



**WITTENSTEIN**

# high **integrity** systems

A Safety Systems Company Specializing in RTOS & Middleware

RTOS, Middleware, Support, & Consultancy

# Committed to Safety

Automotive Medical Aerospace Process Nuclear Rail RTOS Middleware Safety Components Tools Services

WITTENSTEIN high integrity systems (WHIS) is a developer of mission and safety critical real-time operating systems and middleware products. WHIS is part of the WITTENSTEIN Group, a global technology company established in 1948 with a presence in over 45 countries.

### A Safety Systems Company

WHIS is the Group's centre of excellence for high integrity and safety critical embedded systems design. Originally part of the aerospace division, WHIS is first and foremost a safety systems company, a key differentiation in the real-time operating systems market, as WHIS has direct experience of developing safety critical products.

The WHIS functional safety management structure, and high integrity development life cycles, ensure that the entire WHIS product range delivers consistently high levels of performance and dependability.

### Our Relationship with FreeRTOS™

WHIS leverage RTOS technology from FreeRTOS™, the market leading embedded real time operating system from Real Time Engineers Ltd.

WHIS has a unique relationship with the FreeRTOS project as Richard Barry, the creator of FreeRTOS and the owner of Real Time Engineers Ltd, is also the Innovation Leader for WHIS and was instrumental in setting up the division.

## Partners



### Dr David Cowling Managing Director

A WITTENSTEIN pioneer with over 40 years' experience in the aerospace industry, specialising in safety critical embedded systems design and flight-qualified fly-by-wire aviation systems.

### Richard Barry Innovation Leader

An influential personality within the RTOS industry and well respected embedded expert. Renowned as the creator of FreeRTOS™, the author of several books and much in demand as a presenter at conferences and trade shows.

### Andrew Longhurst Business Development Manager

A skilled project leader with an extensive background in electrical, electronic and software engineering delivering an in depth understanding of the challenges facing embedded engineers within the safety critical sector.

### Steve Ridley Head of Engineering

A highly knowledgeable and talented engineer with more than 20 years' experience designing real time embedded software for use in safety critical applications across aerospace, automotive, military, industrial and telecoms industries.



# RTOS & Middleware Components

### RTOS, Middleware, Tools and Services

The WHIS RTOS ecosystem has been tailored to enable embedded software engineers to develop robust and responsive products, efficiently and on-time.

### Extensive Architecture and Tool Chain Support

WHIS products support an extensive range of embedded platforms including over 30 microprocessor architectures and more than 15 tool chains, providing solutions for commercial and safety critical applications, backed up by flexible licensing terms.

### Knowledgeable, Comprehensive Support

Customers are supported from project conception and throughout the lifetime of their product. The WHIS team of expert engineers provide not just technical support, but advice on how to use our components within a safety critical development, and on all aspects of product certification.

### From Single Products to Corporate Solutions

The WHIS extensive and feature rich product range offers a complete solution for engineers seeking software components for their next project, and for corporations seeking a single supplier to fulfill all their RTOS and middleware needs throughout their entire organization.

### Continual Innovation

SAFERTOS® was the first RTOS to be certified to IEC 61508 by TÜV SÜD, as well as the first pre-certified RTOS to be ROM'ed within a mainstream microprocessor. WHIS continues to lead the way with its family of real time operating systems solutions that have revolutionized the RTOS market.



## Subscribe

Stay informed about our latest news, upcoming product launches, special events and the exhibitions in which we are participating.

