehicle systems. The visualization provided by AR gives participants detailed insights into the structure and functionality of the components. In partnership with Microsoft, Bosch is one of the first companies worldwide able to use the AR solutions it has developed in-house on the new HoloLens 2. The headset's much bigger field of view gives repair shop workers access to more information at a glance and allows them to look at larger objects up close.

Flexible air pollutant monitoring system: At present, air quality is frequently measured only at certain points using very large and expensive stationary equipment, and the results of a single monitoring station are often taken as representative for the overall air quality in a city. In order to gain a better understanding of the relationship between the various sources of emissions and the environment, Bosch has developed a new air pollutant monitoring system. The compact units can be deployed flexibly throughout the city, for example at street light poles or bus stops. They measure particulate matter and nitrogen dioxide as well as temperature, pressure, and humidity in real time. Bosch uses this data to compile air quality maps and advise cities in Germany and other countries on traffic planning and management. At a traffic hub in Stuttgart with the highest air pollution in Germany, the company has demonstrated how pollutant emissions from the existing level of traffic can be reduced by up to 20 percent by maintaining traffic flow.



## **Live #LikeABosch: products and solutions for better living**

BSH Household appliances with Home Connect: From washing machines to ovens right through to coffee machines or vacuum cleaners – with the [Home Connect](#) app, users have any-time access to relevant information and can not only switch the appliances on and off, but also select programs, adjust timers, set them to energy-saving mode, and much more. Home Connect's extensive functionalities make housework easier, safer, and more efficient. Users can also benefit from a continuously growing ecosystem thanks to the large number of connected partner services. Fitbit, as exclusive wearables partner, has also joined the ecosystem. With the Home Connect app for Fitbit, the Versa and Ionic smartwatches can be used to monitor all Home Connect-compatible appliances. What's more, connected coffee machines, for example, can be switched on or the oven preheated with a tap on the wrist.

Boost for startups: The [BSH Startup Kitchen](#) is BSH Hausgeräte GmbH's venture client unit. An interdisciplinary team specifically seeks out startups offering original and innovative hardware and software for the household appliances market or BSH's production and administration. Once they are included in the program, startups have the opportunity to test and validate their product or service before it is even market-ready and in direct cooperation with BSH. If the pilot run is successful, the partners can engage in a long-term business venture.

## **Manufacture #LikeABosch: products and solutions for all aspects of connected manufacturing**

Intralogistics in motion: Autonomous transport systems bring flexibility and transparency to intralogistics. Bosch Rexroth's new [ActiveShuttle](#) moves loads weighing up to 260 kg quickly and safely through production facilities. An integrated hub platform enables fully automated loading and unloading of dollies equipped with small load carriers. As a result, ActiveShuttle can facilitate many kinds of transport concepts, ranging from cyclical deliveries to consumption-based material supply. Even when other transport vehicles are in play and people are present, the vehicle merges effortlessly into the intralogistics environment.

Visual inspection using artificial intelligence: Artificial intelligence holds huge potential to improve manufacturing quality and productivity. [ViPAS](#) from Bosch is an AI-based system for visual quality control. Equipped with a gripper arm, cutting-edge camera technology, and intelligent software, ViPAS inspects the most diverse kinds of components ranging from screws to pumps and right through to common-rail injectors. It compares the images recorded with stored

information and classifies the parts either as “OK” or “not OK” (i.e. faulty). Thanks to deep learning, the system can be trained with sample images. As a result, ViPAS can be used for a range of visual inspection tasks.

3D printing for industrial applications: Bosch and BigRep, one of the leading suppliers of large-format 3D printers, are working on establishing [3D printing as industrial production technology](#). Automated additive manufacturing can not only be used to produce prototypes and models quickly and efficiently, the technology is also being readied for deployment in mass manufacturing. To this end, the companies have equipped BigRep printers with IoT solutions from Bosch. IoT devices, software, and intelligent sensors monitor all operating conditions and help to optimize process quality. This data also increases the quality of the printed components. The software is able to detect wear and errors before they cause machine downtime, thus increasing the availability of 3D printers.

Software for a transparent value stream: [Nexeed software](#) harmonizes, analyzes, and visualizes big data volumes in connected manufacturing. It can help to raise productivity by up to 25 percent at individual facilities or reduce stockpiling by as much as 30 percent as internal projects at Bosch have demonstrated. On top of that, Nexeed can increase flexibility within plants: machines can be retooled faster and geared up for customized production – all the way down to batch sizes of one. In intralogistics and extralogistics as well, Nexeed software improves the transparency of materials flows and international supply chains.

