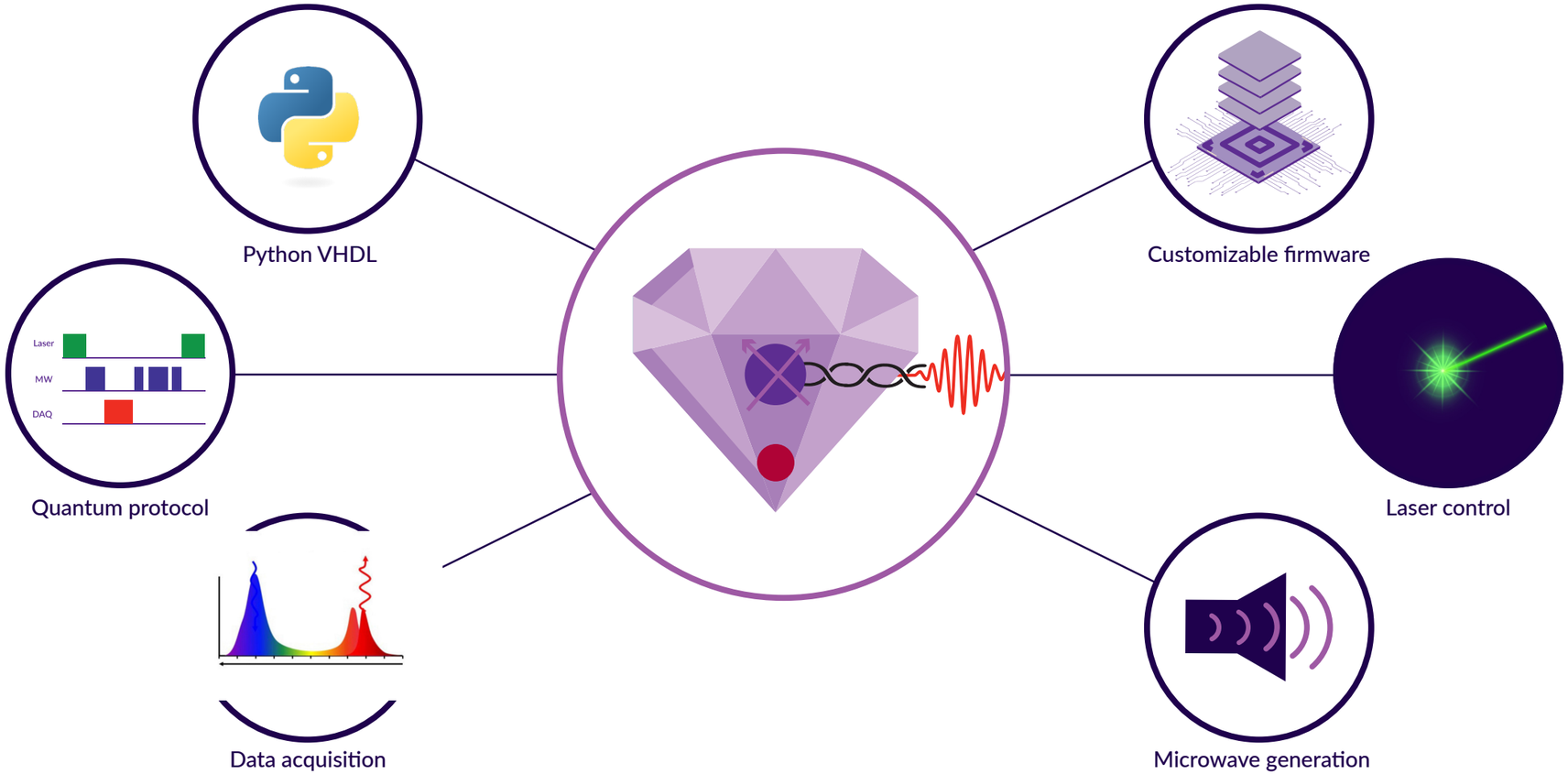
COSYLAB

Advancing humanity.
Engineering remarkable.



NV Centers – at the Heart of Quantum

NV (nitrogen–vacancy) centers are defects in a diamond's crystal lattice. They exhibit unique quantum properties that make them ideal for high-precision magnetic field sensing, quantum computing, and quantum-enhanced imaging.

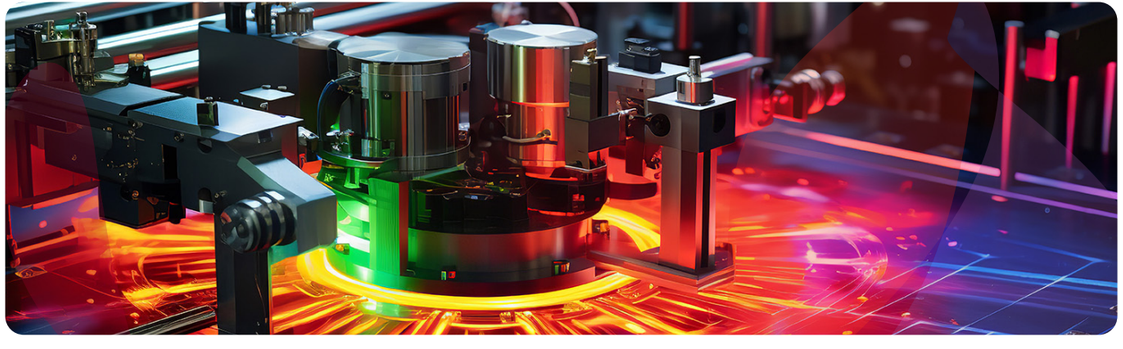
starQ –
Solving Tomorrow‘s Challenges Today

starQ is a NV controller, a specialized hardware device designed to manage and control NV centers in diamonds.