Sign up to our newsletter at [www.highintegritysystems.com/newsletter](http://www.highintegritysystems.com/newsletter)

FreeRTOS™ is a market leader, with over 100,000 downloads per year

FreeRTOS™

We added commercial licensing, middleware, support & indemnification

OPENRTOS®

We rebuilt for the safety sector, adding multiple certification standards

SAFERTOS®

We provide a leading RTOS ecosystem that has achieved global recognition





# OPENRTOS®

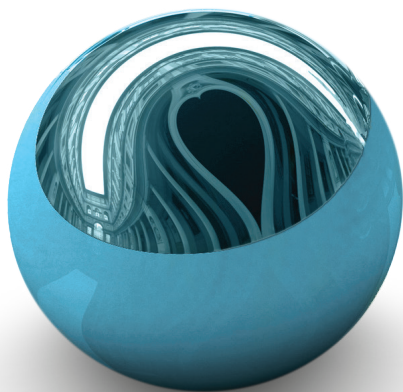
Fast, Lightweight, Intuitive

OPENRTOS® provides the only available commercial license for FreeRTOS™, the highly successful, small, efficient embedded real time operating system distributed under a modified GPL license. OPENRTOS and FreeRTOS share the same code base, however OPENRTOS truly transitions developers into the professional world, with full commercial licensing, and access to direct support, backed up by tools, training and consultancy services. Developers can extend the functionality of OPENRTOS by selecting from a wide range of middleware components and Board Support Packages.

OPENRTOS supports a large number of microprocessors and FPGA soft cores, can be used in System on Chip devices and even ROM'ed into the memory of microprocessors.

### Start your Development for Free

Our novel approach to licensing means developers can start their development for free using FreeRTOS and upgrade to OPENRTOS later when a commercial license, middleware, or support is required. FreeRTOS updates and ports are simultaneously released by WITTENSTEIN high integrity systems as OPENRTOS.



### Commercial License

An OPENRTOS license frees users from the FreeRTOS modified GPL license. Developers no longer have to publicize that their products contain FreeRTOS, or offer to make the FreeRTOS code base available to their customers. Additionally an OPENRTOS license provides IP indemnification, access to professional support and the ability to select components from our range of CONNECT MIDDLEWARE.

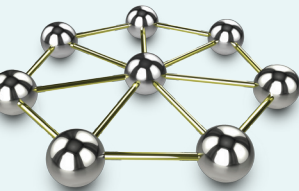
### Professional Service

WHIS takes responsibility for ensuring OPENRTOS works with your chosen processor / compiler combination, verifies its correct operation, and delivers a working demonstration project with full source code integrated with any purchased middleware components. This approach has been designed to ensure your developers are working effectively with our products without delay. OPENRTOS is also supplied with one year's free support, giving you direct access to our team of highly experienced engineers.

## Safety Components

Increase the Integrity of your Products

Our safety components are designed to bring greater integrity to your safety critical application. All of our safety components are delivered as high integrity modules, with both full source code and a Design Assurance Pack built to the same exceptionally high standard as SAFERTOS.



### SAFEXchange™

Securely share safety critical data between multiple processors and cores across black channel communication buses. Conforms to the principles of IEC 61784-3.

### Checkpoints

Provides a sophisticated task monitoring capability that allows the user to specify timing tolerances for critical sections of code.

### CRC Checker

Guard against corruption and malicious attack by confirming the correctness of your program memory.

# SAFERTOS®

Safe by Design



SAFERTOS® is a pre-emptive, pre-certified real time operating system that delivers unprecedented levels of determinism and robustness to embedded systems. Based on the FreeRTOS functional model, but specifically re-designed for the safety market by our own team of safety experts, SAFERTOS is independently certified by TÜV SÜD to IEC 61508 SIL3.

### Built Specifically for the Safety Market

Designing a safety critical RTOS is about more than just applying process. Risk management is required across the complete development life cycle to identify a full set of safety requirements. These safety requirements have a major impact on the implementation of the RTOS, resulting in a trusted product containing intrinsic self-verification routines and other features essential for use in a safety critical application.

### The Design Assurance Pack™

SAFERTOS is tailored to your specific processor/compiler combination, and delivered with full certification evidence in the form of a Design Assurance Pack™ (DAP) . The DAP gives you complete transparency over the full Design Life Cycle, and illustrates the exceptional high quality of SAFERTOS.