Intelligence for autonomous robots: Bosch’s mobile robotics platform is an innovative software solution for developing and operating autonomous mobile robots in industrial applications. Within a short period of time, robots can learn, for example, to get their bearings, detect and navigate around obstacles, or load and unload items such as pallets or boxes. Via the cloud, the operator can also see where a robot is located and what job it is performing and can assign new tasks to it. Based on a modular, generic platform, the approach allows different robots and whole fleets of robots to be individually and quickly equipped with this intelligence and operated. Potential areas of application include robotic cleaners that autonomously clean large facilities such as train stations or airports, logistics robots to transport items within large warehouses, for example, or outdoor machinery for agricultural or construction uses.

Bosch Elevator Cloud monitors elevators: In this solution, sensors record elevator operating data that is subsequently transferred to the cloud and analyzed. The evaluated information helps detect elevator breakdowns and predict future disruptions in operation, thereby increasing elevator availability and easing the job of elevator operators. The aim is to extend these smart services in future to include other systems such as heating or air-conditioning systems.

### **Products and solutions for all aspects of connected agriculture**

Smart weed control: In the fields, weeds compete with crops like corn and wheat for sunlight, water, and nutrients. To combat these undesired plants efficiently, herbicides are generally applied over large surface areas, covering crops and fields in the process. BASF and Bosch have therefore joined forces to further develop [smart spraying technology](#) that uses camera sensors to distinguish between crops and weeds. This will enable crop protection agents to target the weeds — and protect the environment.

Deepfield Connect milk monitoring: The germ count of milk stored in milk tanks critically hinges on the tank's temperature. The [Deepfield Connect tank guard](#) uses an app and warning light mounted on the tank to warn farmers if problems arise. Temperature sensors monitor the milk tank's cooling, cleaning, and agitator systems. These data are then relayed via the Bosch IoT cloud to a smartphone app, which gives farmers a remote, 24/7 overview of all the tank's key functions so that they can respond in time in the event of failures and malfunctions.

### **Bosch ConnectedWorld 2019**

At this year's Bosch ConnectedWorld forum for the IoT industry in Berlin, more than 80 exhibitors will demonstrate how the rapid development of the internet of things is creating new opportunities in the world of work and in private life. On May 15 and 16, around 5,000 participants will gather at the Berlin "Station" venue, which covers 14,000 square meters. The more than 150 speakers will include the Bosch CEO Volkmar Denner as well as Dr. Joachim Wenning (CEO Munich Re), Magnus Hall (CEO Vattenfall), and Sir Timothy Berners-Lee (inventor of HTML and founder of the world wide web). At a hackathon, some 700 programmers, start-up associates, and designers will develop new ideas for connected solutions in everyday life, mobility, and manufacturing and logistics. This year will be the sixth time Bosch ConnectedWorld has taken place. It is one of the world's largest international forums for the internet of things.

**Press photos:** #1713210, #1713206, #1849872, #1714754, #1830614,  
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*The Bosch Group is a leading global supplier of technology and services. It employs roughly 410,000 associates worldwide (as of December 31, 2018). According to preliminary figures, the company generated sales from operations of 77.9 billion euros in 2018. Its operations are divided into four business sectors: Mobility Solutions, Industrial Technology, Consumer Goods, and Energy and Building Technology. As a leading IoT company, Bosch offers innovative solutions for smart homes, smart cities, connected mobility, and connected manufacturing. It uses its expertise in sensor technology, software, and services, as well as its own IoT cloud, to offer its customers connected, cross-domain solutions from a single source. 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 Bosch Group comprises Robert Bosch GmbH and its roughly 440 subsidiary and regional companies in 60 countries. Including sales and service partners, Bosch's global manufacturing, engineering, and sales network covers nearly every country in the world. The basis for the company's future growth is its innovative strength. At 125 locations across the globe, Bosch employs some 69,500 associates in research and development.*

*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.*

*Additional information is available online at [www.bosch.com](http://www.bosch.com), [www.iot.bosch.com](http://www.iot.bosch.com), [www.bosch-press.com](http://www.bosch-press.com), [www.twitter.com/BoschPresse](http://www.twitter.com/BoschPresse).*