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## **Business year 2016: connectivity keeps Bosch on growth course**

### Artificial intelligence rounds off IoT expertise

January 27, 2017

PI 9490 RB ML/KB

- ▶ Sales grow to 73.1 billion euros
- ▶ EBIT reaches some 4.3 billion euros
- ▶ Mobility Solutions business sector grows faster than automotive production
- ▶ Research and development expenditure increases to 6.6 billion euros
- ▶ 300-million-euro investment in center for artificial intelligence
- ▶ Market for intelligent assistants and personalized services is worth billions
- ▶ Bosch CEO Denner: “Bosch in the midst of its most fundamental transformation process ever.”

Stuttgart, Germany – In 2016, Bosch Group once again increased its sales. According to preliminary figures, sales rose last year by a nominal 3.5 percent to some 73.1 billion euros. After adjusting for exchange-rate effects, sales growth was 5.4 percent. Sales results were negatively impacted by exchange-rate effects to the tune of some 1.3 billion euros. “Despite unfavorable conditions, we achieved our growth forecast in 2016,” said Dr. Volkmar Denner, chairman of the board of management of Robert Bosch GmbH. “Bosch is in the midst of its most fundamental transformation process ever. Industries, markets, technologies – Bosch is actively shaping change.” When it comes above all to connectivity over the internet of things (IoT) and the transition to electromobility, Bosch is making upfront investments running into billions of euros. In 2016, the company increased its research and development spending to roughly 6.6 billion euros. As Dr. Stefan Asenkerschbaumer, the CFO and deputy chairman of the board of management, explained: “The result we achieve today will finance tomorrow’s success.” The supplier of technology and services recorded roughly 4.3 billion euros in earnings from operations before interest and taxes (EBIT from operations) in 2016. Bosch wants to be a leading [IoT](#) supplier. The company sees huge growth potential in the business with intelligent digital assistants. “The IoT is getting personal. With the help of artificial intelligence, we are personalizing connectivity,” the Bosch CEO

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said. For this reason, Bosch is investing some 300 million euros in a new center for artificial intelligence, which will round off its IoT expertise.

### **Artificial intelligence: 300 million euros for new center**

The new year saw the new Bosch Center for Artificial Intelligence (BCAI) begin its work. The center's objective is to enhance expertise in the field of artificial intelligence. "With its [sensor technology](#), Bosch has made things capable of feeling. Now Bosch is making them capable of learning and intelligent action," said Denner, who is also responsible for research and advance engineering on the Bosch board of management. "Ten years from now, scarcely any Bosch product will be conceivable without artificial intelligence. It will either possess that intelligence itself, or AI will have played a key role in its development or manufacture," he said. Within just five years, products featuring artificial intelligence are expected to account for 10 percent of Bosch sales. The BCAI will initially employ some 100 experts in India (Bengaluru), the U.S. (Palo Alto), and Germany ([Renningen](#)). By 2021, Bosch will have invested 300 million euros in expanding the center. In the same period, it is planned to grow its workforce several times over.

### **Intelligent digital assistants: a market worth billions**

For Bosch, the personalization of the internet of things is the next level of connectivity. "Bosch will use artificial intelligence to turn things into [intelligent assistants](#). Products will become partners, companions, personal assistants," the Bosch CEO said. The market research organization Tractica forecasts that the number of people using digital assistants will grow by more than 350 percent by 2021. "Digital assistants are the interface to customers. With connected products, Bosch can maintain a direct relationship with customers. The better we know individual users, the more personalized the service we will be able to offer," Denner continued. One of the products Bosch presented at the CES (Consumer Electronics Show) in Las Vegas was the [home robot Kuri](#). When developing the robot, Bosch focused on personalization: that is to say, its ability to interact with people. The company also presented [Mykie](#), an assistant that is tailored to the demands of smart kitchens. For example, Mykie knows what is in the fridge, writes shopping lists automatically, and helps with the cooking. Also at CES, a [concept car](#) gave an inkling of what the "Auto" personal assistant will be like. According to a new [study](#) by Bosch and Prognos, connected vehicles will give people the opportunity to use nearly 100 hours each year in a more efficient and relaxed way.

