

## **Bosch highlights essential role of software in its products at Software Day 2023**

### **Mobility business plans growth fueled by software**

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- ▶ Bosch software enables new Intelligent Traffic Systems in M-1 Intelligent Corridor in Detroit
- ▶ Bosch Mobility plans to grow to around \$20 billion in Americas by 2029 fueled by software; recent customer wins valued in the billions
- ▶ From vehicle motion and battery management to interior sensing, software is at the core of Bosch Mobility solutions
- ▶ Bosch invests for growth in North American region

Plymouth, Mich. – Across its broad portfolio of solutions, software lives at the core of Bosch solutions that deliver on the company’s “Invented for Life” brand promise. At Software Day 2023, Bosch in North America is highlighting its history, expertise and future potential of software and the essential role of software across the company’s four sectors: mobility, industrial technology, consumer goods and energy and building technology.

The company is announcing plans for growth in its Bosch Mobility business sector, fueled by software. It will demonstrate how decades of experience in vehicle motion have been applied to a new software-only solution as well as how software is utilized in interior sensing to detect driver distraction and drowsiness behaviors as well as children left behind in a vehicle.

Bosch is also announcing a new intelligent transportation systems deployment in the M1 Intelligent Corridor in Detroit that is powered by Bosch AI technology. By enabling smart infrastructure with intelligent AI-powered video sensors and cloud-based data services Bosch helps to improve safety and efficiency of roads.

“Our associates are utilizing software to deliver product experiences that delight our customers across the region and throughout the world,” said Mike Mansueti, president of Bosch in North America. “We have a strong legacy of software expertise to build from to continue pushing the possibilities utilizing software.”

### **Intelligent Traffic Systems in new M-1 Intelligent Corridor**

The role of software in the company's cross-domain expertise is seen in the use of video cameras for Intelligent Traffic Systems. The company announced at Software Day its role in the M1 Intelligent Corridor, an \$11.5 million project with \$5 million in federal funding from the U.S. Department of Transportation. Bosch is collaborating with the Michigan Department of Transportation (MDOT), the Federal Highway Administration (FHWA), the City of Detroit, WSP Michigan Inc., MH Corbin, Derq USA and Wayne State University. The project will deploy and evaluate an intelligent transportation network along the M-1 (Woodward Avenue) transportation corridor to serve the citizens of Detroit and surrounding communities.

The Bosch contribution includes both hardware and software-as-a-service. Software powers edge computing and data analytics to help optimize transportation systems. The deployment will feature pedestrian detection, prioritization and alerts; traffic intersection preemption and signal priority for authorized vehicles; and vehicle-to-vehicle and vehicle-to-infrastructure communications.

"Ultimately Bosch hardware and software solutions work together to solve the challenge of inefficient road traffic," Mansuetti said. "Our intelligent cameras with on-board AI and edge computing enable real-time alerts and data to help improve safety and efficiency."

### **Software-defined vehicle growth enabled by 40+ years of software expertise**

By 2029, Bosch Mobility in the Americas aims to contribute around \$20 billion annually to the global revenue of Bosch Mobility. This would represent an increase from approximately one fifth of global Bosch Mobility revenue in 2022 to approximately one quarter of global Bosch Mobility revenue by 2029. A major driver of that growth will be the company's software expertise as the industry doubles down on the software-defined vehicle.

Bosch has a long history in mobility software – more than four decades – and the company is comfortable in various business models for software based on customer needs. As software and hardware de-coupling increases, Bosch has strong experience already supporting customers in software-defined vehicle solutions. Bosch Mobility has recently booked significant business in the Americas with lifetime revenues amounting to several billion dollars spanning hardware plus software as well as software-only solutions.

Beginning in 2023, the Americas region will already realize revenue in the billions annually from hardware plus software projects including driver assistance, vehicle architecture, powertrain and vehicle motion.

“Our expertise in software means we can provide customers a variety of solutions,” said Paul Thomas, who will [assume the role](#) of president, Americas for Bosch Mobility beginning January 2024. “It’s essential to be comfortable in different software business models and approaches to capture the benefits of the software-defined vehicle that ultimately bring benefit to drivers on the road.”

Software is evident across the Bosch Mobility portfolio. Already more than half of its R&D associates globally for the mobility business are software engineers and the company produces more than 250 million control units globally every year, all configured with its proprietary software. At Software Day, Bosch is showcasing software solutions ranging from vehicle motion and battery management to monitoring inside the vehicle for driver drowsiness, children left behind or if someone smoked in a rental vehicle.

### **Software Day Highlights**

Vehicle motion management shows how the [reorganization of Bosch Mobility](#) and intensified cross-divisional collaboration is conducive to software-defined vehicle approaches in engineering. For 45 years, Bosch has been developing solutions for vehicle motion beginning with the introduction of anti-lock braking in 1978 and electronic stability control, also known as ESP®, in 1995. Bosch has continued to introduce motion software features and functions that are available in advanced braking, steering and powertrain solutions.

