

Autonomous flight, the Bavarian way

BayCHAMP initiative promotes Bavaria-made
computer hardware for air mobility platforms



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Introduction

Before long, autonomous flying craft will be used for goods and passenger transport, providing a ubiquitous traffic infrastructure. With its BayCHAMP initiative, the German state of Bavaria promotes the design of domestic computer hardware for use in air mobility platforms for small to mid-sized aircraft, in which classic aviation systems are difficult to integrate. The consortium's leader MicroSys has designed an innovative platform that ensures maximum safety and reliability, providing a substantial contribution to the future development of the Bavarian aerospace sector.

Bavaria is a key site of aerospace research and development. The free state in the south of the Federal Republic of Germany enjoys high levels of added value and employment in this high-tech industry. A multitude of original equipment manufacturers (OEM) and suppliers as well as universities and research institutes cover the entire value chain and contribute to the state's reputation as a leading aerospace region.

Bavarian aviation strategy

In an effort to hedge the highly innovative aerospace region's claim to factual industry leadership, the Bavarian government and parliament support the activities of companies and research institutes. Within the framework of Bavaria's 2030 aviation strategy, the state ministry of economy, state development and energy initiated the Holistic Air Mobility Initiative Bavaria (HAMI). This aims at utilizing innovative flying transport systems for inner-city and regional traffic for goods and passenger transport.

Within this high-level strategy, the ministry funds future-oriented projects with automation and the use of autonomous functionalities as a foundation for the goods and passenger transport. Another requirement posed on the developments funded is to facilitate operational implementation and seamless integration with existing infrastructure models or traffic systems. This enables them to sustainably hedge the leading role of Germany's aviation industry.

Computer hardware for future avionics

Within the framework of HAMI, the BayCHAMP initiative was launched in 2022 with the aim of further developing Bavaria as an aviation hub. Endowed with several million Euros, the program will terminate at the end of 2024. Its aim is to promote regional design and production of computer hardware for use in air mobility platforms for small to mid-sized aircraft, in which classic aviation systems are difficult to integrate.

"To enable people without a classic pilot training to use this kind of aircraft, these systems need the ability to calculate and execute autonomous flight maneuvers", says Ina Sophia Schindler, General Manager of MicroSys Electronics GmbH. "At the same time, meeting elevated safety standards requires safeguarding with three-channel dissimilar component redundancy and strict approval procedures for the systems."

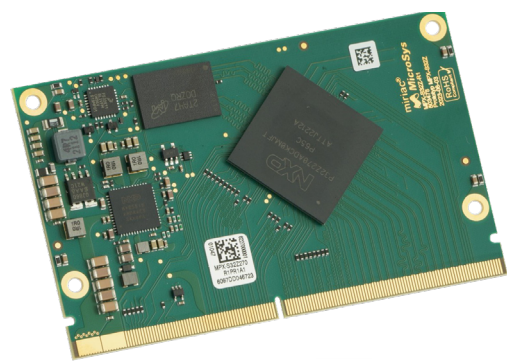


The BayCHAMP initiative launched by the Bavarian state ministry of economy, state development and energy in 2022 promotes regional design and production of computer hardware for use in air mobility platforms for small to mid-sized aircraft. Image © AVILUS

Modular flight control systems

Within the framework of the BayCHAMP program, MicroSys designed the miriac® MPX-S32Z2 system-on-module (SoM). This poses a high-performance platform for various highly innovative applications. While mainly targeting aerospace use cases, it is equally suitable for use in automotive or machinery applications. miriac® SoMs are application-ready platforms based on NXP® processor technology. The modules made in Germany support all processor integrated functionalities with a comprehensive, perfectly harmonized packages.

AEE Aircraft Electronic Engineering GmbH acts as a systems integrator and system builder of a flight control computers. The certified business used a carrier board designed in-house to integrate the miriac® MPX-



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S32Z2 SoM as well as a miriac® MPX-S32G399A high-performance processor module. Software specialist Tech S.A.T. GmbH used this configuration to create the third channel needed to fulfill the safety requirements.

Facilitating autonomous flight

“To fulfill the real-time requirements, the fast measurement and control algorithms use the miriac® MPX-S32GZ2”, Ina Sophia Schindler explains. “The architecture of the NXP processor used ensures uncompromised data determinism.” This is required to ensure reliability levels sufficient for autonomous flight. This is also the reason behind combining the SoM with the miriac® MPX-S32G399A. This module provides the high levels of processing power required for calculating complex flight paths.

Passenger safety is of course the prime requirement. Consequently, gaining the required approvals and certifications is vitally important. While system manufacturers need to gain approval for the overall system, MicroSys supports them by comprehensively preparing components such as the MPX-S32G SoM for approval during the design phase. The MPX-S32Z2 SoM also comes complete with all artifacts required for approval to facilitate timely deployment.

“The test flights due to be performed during the final project step to demonstrate the reliability of the computing platform and to prepare the approvals have already been scheduled”, Ina S. Schindler is glad to say. “They constitute the final step towards meeting the goals set by BayCHAMP.”

“The test flights demonstrating the reliability of the computing platform constitute the final step towards meeting the goals set by BayCHAMP.”



Ina S. Schindler, Managing Director,
MicroSys Electronics GmbH

Application-ready vehicle network processing platform

About MicroSys Electronics

MicroSys Electronics has been designing and developing embedded system solutions since 1975, is an NXP Gold Partner and widely integrates NXP's S32 Automotive, Layerscape and QorIQ processor technology. Designs based on System-on-Modules (SoMs) are the strengths of this German company, with the portfolio ranging from application-ready SoMs and customer-specific carrier board designs to fully integrated systems. Application areas for these extremely rugged designs with long-term availability are primarily found in markets where safety standards analog to IEC 61508 are required, such as railway technology (EN 50155), aviation (DO-160), and mobile machinery (ISO 13849), as well as manufacturing robots (ISO 10218), control systems (IEC 61131-6), and drive systems (IEC 61800-5-2). Further application areas can be found in medical technology (60601), and in critical infrastructures, for instance in the nuclear sector (IEC 61513) or the process industry (IEC 61511). MicroSys works closely with its customers in all these industries to ensure that the specific applicable standards are fully met.

For more information, visit www.microsys.de



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