### **The future of mobility: "Vision Zero"**

Stress-free, accident-free, and emissions-free: that is Bosch's vision for the traffic of the future. "Zero accidents, zero emissions, and zero stress – those are our

targets for the mobility of the future,” the Bosch CEO Denner said.

Technologically, this means [automation](#), [electrification](#), and [connectivity](#). Denner continued: “We will actively shape the change in mobility. Bosch will be a leading supplier of mobility solutions, and also lead in electromobility.” Bosch is conducting intensive research to achieve the [breakthrough in battery technology](#) that will make mass electric driving affordable. At its Feuerbach location in Stuttgart, the company has set up a battery campus, bringing together its development activities relating to battery cells and battery packs. Together with battery researchers, 300 associates are working to make future cell technologies ready for industrial production. Each year, Bosch invests some 400 million euros in electromobility. With its broad portfolio of production-tested components such as electric motors, power electronics, and batteries, Bosch has already won 30 contracts. “Bosch has all the [key components](#) for electric driving. We are active in every market. Our customers are classic automakers and [new market players](#). Even now, Bosch stands for electromobility,” Denner said.

In the future as well, Bosch will invest in further improving the classic combustion engine. With synthetic fuels, or synfuels, combustion engines can also save resources and be CO<sub>2</sub>-neutral. “In 2025, more than 80 percent of new vehicles will likely still be using combustion engines. But even these engines will be able to play a big part in reducing global warming,” the Bosch CEO said.

### **Business performance in 2016 by business sector**

Negative exchange-rate effects made themselves felt in the way the business sectors’ sales developed. “After adjusting for those effects, all business sectors except Industrial Technology increased their sales, in some cases significantly so,” Asenkerschbaumer said. The **Mobility Solutions** business sector grew a nominal 5.5 percent in 2016, and thus more strongly than global automotive production. After adjusting for exchange-rate effects, growth was 7.0 percent. According to preliminary figures, sales came to 44.0 billion euros in 2016. In gasoline injection systems, Bosch posted a new record, selling 250 million high-pressure injectors. The company was especially successful with driver-assistance and infotainment systems. In 2016, the **Consumer Goods** business sector increased its sales revenue by 2.8 percent to 17.7 billion euros. Exchange rate-adjusted growth was 6.2 percent. Both Power Tools and BSH Hausgeräte GmbH again presented many connected products in 2016. Sales of the **Energy and Building Technology** business sector grew by 0.8 percent in 2016 (3.2 percent after adjusting for exchange-rate effects), to 5.2 billion euros. The Thermotechnology, Security Systems, and Service Solutions divisions are posting ever greater sales with connected solutions such as [smart heating systems](#), [video technology](#), and services such as the [eCall](#) emergency service and the concierge service.

According to preliminary figures, the Industrial Technology business sector posted a 5.1 percent year-on-year drop in sales to 6.3 billion euros. Adjusted for exchange-rate effects, the drop is 4.5 percent. Above all, developments in markets such as China, Russia, and Brazil are continuing to create difficulties for the Drive and Control Technology division. In 2016, business in the Packaging Technology division remained roughly on a par with the previous year.

### **Business performance in 2016 by region**

The preliminary figures for **Europe** show very positive business developments for the Bosch Group in 2016. In this region, the supplier of technology and services increased its sales by 3.4 percent (4.8 percent after adjusting for exchange-rate effects) to 38.6 billion euros. At 12.4 billion euros, sales remained roughly on their previous-year level in [North America](#). This was a drop in sales of 2.0 percent, or 1.8 percent after adjusting for exchange-rate effects. In **South America**, the Bosch Group increased its sales by an exchange rate-adjusted 2.1 percent. In nominal terms, sales fell by 5.7 percent to 1.3 billion euros. In [Asia Pacific](#) including Africa, Bosch generated sales growth of 12 percent after adjusting for exchange-rate effects. In nominal terms, sales grew by 8.1 percent to 20.8 billion euros.