Now the company is launching **Vehicle Dynamics Control 2.0**, which incorporates all the company’s hardware and software knowledge to seamlessly enable multi-actuator motion control. This helps to potentially shorten braking distances and can help the driver to take fewer corrective actions regarding controlling the vehicle. The Vehicle Dynamics Control can be deployed as a software-only solution independent of any Bosch hardware and can be integrated for example in a central vehicle computer. In the United States, the software is applicable for market-specific developments like trucks and electrification.

Software is a tool to help consumers get to know their batteries better. Range anxiety is a major barrier to mass EV adoption and the Bosch software-as-a-service solution **Battery in the Cloud** helps to address this challenge by forming a digital twin of the battery and collecting data periodically from the vehicle. Information from Battery in the Cloud can help to enable increased battery life or charging speed based on individual driving profiles, projections on aging of a battery three to eight years in the future and even provide a usage certificate

regarding the battery health to support residual value of the vehicle or second life use of the battery.

Bosch **interior sensing solutions** help to enhance safety, comfort, and convenience for all vehicle occupants. The system leverages different hardware approaches as interior cabin-sensing radar is combined with an occupant monitoring camera. Software brings the system together through sensor fusion merging multiple types of sensing data. Software algorithms are capable of aiding in the detection of specific scenarios in the vehicle including driver drowsiness and driver impairment based on eye behavior. Additionally, the system utilizes new methods for detecting if a child has been left behind in a vehicle. Interior sensing solutions from Bosch help to fulfill requirements defined in regulations and consumer testing programs like the European New Car Assessment Program.

For the company's **RideCare Insight** solution, software engineers have worked to help rental company operators and fleet owners know when someone has smoked in the vehicle or damaged the vehicle during a rental. This data combined with vehicle data allows a rental return agent a complete picture of the vehicle condition from the start to the end of the rental. The solution combines Bosch expertise in sensors as the Bosch BMI270 IMU (Accelerometer/Gyroscope) sensor – which can be found in smartphone and smart watches – helps to detect crashes while a combination of sensors allows for smoking detection. A smoking detection algorithm helps to detect a likely smoking event – cigarette, vaping or similar product – inside a vehicle event even if it is as short as 30 seconds.

“Software is the lifeblood of our solutions,” Thomas said. “Software enhances our hardware and also powers new software-as-a-service offerings that diversify our portfolio of offerings to help us achieve our goals in the Americas.”

### **Sales in North America increase as organization invests for growth**

Bosch ended its 2022 fiscal year with \$15.1 billion (14.3 euros) in sales to third parties, an increase of nearly 12 percent year-over-year. The region achieved total net sales of more than \$16 billion USD when accounting for internal sales. The Mobility Solutions business sector increased sales by more than 12 percent to nearly \$9 billion USD in the North American region. Energy and Building Technology as well as Industrial Technology business sectors both posted double digit growth in the region. Energy and Building Technology increased by around 30 percent to more than \$1.3 billion while Industrial Technology increased around 20 percent to more than \$1.2 billion. After two straight years of double-digit growth in 2020 and 2021, the Consumer Goods business sector once again achieved sales of \$3.5 billion USD in 2022, which equaled 2021.

To build on its success in the North American region, Bosch is investing for growth. In April 2023, the company announced plans to acquire U.S. chipmaker TSI Semiconductors in Roseville, California. The company intends to invest more than \$1.5 billion USD in the site for upgrades to produce silicon carbide chips for electromobility.

“The North American market – and in particular the United States – holds strong promise for growth at Bosch as part of a diverse global portfolio,” Mansuetti said. “We are focused on identifying and delivering products and services that meet the regional needs of our customers across all areas of our business.”

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**About Bosch**

Having established a presence in North America in 1906, today the Bosch Group employs 37,000 associates in more than 100 locations in the region (as of Dec. 31, 2022). Bosch generated consolidated sales of \$15.1 billion in the U.S., Canada, and Mexico in 2022. For more information visit [www.bosch.us](http://www.bosch.us), [www.bosch.ca](http://www.bosch.ca) and [www.bosch.mx](http://www.bosch.mx).

The Bosch Group is a leading global supplier of technology and services. It employs roughly 421,000 associates worldwide (as of December 31, 2022). The company generated sales of \$93.1 billion in 2022. Its operations are divided into four business sectors: Mobility Solutions, Industrial Technology, Consumer Goods, and Energy and Building Technology. As a leading IoT provider, Bosch offers innovative solutions for smart homes, Industry 4.0, and connected mobility. Bosch is pursuing a vision of mobility that is sustainable, safe, and exciting. 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 facilitate connected living with products and solutions that either contain artificial intelligence (AI) or have been developed or manufactured with its help. 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 470 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. With its more than 400 locations worldwide, the Bosch Group has been carbon neutral since the first quarter of 2020. The basis for the company's future growth is its innovative strength. At 136 locations across the globe, Bosch employs some 85,500 associates in research and development, of which nearly 44,000 are software engineers.

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-four percent of the share capital of Robert Bosch GmbH is held by Robert Bosch Stiftung GmbH, a charitable foundation. The remaining shares are held by Robert Bosch GmbH and by a corporation owned by the Bosch family. 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.

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

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