Press release

January 6, 2020

CES 2020: Bosch raises the bar when it comes to artificial intelligence

Beneficial AI: building trust in the technology together

- Bosch board of management member Michael Bolle: “Bosch aims to become an innovation leader in the field of AI as well.”
- Technology of the future: Bosch invests 3.7 billion euros annually in software development.
- Training program: over the next two years, Bosch will make 20,000 associates ready for AI.
- Interaction: thanks to AI and the IoT, Bosch makes everyday life easier in mobility, at home, and in manufacturing.
- A world first: digital sun visor uses AI to protect drivers’ vision the smart way.

Las Vegas, NV, USA – Whether for automated driving, the smart home, or manufacturing: artificial intelligence (AI) has become an integral part of everyday life. Bosch uses AI and the internet of things (IoT) to make life easier for people and as safe as possible. Here, the slogan “Beneficial AI. Building trust together” sums up the technology and services company’s approach. The focus is on safe and robust AI for the manufacture of smart products, which Bosch will be showcasing at this year’s CES. One of these products is the Virtual Visor: an AI-based digital vehicle sun visor that will be making its debut at the world’s largest trade fair for consumer electronics. The product has also won a CES® Innovation Award, as has Bosch’s 3D display for the car.

Other Bosch AI highlights at the show include an application for predictive maintenance of the International Space Station, a system for monitoring vehicle interiors, and a smart platform for medical diagnostics. “The solutions we’re showcasing at CES make it clear that Bosch aims to become an innovation leader in AI as well,” says Bosch management board member Michael Bolle. “As of 2025, every Bosch product will either contain artificial intelligence or will have been developed or manufactured with the help of AI.” The global market volume for AI applications is expected to be around 120 billion dollars over that same period, a twelvefold increase compared to 2018 (source: Tractica). Bosch wants to tap into that potential: the company already invests 3.7 billion euros each year

Bosch Benelux
H.J. Genessestraat 1
BE-1070 Brussels

E-mail peter.detroch@bosch.com

Corporate Communications
Benelux
www.bosch-press.be
www.bosch-press.nl

in software development, currently employs more than 30,000 software engineers, and has 1,000 associates working on AI.

In addition, Bosch has established a comprehensive training program. “We plan to make nearly 20,000 associates AI-savvy over the next two years,” Bolle explains. “We must invest not only in artificial intelligence, but in human intelligence as well.” The program includes training formats at three different levels for managers, engineers, and AI developers and includes guidelines for using AI responsibly. To that end, Bosch has drawn up its own set of AI principles that address issues of AI security and ethics. With this in combination with its expertise, the company intends to build trust with customers and partners alike: “Anyone who has internalized technical and ethical principles knows how important data security and sovereignty are,” Bolle says. “In a way, trust is the product quality of the digital world.”

Expertise saves lives

In the future, Bosch believes one core area of expertise will be the industrial application of artificial intelligence. “We want to harness the power of artificial intelligence not for the purpose of creating models of human behavior, but instead to improve technology to benefit people,” Bolle says. “For this reason, industrial AI has to be safe, robust, and explainable.” According to Bosch, that means people should always remain in control, whether on the street, at home, or in manufacturing.

As a pioneer in the development of life-saving driver safety systems such as ABS, ESP, and airbag control units, the company has already proved in the past that people benefit from reliable machines. AI can also make driver assistance systems even more efficient and intelligent: when Bosch’s AI camera for automated driving identifies partially concealed pedestrians, for example, the automatic emergency braking assistant can react even more reliably. Bosch is creating learning technology that is “Invented for life.”

Bosch invests 100 million euros in an AI campus

Innovations require investment. In addition to spending on software development, Bosch is investing worldwide in people and in competence centers. For example, the company is investing 100 million euros in the construction of a new AI campus in Tübingen, Germany. The move into the new research complex is planned for the end of 2022. It will then offer some 700 AI experts space for creative and productive exchange. These experts come from Bosch, external startups, and public research institutions. The new campus should strengthen exchange among experts in Cyber Valley. “Building trust together” will be a living reality there. Bosch is a founding member of Cyber Valley, which was established in 2016. This joint research venture brings together partners from industry, academia, and government to drive forward AI research and quickly transfer research findings into real-world industrial applications.

In addition, the Bosch Center for Artificial Intelligence (BCAI) operates at seven locations worldwide, including two in the U.S.: in Sunnyvale, California and Pittsburgh, Pennsylvania. The BCAI currently has a total of some 250 AI specialists working on more than 150 projects in the domains of mobility, manufacturing, smart homes, and agriculture.

World-first Virtual Visor originated in the U.S.

Bosch has creative AI minds developing product innovations for mobility, the smart home, and Industry 4.0. Its AI world first for the automotive sector, which is celebrating its world premiere in Las Vegas, originated in the U.S.: the Virtual Visor, which is a transparent digital sun visor. A transparent LCD display connected to the interior monitoring camera detects the position of the driver's eyes. Using intelligent algorithms, the Virtual Visor analyzes this information and darkens only the portion of the windshield through which the sun would dazzle the driver. The Virtual Visor scored the highest in its category at the CES Best of Innovation Awards. Bosch's new 3D display won its category as well. Using passive 3D technology, the display generates a realistic three-dimensional effect for images and alerts. This allows visual information to be grasped faster than when displayed on conventional screens, increasing road safety.