### **Recruitment in Asia Pacific, central and eastern Europe, and Germany**

Worldwide, the Bosch Group employed some 390,000 associates as of December 31, 2016. Headcount increased by roughly 15,000 in 2016. New associates were taken on above all in Asia Pacific and central and eastern Europe. In Germany, headcount grew by 2,100 associates.

### **Forecast for 2017 – only moderate growth, with greater fluctuations**

For 2017, Bosch is forecasting only moderate growth of 2.3 percent for the global economy. The supplier of technology and services sees risks to the economy above all in political developments in the U.S. and Europe. In 2017, Bosch again intends to stay on its growth course, and to grow faster than its respective markets. It wants to further improve the competitive and profit situation of all its divisions.

An overview of key figures can be found [here](#).

### **Press photos:**

#834476, #948725, #949878, #534877, #456246, #695148, #951280, #951281, #785164, #452451, #452459, #414275, #452462, #455138, #499674, #536228, #694841, #695145, #710763, #949352, #535802, #311140, #336958

**Infocharts:**

#953864, #953865, #953866, 953867, 953868, #953869, #835409, #940028,  
#940024, #940023, #940025, #452423, #452425, #452426, #499085, #940046,  
#940056, #801213, #801214, #801215, #801207, #801208, #801209, #801210,  
#801211, #801212

**Videos:**

[How things become partners – the IoT's getting personal](#)

[Research campus in Renningen](#)

[Smart assistant: the Kuri home robot](#)

[The connected car as a third living environment](#)

[Bosch connected solutions: from Mykie to the connected car](#)

[The connected car is becoming a personal assistant](#)

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*The Bosch Group is a leading global supplier of technology and services. It employs roughly 390,000 associates worldwide (as of December 31, 2016). According to preliminary figures, the company generated sales of 73.1 billion euros in 2016. 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 industry. 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 create solutions for a connected life, and to improve 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 450 subsidiaries and regional companies in some 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 120 locations across the globe, Bosch employs 59,000 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 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.*

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](https://www.twitter.com/BoschPresse).

Key data for the business year 2016  
– preliminary, rounded figures



Currency figures in billions of euros (rounded)	2016	2015	Year-on-year change
Total sales revenue	73.1	70.6	nominal: 3.5% exchange rate-adjusted: 5.4%
<b>Sales revenue of the business sectors</b>			
Mobility Solutions	44.0	41.7	nominal: 5.5% exchange rate-adjusted: 7%
Industrial Technology	6.3	6.6	nominal: – 5.1% exchange rate-adjusted: – 4.5%
Consumer Goods (including other activities)	17.7	17.1	nominal: 2.8% exchange rate-adjusted: 6.2%
Energy and Building Technology	5.2	5.1	nominal: 0.8% exchange rate-adjusted: 3.2%
<b>Sales revenue in the major regions</b>			
Europe	38.6	37.3	nominal: 3.4% exchange rate-adjusted: 4.8%
- of which Germany	14.5	14.2	nominal: 2.3%
North America (including Mexico)	12.4	12.7	nominal: – 2% exchange rate-adjusted – 1.8%
South America	1.3	1.4	nominal: – 5.7% exchange rate-adjusted: 2.1%
Asia Pacific (including other regions)	20.8	19.2	nominal: 8.1% exchange rate-adjusted: 12.0%
<b>Research and development cost</b>	6.6	6.4	3.3%
<b>EBIT from operations</b> (adjusted for one-off effects) as a percentage of sales revenue	4.3 5.8	4.6 6.5	
<b>Associates</b>	<b>December 31, 2016</b>		<b>Year-on-year change</b>
Bosch Group	390,000		15,000
Europe	237,000		7,300
- of which Germany	134,000		2,100
Americas	43,000		1,600
Asia Pacific (including other regions)	110,000		5,700
<b>Associates in research and development</b>	<b>December 31, 2016</b>		<b>Year-on-year change</b>
Bosch Group	59,000		3,700
Europe	34,000		2,100
- of which Germany	26,000		1,400
Americas	3,000		300
Asia Pacific (including other regions)	22,000		1,300

