SHIRATECH
KNOWTION

Certified Software Development for

DEFENCE
AND AVIONICS

OUR
SERVICES

- Prototype Development
- Product Development
- Functional Safety
- Project & Technical Management
- Requirements Analysis
- System Engineering
- System Optimization & Refactoring
- Software Development
- System Integration
- System Verification
- Certification Process

HOW WE WORK

HOW WE BEGIN

We believe that great software starts with understanding. Through close collaboration, we gain a clear picture of your requirements, goals, and challenges. Depending on the nature, scope, and target environment of your project, we jointly define the effort, schedule and final objectives.

HOW WE IMPLEMENT YOUR PROJECT

Our end-to-end development approach ensures that every project is built on technical excellence and proven industry standards. Whether agile or following the waterfall model, each project adheres to a structured and transparent process:

- ▶ Requirements analysis and specification
- ▶ Joint process alignment and documentation
- ▶ Architecture and module development
- ▶ Installation and deployment in your target environment

WHAT WE VALUE MOST

We ensure the highest quality and compliance through comprehensive quality assurance methods:

- ▶ Adherence to documented development standards (e.g., V-Model XT)
- ▶ Traceability of artifacts throughout the entire product lifecycle
- ▶ Continuous audits and formal reviews (four-eyes principle)
- ▶ Structured verification using the Verification Cross Reference Index (VCRI)

WHAT
WE OFFER

For all phases of your product development

We offer a comprehensive range of services, from developing tailor-made concepts that take your specific requirements into account to the rapid implementation of functional prototypes. In addition, we reliably support you through all phases of development and certification of safety-critical systems.

System Concept

We develop customized concepts that take special requirements into account, for example for safety-critical systems. Norm-compliant procedures, such as hazard and risk assessments, are incorporated into the planning process from the very beginning. Our goal is to lay the foundation for a safe, reliable, and standards-compliant system already during the concept phase, ensuring that all relevant conditions are met. Based on this foundation, we design robust system architectures with clearly defined safety boundaries, redundancy concepts, and fault-handling strategies, tailored to meet Safety Integrity Level (SIL) and military requirements.

System Design

A well-thought-out system design is crucial for the performance and long-term viability of a technical product. Within the framework of a structured systems engineering process, we capture and analyze all functional as well as safety-relevant requirements. Building on this, we make informed decisions together with our clients regarding the selection of suitable hardware components and develop an appropriate software architecture. We focus on clear modularization, well-defined interfaces, and long-term maintainability of the software. The aim is a future-proof architecture designed to support continuous enhancements and compliant verification according to relevant standards.

Prototype Development

By developing prototypes, we can quickly and efficiently implement initial functional versions of a system. This is based on an initial design of the system and software architecture, which serve as the foundation for the targeted implementation of core system functions. This early-stage functional prototype provides valuable insights for further development. Key system aspects can be tested, validated, and optimized already in the early project phases, reducing development risks, accelerating decision-making, and laying the groundwork for efficient further development up to the final product.

Certification Process

For safety-critical systems, standards-compliant certification is essential. We guide our clients through the entire certification process, for example in accordance with IEC 61508. Our expertise includes implementing compliant development processes (e.g., according to the V-Model), developing safety-critical software, conducting comprehensive verification and testing, and preparing all necessary documentation. This creates the foundation for successful certification and a reliable, long-term operational system solution.

SUCCESS
STORIES

SIL3-compliant black-channel communication for safety-critical I/O data

PROJECT GOAL

In mission-critical environments, reliable data communication is crucial. Our client required the development of a modular, SIL3-certified product family for secure I/O data exchange using black-channel communication—deployed in scenarios where The solution was designed to be deployed in environments where the transmission path itself cannot be trusted, but data integrity must still be guaranteed.

This not only required the technical implementation of SIL3-compliant modules based on the IEC 61508 standard, but also a structured, holistic approach to the design, specification, and testing of safety-critical systems. Through close collaboration, system-level engineering, and our embedded software expertise, we were able to transform the concept into a robust, certifiable solution—ensuring safety, flexibility, and compliance.