Additional safety comes from Bosch's new interior monitoring system for vehicles. It detects when the driver is drowsy or looks at a smartphone based on eyelid movements, direction of gaze, and head position – and alerts the driver to critical situations. It also monitors the vehicle interior to determine how many occupants are present and where and in what position they are sitting. This makes it possible to optimize the operation of safety systems such as the airbags in an emergency.

In 2019, Bosch sales of driver assistance systems rose by 12 percent to around 2 billion euros. They are paving the way for automated driving. In the future, when vehicles are in partially automated driving mode for sections of the journey such as on the freeway, the driver monitoring system will become an indispensable partner: In these situations, the camera will ensure that the driver can safely take the wheel again at any time. By 2022, the company will have spent around 4 billion euros on automated driving and will employ more than 5,000 engineers. To round out its sensor portfolio in this domain, Bosch is now working on making lidar sensors production-ready as well. In addition to radar and cameras, lidar is the third essential sensor technology. The Bosch long-range lidar sensor can also detect non-metallic objects at a great distance, such as rocks on the road.

Bosch AI used in space and in medicine

The company is aiming high with its SoundSee sensor system, which was sent into space at the end of 2019. Riding on NASA's autonomous flying Astrobee robot, SoundSee will isolate unusual sounds on the ISS, analyze the audio using AI-driven analytics, and

indicate when maintenance is necessary. Starting in early 2020, audio data captured by Soundsee will be delivered to a ground control facility configured to meet NASA specifications and built into the Bosch Research Center in Pittsburgh, PA. The system, which is barely bigger than a lunchbox, was developed in the U.S. together with Astrobotic as part of a NASA research collaboration.

A completely earthbound but no less innovative product is Vivascope, a smart pathology platform that helps in medical diagnosis. Vivascope magnifies specimens like blood and other bodily fluids, digitizing the microscopic findings, and analyzing them with the help of artificial intelligence-powered algorithms. It is capable of precisely and rapidly identifying cell anomalies and providing physicians with useful support in evaluation and diagnosis.

Smartglasses Light Drive make everyday glasses smart

Bosch is also showcasing many non-AI innovations at CES. For example, its Light Drive smartglasses module is the world's first sensor-based solution for making a normal pair of glasses smart. It is more than one-third thinner than other solutions on the market and weighs less than ten grams. The crystal-clear images projected into the wearer's field of vision, which are clearly discernible even in direct sunlight, range from navigation information and text messages to calendar entries and operating instructions – depending on the information received from a smartphone or smartwatch.

At CES, Bosch is using its IoT shuttle technology showpiece to present the solutions that the company offers automakers and mobility service providers for the electrification, automation, connectivity, and personalization of ridesharing vehicles. Its portfolio goes beyond components to include seamlessly connected mobility services that give users flexibility in how they operate, manage, charge, and maintain their fleet vehicles, as well as making each journey safe. At the Bosch booth, visitors can also see improved drive and sensor technologies for the connected and emissions-free mobility of the future.

Solutions for the entire house: expanded portfolio for residential IoT

Bosch is expanding the scope of its services for the residential internet of things (IoT). The highlight here is the open Home Connect platform, which is being showcased at CES. Starting in mid-2020, the platform's app will also offer control of lighting and shade, entertainment, and smart gardening equipment from different manufacturers. The number of partner companies, which is currently at 40, is set to more than double, making life at home even more convenient and efficient.

Smart technology protects the environment

Underlying all these innovative products is Bosch's entrepreneurial mindset. "We want to harmonize commercial, environmental, and social responsibility," Bolle says. Climate protection is also a major concern here. According to Bolle, "Bosch not only develops

environmentally friendly solutions, but also acts as a role model. By the end of 2020, all our 400 locations worldwide will be climate neutral and from development to manufacturing to administration no longer leave a carbon footprint. We've already achieved this for our German locations."

Artificial intelligence plays a role here, too: at individual locations, for example, an in-house energy platform uses intelligent algorithms to identify deviations in energy consumption. This alone has enabled some plants to reduce their CO_2 emissions by more than 10 percent over the past two years. Considering that Bosch operates a total of 270 such plants, the savings potential is enormous. As Bolle explains, "That's how we sum up our message at CES: Bosch has big plans for AI in many respects."

Bosch at CES 2020:

- **PRESS CONFERENCE:** In Ballrooms B, C, and D, Mandalay Bay Hotel, Las Vegas **South Convention Center, Level 2**, from **9:00 to 10:30 a.m. local time on Monday, January 6, 2020.**
- **BOOTH: Tuesday to Friday, January 7–10, 2020**, in the Central Hall, booth #12401
- **FOLLOW** the Bosch CES 2020 highlights on Twitter: **#BoschCES**
- **PANELS WITH BOSCH EXPERTS:**
  Wednesday, January 8, 2020, 10:15 to 11:15 a.m. (local time)
  Event entitled "Growth of Apprenticeships for 'New Collar' Jobs" with Charlie Ackerman, Senior Vice President of Human Resources, Las Vegas, South Convention Center

Contact person for press inquiries:
Peter De Troch
+32 (0)2 525 53 46

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.

Additional information is available online at www.bosch.com, www.iot.bosch.com, www.bosch-press.com, www.twitter.com/BoschPresse.