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## “Connected Car Effect 2025”

### **Bosch study shows: more safety, more efficiency, more free time with connected mobility**

December 2016

PI 9512 BBM Ks

- ▶ Model calculations for the year 2025 show the benefits of connected and assisted driving for the US, China and Germany
- ▶ 260,000 accidents avoided, nearly 400,000 tons of CO<sub>2</sub> emissions saved, considerable time gains
- ▶ EUR 4.43 billion lower material and damage costs
- ▶ 350,000 fewer traffic accident injuries

After a long drive on the highway comes a moment of sudden fear: a traffic jam behind the next curve. Once you've reached your destination later on, there's no parking anywhere in sight. These days, this is everyday life behind the wheel. In fewer than ten years though, there will be completely new possibilities: highly automated driving will ensure relaxed highway travel, cars driving ahead will send advanced warning of slowing traffic, and your own vehicle will ease off the gas before a dangerous situation can arise. At the end of a journey, navigational devices will guide the driver directly to a free parking area or the car will even find its way through the parking garage completely independently.

With the integration of cars into the Internet, this vision is not science fiction but becoming reality. The study “Connected Car Effect 2025” by Bosch and the consulting firm Prognos investigated more closely what this trend will mean specifically for the US, Germany and the major cities of China. The result: safety systems and cloud-based functions can prevent around 260,000 injury accidents, save 400,000 tons of CO<sub>2</sub> emissions and offer drivers many hours of more time for other activities. “Connected mobility will mean fewer accidents, less fuel consumption, less stress,” says Dr. Dirk Hoheisel, member of the Bosch board of management, summarizing the results of the model calculations.



### **Known assistance and safety systems will become data sources**

“The hidden heroes of the connected revolution are assistance and comfort systems, which we are often already familiar with,” says Hoheisel. According to the model calculations, the Electronic Stability Program (ESP), for example, will be available in up to 90% of all vehicles in the three countries covered by the study by 2025, with sensor-based automatic emergency braking and lane assists in up to 40 percent of the car fleet. Systems for more comfort and connectivity will also be found in the majority of cars: in 2025, smartphones will be integrated into approximately every other vehicle’s infotainment system.

The increasing number of such systems and their increasing connection to the Internet make them far more than the sum of their parts – for everyone involved. ESP sensors will report upcoming sections of icy road, cameras will collect data on speed restrictions and fog, functions such as Internet-based parking solutions and wrong-way driver warnings in virtually real-time will be in widespread use.

### **Individual findings from the study “Connected Car Effect 2025”**

“Our study shows that the effects of connectivity will have a perceptible impact on every driver in 2025,” says Hoheisel. For the study, Bosch and Prognos have produced calculations for the US, China and Germany. Here is a selection of the individual findings:

- Over 260,000 accidents involving personal injuries (US: 210,000, China: 20,000, Germany: 30,000) will be avoided annually – as many accidents as occur within two years in Germany’s capital city of Berlin.
- 350,000 fewer people injured by traffic accidents – the same as 12 years without traffic injuries in Los Angeles. In the US alone, there will be 290,000 fewer (China: 25,000, Germany: 37,000).
- About 11,000 people could be saved through connected assistance systems, 4,000 of whom in the US (China: 7,000, Germany: 300).
- Up to EUR 4.43 billion in material and damage costs will be saved by connected assistance systems. This is nearly double the sum spent by the Chinese government in 2016 to improve air quality in Beijing. These sums mean considerable savings for insurance companies, keeping a little more money in the purse or wallet of every individual vehicle owner. Of the EUR 3.6 billion attributable to US’s savings (China: EUR 380 million, Germany EUR 450 million), smartphone integration alone will contribute over EUR 100 million.
- Nearly 400,000 tons of CO<sub>2</sub> will be spared thanks to connected mobility functions – as much as the Black Forest national park in Germany can process in three years. Concepts such as community-based parking and

active parking lot management will reduce parking traffic by up to 480 million kilometers, while highly automated driving saves additional fuel.