With starQ, you can achieve unmatched precision and control tailored exactly to your needs. Engineered for seamless integration with NV sensors and delivering ultra-clean microwave performance, starQ empowers you to elevate your operations with reliability and ease.

Benefits:

- Precision Control, offering highly accurate control and data feedback.
- Custom Firmware, tailored to fit your unique requirements.
- White Labeling, alligned to your branidng needs.
- NV Sensor Optimization, enhancing performance in relevant applications.
- Integrated Timing and Synchronization to ensure seamless, coordinated operations.
- Advanced Sequence Generation for sophisticated applications.
- High-Quality Microwave Output, with no harmonics and low noise.



Key Challenges

■ No dedicated CE product for NV centers. ■ Usually multiple standalone electronics are put together in a lab for a proof of concept.	→ Allows controlling the NV center with an all-in-one CE certified device
■ Sophisticated real-time, fast and accurate control and data acquisition. ■ Advanced quantum protocols.	→ Advanced sensor FPGA control based on NV
■ Different NV applications have different basic or advanced functionalities needs.	→ Allows custom controller development using starQ
■ NV controller is only a part of the whole system. ■ Different use cases need different sub-systems and one of them is NV controller. ■ The integrability is important for high–end product on a specific application.	→ Can be integrated into your own system

starQ Functionalities & Specifications

Functionalities

- Sequence generation
- Synchronization of inputs & outputs
- 4 analog inputs, 4 analog outputs, 4 digital outputs, 4 digital inputs
- Real-time execution
- C++ and Python SW API

Specifications

- Analog outputs (RF generation): **10Gsps, RF bandwidth DC-4GHz**
- Analog inputs (Data Acquisition): **1Gsps, bandwidth DC-0.4GHz**
- Digital I/Os: **TTL signal with level translator 3.3V/5V**
- Timing resolution: **10ns**
- Ethernet connection: **1Gb bandwidth**

starQ Applications & Use Cases

Quantum Sensing

Magnetometry
Temperature Sensing
Electric Field Sensing
Qyroscope

Quantum Computing

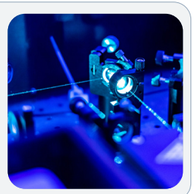
Quantum Memory
Qubit Base

Biological Applications

Nanodiamond Sensors
Non-invasive Imaging

Quantum Metrology

High-Resolution Imaging
Atomic force microscope



Fundamental Physics

Quantum Entanglement and Decoherence Studies
Tests of Quantum Gravity

MRI and NMRI

Nanoscale MRI

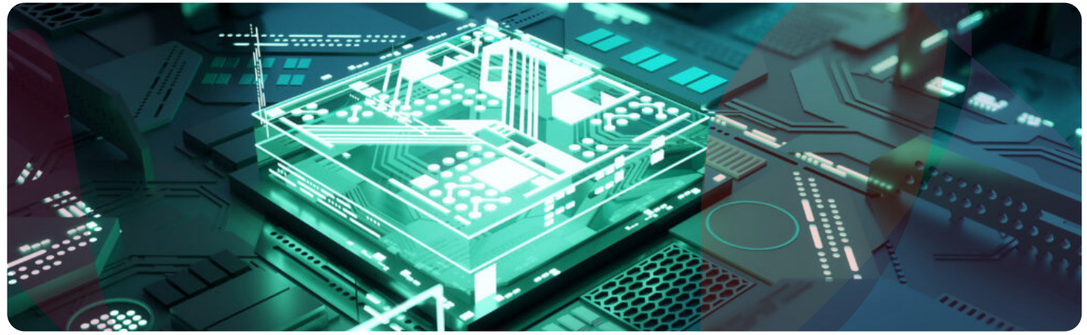
Customization & Resources

Tailored to Your Needs

- starQ offers flexible customization to meet unique application requirements — from custom firmware to white-labeling. Our team is ready to help you achieve the perfect fit for your project.
- Send us an email to **quantum@cosylab.com** to discuss how we can customize the right solution for you.

See starQ in action

- Explore how starQ powers a cutting-edge quantum gyroscope, enabling high-precision navigation in tight spaces. The innovative approach to control and synchronization highlights the potential of quantum technology in miniaturized, real-world applications.



Slovenia HQ office
T: +386 1 477 66 76
E: info@cosylab.com

China
T: +86 512 6813 3600
E: china@cosylab.com

Japan
T: +81 3 6275 0400
E: japan@cosylab.com

Switzerland
T: +41 56 560 50 43
E: switzerland@cosylab.com

USA
T: +1 630 364 27 44
E: usa@cosylab.com

About Cosylab

Cosylab is the leading provider of cutting-edge expertise, turnkey software solutions, and electronics for the world's most advanced systems and devices, such as particle accelerators, large telescope arrays, fusion reactors, quantum technology, innovative medical devices and cancer therapy systems. Our turnkey software solutions enable organizations to make scientific breakthroughs, deliver state-of-the-art cancer treatments, develop healthcare innovations and bring clean fusion energy to the world.

We help organisations of all sizes and scopes accelerate development and shorten time-to-market with our unique end-to-end capabilities. Our solutions are integrated into the most significant Big Science international projects, including CERN and ITER, and transformative quantum initiatives. We provide software products and services to the largest medical device manufacturers and cancer centres worldwide, such as Varian and MGH. Our engineering expertise helps innovative medical start-ups get their medical devices to patients faster.

From our headquarters in the EU and subsidiaries across Europe, North America and Asia, we have worked on hundreds of multi-year and multi-people projects worldwide.

www.cosylab.com

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