OUR SOLUTION

▶ Modular, SIL3-certified Product family

▶ Takeover of Leadership in System & Software Engineering

▶ SIL3-compliant Development Processes

▶ Testing & Validation

Benefits

✚ SIL3-certified product family, ready for deployment

✚ Flexible modules, adaptable to various applications

✚ Strengthening client teams through improved toolchains and processes

✚ Robust, scalable architecture for safety-critical environments

✚ Proven functional safety through comprehensive testing and documentation

Embedded Camera Systems: Low-latency Multi-stream Processing

PROJECT GOAL

Parallel video streams from visible light and infrared are essential in many applications, such as environmental monitoring or condition assessment. In several projects, we have worked closely with our clients to develop components that capture image data from multiple cameras synchronously, process it efficiently, and provide it via standardized interfaces. This ensures minimal latency and a low computational footprint, preventing overload in downstream systems.

We aimed to develop scalable software modules for low-latency multi-stream processing. The requirements were defined collaboratively, implemented as prototypes within a short timeframe, and, after thorough validation, transitioned into production-ready solutions. The development process consistently followed recognized standards such as V-Model XT and AQAP 2110.

OUR SOLUTION

▸ Fast Prototype Development

▸ Modular Development of Embedded Software

▸ Testing & Validation

▸ Standardized Interfaces (H.265, RTSP, NGVA)

Benefits

+ Robust, scalable system design

+ Resource-efficient programming

+ Utilization of hardware acceleration

+ Standards-compliant documentation

+ Minimal latency in the video channel

+ Support for displaying overlays

Airspace Surveillance: Algorithms for Tracking Civil Aircraft

PROJECT GOAL

Modern airspace surveillance relies on a continuously updated air situation picture that provides critical information such as aircraft type, flight number, exact position, and speed to support informed decision-making. This requires integrating and processing data from a variety of radar sources, including primary radar, secondary radar (Mark X/XII), ADS-B, and Wide Area Multilateration (WAM).

The goal of this project was to develop a highly precise, real-time tracking algorithm capable of processing heterogeneous radar data with varying error patterns, measurement rates, and interference characteristics. Integrated into an existing Surveillance Data Processing System (SDPS), the software meets the highest standards for reliability and latency, ensuring accurate aircraft tracking even in the event of signal disturbances or system failures.

OUR SOLUTION

▸ Advanced Algorithms for Data Association & Track Updates

▸ Multisensor Data Fusion

▸ Rigorous Development & Testing

▸ Rapid Prototyping Environment

Benefits

✚ Global tracking using a unified coordinate system

✚ Redundant system ensuring uninterrupted data processing

✚ High-precision positioning with automatic correction of errors

✚ Detection of aircraft maneuvers (climb, descent, turns)

✚ Automated deactivation of faulty radar stations

✚ Reliable, real-time air situation picture for decision-makers

ABOUT US

We are your central technology partner for fail-safe software development in safety-critical applications.

From architecture to certification, we support providers of avionics and defense solutions in the development, localization, customization, and integration of advanced technologies. Our expertise in software development and systems engineering ensures the reliable, compliant, and certified delivery of mission-critical functions. Each solution is aligned with the highest safety and compliance requirements.

We offer a comprehensive range of services: from developing tailored concepts based on specific requirements to the rapid implementation of functional prototypes.

Highlights

14+ years of experience in functional safety

125+ successfully delivered projects

30+ highly qualified developers (PhD & Master's only)

Experts for embedded systems and safety-critical software

Agile teams that integrate seamlessly into your development process

SOFTWAREALLIANZ DEUTSCHLAND

ISO 9001
Knowtion GmbH, Karlsruhe
certified since 2012

Mitglied im
AMA
Verband für Sensorik + Messtechnik
Innovationen verbinden

OPEN INDUSTRY 4.0 ALLIANCE

Allianz für Cyber-Sicherheit
Teilnehmer

CyberForum
HIGHTECH. UNTERNEHMER. NETZWERK.

Our Expertise

With many years of experience in the development and certification of safety-critical systems, we are a reliable partner for demanding projects.

Our interdisciplinary expertise in automotive, industrial automation, and air traffic management enables us to seamlessly deliver mission-critical solutions.

We develop systems that impress with high reliability, performance, and tailored design to meet individual requirements and highest expectations.

Our typical customers

- System Integrators
- Medium-sized Suppliers
- Component Manufacturers

Industry standards

ED-153   IEC 61508   DO-178   MIL-STD-882

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Let's develop
RELIABLE SYSTEMS TOGETHER

BOOK A MEETING →

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