- Approx. 70 million driving hours will be shed by connected parking functions in the US, China and Germany. That is as many hours as 40,000 employees work in a year.
- 31 hours of free time on the highway: US citizens spend 43 hours per year on interstates (China: 26 hours on expressways, Germany: 39.5 hours on highways). Highly automated driving and simultaneous Internet connection will make free around 80 percent of time behind the wheel to be used for something other than driving: reading, emails, video conferencing, films, for example. Frequent drivers who reach 40,000 kilometers of driving a year could benefit from 95 extra hours of productivity during their journeys.

### **Bosch is the driver of connected mobility**

There is hardly another company with as much drive toward connected mobility as Bosch. The technology and service company is developing the necessary connectivity technologies, sensors, and cloud solutions. Its portfolio also extends to a variety of different services through intuitive display and operating concepts.

### **Investigative methodology**

Bosch and Prognos assessed a total of eleven technologies for private passenger transport, particularly their dispersion and impacts by 2025 in the US, Germany, and metropolitan areas in China. “In model calculations, we simulated the speed at which the new technologies would be adopted into the vehicle fleet,” explains Prognos mobility expert Stephan Kritzinger. The model is based on international statistics on vehicle inventories, accident data and current research, as well as estimates by Bosch and Prognos.

Since 1959, Prognos has been advising decision-makers across Europe from politics, business and society on questions about the future. Grounded in neutral analyses and well-founded forecasts, experts in Basel, Berlin, Bremen, Brussels, Düsseldorf, Freiburg, Munich and Stuttgart develop practical decision-making grounds and future strategies for companies, contracting authorities and international organizations.

### **More information on „Connected Car Effect 2025“**

- ▶ [YouTube-Video “Connected Car Effect 2025”](#)

### **Contact person for press inquiries:**

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**EXPERIENCE BOSCH AT CES 2017** in Las Vegas, Nevada, USA: At CES 2017, Bosch is showing how the Internet of Things is getting personal – how things can be turned into partners. Connected technologies enable personal assistance in all areas of life: they improve mobility, shape the cities of the future, make the home intelligent, health care technology more efficient, and make work easier. Bosch is presenting an expanded portfolio of "Simply.Connected" networked solutions.

**BOSCH PRESS CONFERENCE: Wednesday, January 4, 2017, 9:00 am to 10:00 am** (local time): with [Dr. Werner Struth, member of the Bosch board of management](#) at Mandalay Bay South Convention Center, Level 2, Mandalay Bay Ballrooms BCD

**FOLLOW** Bosch's CES 2017 Highlights on Twitter: [#BoschCES](#)

**BOSCH BOOTH: Thursday to Sunday, January 5-8, 2017** at Central Hall, booth #14128

**PANELS WITH BOSCH EXPERTS:**

**Thursday, January 5, 2017; 11:30 am to 12:30 pm** (local time): [Conference track "MEMS & Sensors: Personalizing Consumer Technology", Session "Where are Consumer Electronics Taking the Sensors Industry?" with Dr. Stefan Finkbeiner, CEO and General Manager, Bosch Sensortec; Venetian, Level 4, Marcelllo 4501](#)

**Friday, January 6, 3:30 pm to 4:30 pm** (local time): [Conference track "Vehicle Technology"; Session "Redefining the Automotive Infotainment Experience" with Torsten Mlasko, Las Vegas Convention Center N258](#)

*Mobility Solutions is the largest Bosch Group business sector. In 2015, its sales came to 41.7 billion euros, or 59 percent of total group sales. This makes the Bosch Group one of the leading automotive suppliers. The Mobility Solutions business sector combines the group's expertise in three mobility domains – automation, electrification, and connectivity – and offers its customers integrated mobility solutions. Its main areas of activity are injection technology and powertrain peripherals for internal-combustion engines, diverse solutions for powertrain electrification, vehicle safety systems, driver-assistance and automated functions, technology for user-friendly infotainment as well as vehicle-to-vehicle and vehicle-to-infrastructure communication, repair-shop concepts, and technology and services for the automotive aftermarket. Bosch is synonymous with important automotive innovations, such as electronic engine management, the ESP anti-skid system, and common-rail diesel technology.*

*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."*

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## From sensors that feel to the all-embracing IoT cloud Connectivity strategy at Bosch

January 2017  
PI 9547 RB DH/KB

A car with an online GPS knows the fastest route from A to B, the connected factory controls itself, the smart home helps save heating costs, thanks to communication with the home-owner's smartphone. Everything is becoming an active part of the internet. Even now, billions of things around the world are beginning to exchange and share information online.

