



CES 2020: Bosch presents intelligent technology that is “Invented for life”

Bosch booth: Central Hall, #12401 / Twitter #BoschCES

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- ▶ Award-winning: Bosch receives the Best of Innovation award – twice – for its world-first virtual visor and the 3D vehicle display.
- ▶ Out of this world: Bosch AI system analyzes instruments on board the ISS.
- ▶ Suitable for everyday use: Bosch technology revolutionizes the design of data glasses.

Stuttgart, Germany / Las Vegas, NV, USA – **At CES® 2020** in Las Vegas, **Central Hall, booth #12401 from January 7 to 10, 2020**, Bosch is presenting connected products for mobility and the home. Among the highlights at the trade fair are solutions that either make use of artificial intelligence (AI) or that were developed or manufactured with its help. The international supplier of technology and services wants to make AI safe, robust, and explainable, whether in manufacturing, smart homes, or automated driving.

CES 2020 Innovation Awards: award-winning Bosch solutions

In the run-up to CES 2020, Bosch twice received the highest score in the Innovation Awards and was also a three-time Honoree. The CES Innovation Awards are an annual program run by the Consumer Technology Association (CTA) covering 28 categories, and serve as an indicator of future trends. In addition to the 3D display for cars, a world first from the Car Multimedia division also received the coveted Best of Innovation award: the virtual visor. Both innovations were also designated Honorees in other categories. The third Honoree distinction goes to Bosch Vivascope – a smart platform for medical diagnostics.

A world first: virtual visor – the transparent digital sun visor (AI inside):

Conventional sun visors shield car drivers from dazzling light. But folding them down often also blocks significant areas of the driver’s field of vision. Bosch has solved this problem with a new, transparent LCD display that replaces opaque

visors. The virtual visor is connected to the interior monitoring camera, which 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 or other light sources would dazzle the driver. The rest remains transparent, leaving the driver's view of the road unobstructed.

3D display – bringing the third dimension to the cockpit: The new Bosch [3D display](#) uses passive 3D technology to generate a realistic three-dimensional effect for images and warning signals. This allows visual information to be grasped faster than when displayed on conventional screens, reducing driver distraction. Furthermore, this display system with spatial depth works completely without additional features such as eye tracking or 3D glasses.

Vivascope – a smart pathology platform for medical diagnostics (AI inside): Bosch Vivascope can magnify microscopic samples of blood and other bodily fluids, take a digital picture of them, and analyze them using artificial intelligence powered algorithms. The device has already been trained on more than 30,000 images and some nine million discrete points cells using machine learning methods – and it is still learning. It is able to determine irregularities in cells quickly and precisely, supporting doctors during evaluation and diagnosis.

A Bosch must-see

SoundSee – intelligent ears for the ISS (AI inside): Barely bigger than a lunch box, Bosch's SoundSee is packed with state-of-the-art artificial intelligence (AI). SoundSee is already in orbit and will soon be deployed onboard on the International Space Station (ISS.) Riding on NASA's flying autonomous Astrobee robot, the SoundSee uses integrated microphones to capture ambient noise in space and then analyze the audio using AI-driven analytics. By using artificial intelligence, SoundSee can analyze audio data to spot potential anomalies and give an indication of when maintenance work is needed. In early 2020, audio data captured by SoundSee will be delivered to a NASA-spec'd ground control facility built into the Bosch Research Center in Pittsburgh, PA. SoundSee was developed together with Astrobotic as part of a NASA research collaboration.

Light Drive smart glasses – keeping information always in view: Bosch Sensortec is presenting [Light Drive smart glasses](#) – the world's first solution for making a normal pair of glasses smart. The integrated projection system consists of MEMS mirrors, optical elements, sensors, and an intelligent software connection. Light Drive smart glasses are more than one-third thinner than previous solutions on the market and weigh less than ten grams. The crystal-clear images they project 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 they receive from a smartphone or smartwatch.