### A Smooth Certification Path

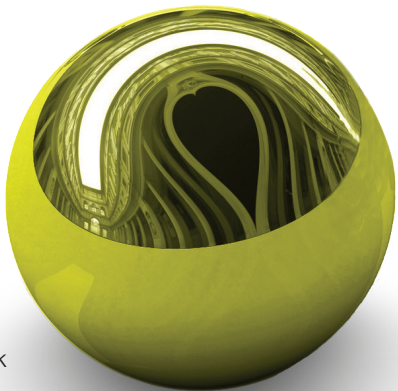
Using our extensive safety critical design experience we have made certifying SAFERTOS integrated within a product an easy and hassle-free process.

Contained within the DAP is the all-important Safety Manual. The Safety Manual explains exactly how to install and integrate SAFERTOS into your development environment. Following the concise instructions will also generate the evidence required by your auditors to confirm the process has been followed correctly. This removes the need to re-test SAFERTOS on your target hardware, and provides a solid dependable platform for your development.

### Key Features

SAFERTOS key features include:

- Intrinsic self-verification routines
- MPU support as standard
- Migration path from FreeRTOS
- IEC 61508 SIL3 certified by TÜV SÜD
- MISRA C compliant
- 100% MC/DC verification coverage
- Supports wide range of microprocessors
- Supports all popular development tools
- Full source code and Design Assurance Pack



### MPU Support as Standard

SAFERTOS is supplied with full Memory Protection Unit support as standard. This allows both safety critical and non-safety critical code to be present within the same linear address space, whilst remaining isolated from each other, greatly reducing development time and cost.

### Full Life Cycle Support

Our own team of software and safety experts are on hand to help. With extensive knowledge and direct experience of safety certified software, we can help resolve your technical, safety and certification issues.

As part of our standard support and maintenance agreement, we will revalidate your version of SAFERTOS with the latest compiler versions, ensuring you can use SAFERTOS with the very latest tools.

### Royalty Free, Perpetual Licensing

We aim to provide customers with a license model that best suits their needs, supported by a transparent pricing policy.

**Our standard licensing model uses a royalty free, perpetual license with an unlimited number of production units.**

We have three standard levels of licensing- Single product, Multi Product and Corporation, but remain flexible and receptive to the needs of our customers.

## Fully Integrated 'Out of the Box' Solutions

When integrating middleware with **SAFERTOS**, our safety engineers will use the **SAFERTOS** MPU functionality to isolate middleware code from other safety critical code segments. This allows mixed safety integrity levels of software to coexist within the same build of code, resulting in lower development & production costs.

We provide full Board Support Package services, and will design to your specific requirements for use with either **OPENRTOS** or **SAFERTOS**.

## USB

## USB Host

CONNECT USB Host is a high performance, scalable stack that enables an embedded host to control a variety of USB devices. It supports multiple devices and hubs with automatic device type detection, driver assignment and application notification.

CONNECT USB Device is a small, efficient and easy to use solution which enables connection of USB devices to PCs and other USB hosts.

- Supports OHCI, EHCI and proprietary host controller standards
- Supports a wide range of class drivers
- Transfer types include Control, Bulk, Interrupt and Isochronous
- Small footprint