Whether connected mobility, connected industry, smart energy systems, or smart building technology, Bosch is systematically making its hardware part of the internet. In this endeavor, the company is benefiting from its diverse portfolio. For decades, Bosch has known how cars, boilers, and industrial machinery work. Step by step, the company is now making its products web-enabled and offering its customers new services.

Bosch is certain that the internet of things (IoT) will make people's lives more convenient and secure, and businesses more efficient and eco-friendly. For this reason, the company is investing heavily in this potentially huge market and extending its expertise. This applies first and foremost to traditional areas of business: even though Bosch has been an automotive supplier for more than 130 years, connected mobility now offers new opportunities beyond the hood, such as car-sharing and multimodal traffic concepts. At the same time, new business models are presenting themselves "off the beaten track," such as in smart homes or the cloud business.

Here, Bosch is pursuing a "3S" strategy: sensors, software, and services.

**Sensors** teach things how to feel, such as a parking space that indicates whether it is vacant or occupied. Bosch is the global market leader in the business with micromechanical sensors.

The huge volumes of data from these sensors can only be processed with the help of a structured **software** platform. The role of this “invisible hand” is played by the Bosch IoT Suite. In connected factories, for example, data mining makes proactive quality management possible. If the software recognizes signs of wear and tear in a production line at an early stage, spare parts can be made available before the machine breaks down.

**Services** – A significant part of the added value that comes from connectivity takes the form of services. In the age of connectivity, new and, above all, beneficial services are about much more than just the classic after-sales model. Instead, Bosch’s web-based services accompany and assist the company’s customers, also in their everyday lives. One such service is secure truck parking. Since early 2017, freight forwarders and truckers have been able to use this portal to reserve secure truck parking spaces along Germany’s freeways.

But to quickly increase the volume of sensors, software, and services on the IoT, there has to be a platform that brings all these aspects together. At Bosch, this key piece of the jigsaw puzzle takes the form of the company’s own IoT cloud. On the internet of things, this cloud is capable of much more than a private online memory. What makes the cloud so special is that it provides a wide spectrum of ready-to-use cloud services. It is designed in such a way that it can speed up IoT projects, reduce time to market for IoT solutions, and increase security. IoT projects thus become simpler and cost less. All this is done while respecting strict data privacy rules and the latest data-security knowledge.

### **Artificial intelligence saves time and money**

The example of the cloud gives an indication of the progress that has already been made with connectivity. Thanks above all the learning algorithms and artificial neural networks (like human nervous systems, they help process the information that has been gathered), artificial intelligence will also play an important role in connectivity in the future. Is the “object” at the roadside a road sign, a cyclist, or a pedestrian? Like human beings, self-driving cars also first have to learn such things. Simulating intelligent behavior on the basis of predetermined or learned patterns is a key competence for structuring the connected world, and thus also relevant for Bosch. In January 2017, Bosch set up a center for artificial intelligence, thus adding a further important piece of the puzzle in its connectivity strategy.