Interior monitoring – safety, comfort, and convenience for all occupants (AI inside): Based on eyelid movements, direction of gaze, and sitting position, this Bosch [vehicle interior monitoring system](#) detects when the driver is drowsy or looks at a smartphone – and alerts the driver to critical situations. It also monitors the vehicle interior to determine how many occupants are present and where they are seated. This makes it possible to optimize the operation of safety systems such as the airbags in an emergency. What's more, the system increases occupants' comfort and convenience. For instance, it automatically activates stored personal settings such as seat position. 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: the camera will ensure that the driver can safely take the wheel again at any time.

Bosch IoT Shuttle – the future of mobility: In the future, mobility service providers (MSPs) will increasingly use shuttles to offer customized on-demand mobility – whether for road freight or passenger transport. At CES, Bosch is using its IoT Shuttle technology showpiece to present the solutions that the company offers automakers and MSPs for the electrification, automation, connectivity, and personalization of shuttles. Its offering goes beyond components to include seamlessly connected mobility services that give users flexibility in how they operate, manage, recharge, and maintain their fleet vehicles, as well as making each journey safe.

Mobility of the future: selection of solutions and services

Lidar sensors – the third type of sensor technology needed for automated driving, alongside radar and camera: Bosch is extending its sensor portfolio for automated driving and is making long-range lidar sensors production-ready. Bosch long-range lidar will be the first solution available on the market suitable for automotive use. This means that it can be manufactured in large volumes and will work reliably throughout a car's service life. Lidar plays a key role in ensuring that highly-automated vehicles can reliably detect hazards even in challenging driving situations – situations where radar and cameras come up short. The long-range lidar can also detect non-metallic objects at a great distance, such as rocks on the road.

Intelligent front camera – understanding images with computer vision and AI (AI inside): This camera detects objects, categorizes them into classes such as vehicles, pedestrians, or bicycles, and measures their movement. The camera is also capable of interpreting what it sees to distinguish between the lane and the grass shoulder or roadside structures – even in the absence of road markings. In congested urban traffic, the camera can also recognize and classify partially obscured or crossing vehicles, pedestrians, and cyclists quickly and reliably. This allows the vehicle to trigger a warning or emergency braking.

Radar sensors – surround sensors for complex driving situations: The latest generation of Bosch radar sensors are even better at capturing the vehicle's surroundings – including in bad weather or poor light conditions. Their greater detection range, wide aperture, and high angular resolution mean automatic emergency braking systems can react more reliably.

Automated valet parking – fully automated valet parking service: This joint development by Bosch and Daimler is the first SAE Level 4 system to be officially approved for everyday use in Germany. The sensors for the parking garage infrastructure and the communications technology come from Bosch. By the end of 2021, it is expected that a dozen other parking garages will be equipped with automated valet parking. Bosch is working on this together with parking garage operators and developers of major real-estate projects.

Vehicle computer – next-generation electronics architecture: One key to the future of connected, automated, and electrified mobility is vehicles' electronics architecture. Not only will new, high-performance vehicle control units make vehicles considerably more powerful in the future, but by reducing the number of ECUs, they will also reduce vehicle weight and complexity in the interactions between components and systems. Bosch vehicle computers will increase computing power by a factor of 1,000 by the start of the next decade. The company is already creating these kinds of computers for automated driving, the powertrain, and the integration of infotainment systems and driver assistance functions.

Perfectly keyless – the smartphone as car key: In the future, Perfectly keyless will use not only Bluetooth for communication between the vehicle and a smartphone, but also ultra-wideband (UWB), a new communications technology that is already available in some smartphones. UWB lets smartphones be localized to within a few centimeters. It also makes communication with the vehicle particularly secure. Bosch is currently working with partners to standardize data transmission between smartphones and vehicles. At CES,

Bosch is presenting a demonstration vehicle in which Perfectly keyless makes use of UWB for the first time.