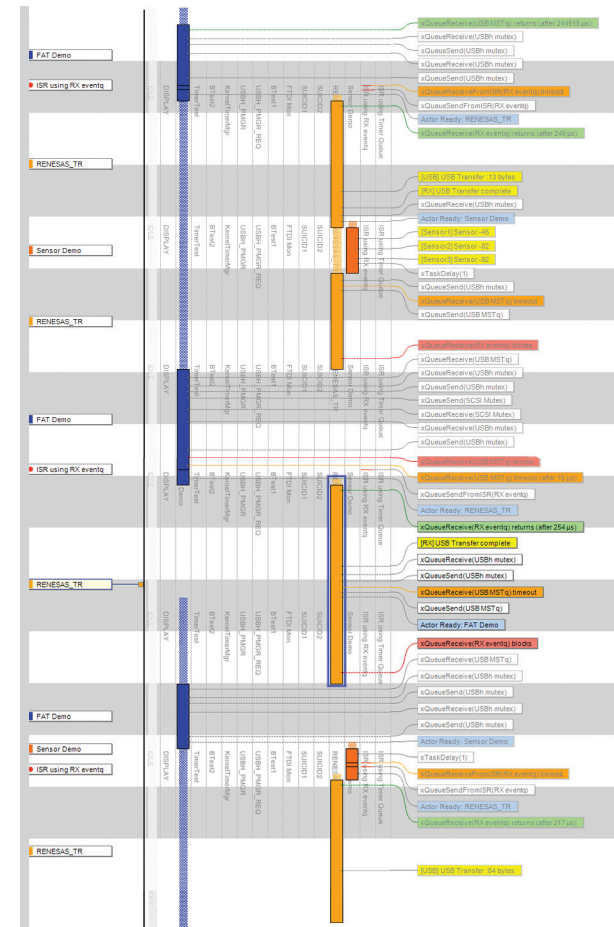
WHIS are the European distributors for InterNiche Technologies Inc., a premier specialist provider of internet protocol software stacks and networking expertise.

NicheStack IPv4 and NicheStack IPv6 are complete TCP/IP protocol stacks combining small size, extreme portability and high performance without compromise in RFC compliance.

NicheStack Dual offers a unique and flexible combination of networking support for devices that must operate in today's IPv4 based networks and be compatible with future upgrades to IPv6 environments.

NicheStack IPSec and IKE bring security to new or existing embedded systems by providing state-of-the-art secure communication, management and high performance VPN end-point capabilities to networked devices.

NicheStack SSL and TSL provide public key asymmetric cryptography with 1024 bit key generation and triple DES encryption.



## In Depth Analysis

Stateviewer is a development tool providing enhanced kernel awareness, including the ability to check the stack usage of each task as well as the task's switching and resource states. The Stateviewer IDE plug-in tool is offered with IAR and Eclipse tools and works with both OPENRTOS and SAFERTOS. It is **freely available for download from our website.**

SAFERTOS+Trace is a powerful profiling tool, that visualizes real time system events, enabling engineers to debug and optimize their applications.

- Over twenty different interlinked views
- Analyze CPU loading profiles
- Understand the interaction of tasks and ISR
- Provides tracing of all kernel events
- Logging of additional user defined events
- Runs on any Windows host
- Smooth magnification and scrolling to change views



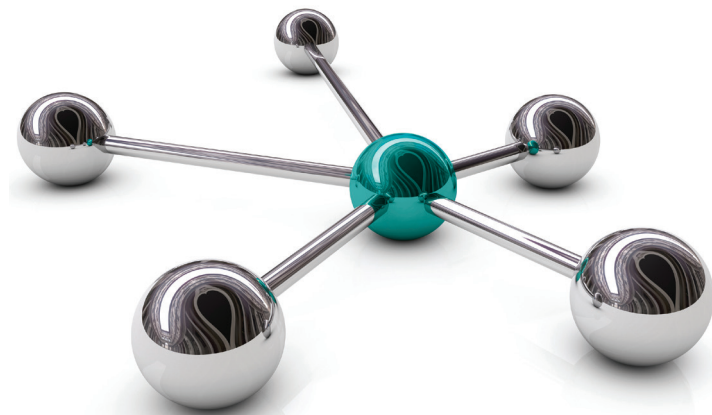
## Benefit from our Expertise

Utilize our experienced team of engineers to really get the most from your product. Understand the full capability of your RTOS and make greater use of its features, leading to enhanced designs and shortened development schedules.

Our consultancy services have been designed to support our customers, allowing us to share our knowledge and experience to help optimize the final design, improve the design processes, and smooth the route to certification.

Sometimes just a few hours of consultancy to review a preliminary design and check the approach being taken is correct can deliver significant benefits to the outcome of a project.

We offer support with all of our products. Be assured that our engineers will be there when you need them throughout the lifetime of your product.





**WITTENSTEIN**

## high**integrity**systems

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