Additional information is available online at <http://iot.bosch.com>

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# Press feature

## **How digital assistants make life easier** Two examples of tomorrow's connected living

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Home help, bodyguard, and butler – until now, only pop stars or top earners have been able to treat themselves to a personal assistant. Now Bosch is looking to change that by offering digital assistants that can lighten everyone's load or call for help in an emergency. What makes this possible is the internet of things. Soon refrigerators, cars, and smart homes will be communicating with each other autonomously in the cloud. Where today the likes of Siri and Alexa can carry out simple voice commands, in the future digital assistants will be able to make our everyday lives easier without any instructions. The following examples show how that works:

### **Traffic jam? The refrigerator has a better idea!**

The idea is for the digital assistant to combine information from various devices and make all of our lives easier. In order for this to happen, different things must communicate with one another, as Bosch shows with the following example: As you drive home from work, your car's navigation system reports a traffic jam and suggests an alternative route. This route happens to pass the supermarket. Without a click, the digital refrigerator signals that it is sending the current shopping list to the vehicle display. While the car is parking at the supermarket, the smart home turns up the heating, so that your home is nice and warm for when you arrive 30 minutes later.

Bosch is already paving the way for these connected digital assistants. Whether a home appliance, gardening tool, car, or heating system, each electric product the company produces will feature connectivity.

### **A connected business trip to London**

A business trip to London in the not-too-distant future: just as the freeway exit for the airport comes into view, the mailman rings the doorbell at home. Not a

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problem, as long as the smart car is connected to the smart home. After a brief video chat with the mailman, the traveler gives an in-vehicle touchscreen command to open the front door. Next stop: the airport parking garage. The vehicle automatically takes over the job of finding a free spot while the traveler goes through security. After the plane has landed in London, the traveler's smartphone reports "congestion on all access roads" and offers an alternative to a taxi: take the train to Regent's Park, where an electric car has been reserved for the remainder of the journey.

This scenario is realistic in the medium term. The technology is already at an advanced stage: according to the Electronica Trend Index 2020, 63 percent of those surveyed are in favor of having a digital assistant for their everyday lives.

For more information visit <http://www.bosch-presse.de/pressportal/de/en/bosch-ceo-denner-the-car-as-we-know-it-will-soon-be-history-77952.html>

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*The Bosch Group is a leading global supplier of technology and services. It employs roughly 390,000 associates worldwide (as of December 31, 2016). According to preliminary figures, the company generated sales of 73.1 billion euros in 2016. 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 industry. 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 create solutions for a connected life, and to improve 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 450 subsidiaries and regional companies in some 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 120 locations across the globe, Bosch employs 59,000 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 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.*

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](https://twitter.com/BoschPresse).





## Seven facts about artificial intelligence:

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### 1.) The cradle of artificial intelligence

The term “artificial intelligence” was coined at a workshop held as part of a research project on artificial intelligence at Dartmouth College in New Hampshire in 1956. Today, the Dartmouth Conference is considered the inaugural meeting for research into artificial intelligence.

### 2.) The great unknown

Big data is a concept that most Germans know nothing about. According to TNS Infratest, 74 percent have never heard of it, while only 9 percent feel able to offer an explanation of what the phrase means. Big data refers to huge amount of data, which is captured, analyzed, and processed. It is the basis for artificial intelligence.

### 3.) Learning from millions of images

Deep learning is an aspect of machine learning that relies on a multi-layered neural network inside a computer, with a structure reminiscent of the human brain. While a small child needs only experience a few cats to then recognize all cats as such, the computer needs to see millions of cat pictures before it can recognize a cat.

### 4.) Smart assistants

The market research organization Gartner predicts that by 2024, some 10 percent of activities with the potential to endanger human lives will be performed by smart systems. One example is assistance systems in vehicles. These will enable future vehicles to communicate more effectively, detect their surroundings more accurately, process data more rapidly – and eventually drive completely autonomously.

### 5.) As clever as a human being

Experts are expecting to create an artificial intelligence that is on a par with human intelligence before the end of this century.

## **6.) Bosch Center for Artificial Intelligence**

In the period to 2021, Bosch will invest some 300 million euros in the Bosch Center for Artificial Intelligence, with around 100 experts researching artificial intelligence at three locations (Bengaluru, Palo Alto, and Renningen).

## **7.) Future Bosch products will be intelligent**

Ten years from now, scarcely any Bosch product will be conceivable without artificial intelligence. Within just five years, products featuring artificial intelligence are expected to account for 10 percent of Bosch sales.

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