Fuel-cell system – electromobility for the long haul: Mobile fuel cells offer long ranges, short refueling times, and – with hydrogen produced using renewable energy – emissions-free operation of electric vehicles. Bosch is currently commercializing a fuel-cell stack together with the Swedish company Powercell. In addition to the stack, which converts hydrogen into electrical energy, Bosch is developing all the essential system components to a production-ready stage.

Rolling chassis – electromobility platform: Electrical powertrains, steering systems, brakes – Bosch has all the building blocks of electromobility in its portfolio. As part of a development partnership with the chassis and automotive technology expert Benteler, the company is demonstrating how all Bosch products for electric vehicles can be integrated with one another. The rolling chassis showpiece is, among other things, helping Bosch to strategically refine products to meet such requirements.

E-axle – SiC technology for high-performance electric vehicles: Bosch is presenting its new Performance e-axle, which incorporates new technological solutions to further increase the efficiency and power density of electrical powertrains. The new drive unit features improved system efficiency of up to 96 percent, which extends vehicle range by up to six percent in the WLTP test cycle. And at three kilowatts of power per kilogram, the power density is 50 percent higher than in the previous e-axle. These improvements are due to the pioneering use of silicon carbide (SiC) semiconductors in the power electronics as well as a space-saving arrangement of the electric motor, power electronics, and transmission.

Connected biking – solutions that deliver a cycling experience 2.0: The Kiox on-board computer keeps training data such as speed, pulse, and the rider's own performance in view throughout the ride. Once the ride is over, users can evaluate the data in the eBike Connect smartphone app or in the online portal. Kiox also boasts a new premium function called Lock, which provides digital protection against theft. Meanwhile, the new SmartphoneHub lets e-bikers enjoy all-around connectivity when riding thanks to the COBI.Bike app, which offers a wide range of functions – from navigation and fitness tracking to connections with third-party services and apps such as Apple Health, Google Fit, and komoot.

Intelligent assistants: safety and comfort on the road and at home

Home Connect – an expanded platform for everyone: Bosch is broadening the scope of its services for the residential internet of things (IoT). Home Connect, the company's open IoT platform encompassing household appliances from Bosch and other manufacturers, is being extended from the kitchen and laundry room to the rest of the home. Starting in mid-2020, Home Connect will offer control of a wide range of additional connected solutions, including lighting, heating, security, and entertainment devices from different manufacturers. Some 40 partner companies currently use the platform, and this number is set to more than double with its expansion, making home life for users even more comfortable, convenient, and efficient.

Bosch Smart Home – new degrees of openness: Bosch Smart Home is soon to be compatible with Apple HomeKit. In the future, it will be possible to control the Bosch smart-home system using the Apple Home app and the Siri voice assistant. To enhance customer benefits even more, in the future Bosch will offer its partners the option of including Bosch smart-home devices and services in their own offerings via an application programming interface (API).

Application Store – everything under one roof: IoT connectivity has a key role to play, especially when it comes to security technology. Now the Bosch subsidiary Security and Safety Things has developed its own IT platform in an effort to make coordinating devices, software, and data for video and security applications in commercial buildings as effective as possible. Thanks to this platform, it takes no time at all to test the compatibility of an app with its intended application or to implement systems. Sample applications in the area of connected living and mobility will be on display at CES.

Spexor – a feeling of safety anytime, anywhere: This compact mobile alarm device can be placed wherever safety is paramount. Whether at home, in the car, in the motorhome, or in the shed – Spexor will keep reliable watch and immediately report any break-ins. The device is fitted with noise, motion, and air-pressure sensors, as well as GPS. If the device detects an intruder, it sends a warning to the user's smartphone via Wi-Fi or the low power wide area (LPWA) IoT wireless technology standard.

Press photos: #1849025, #2898169, #2898170, #2898171, #2898173, #2898174, #2898521, #2901307

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

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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.

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