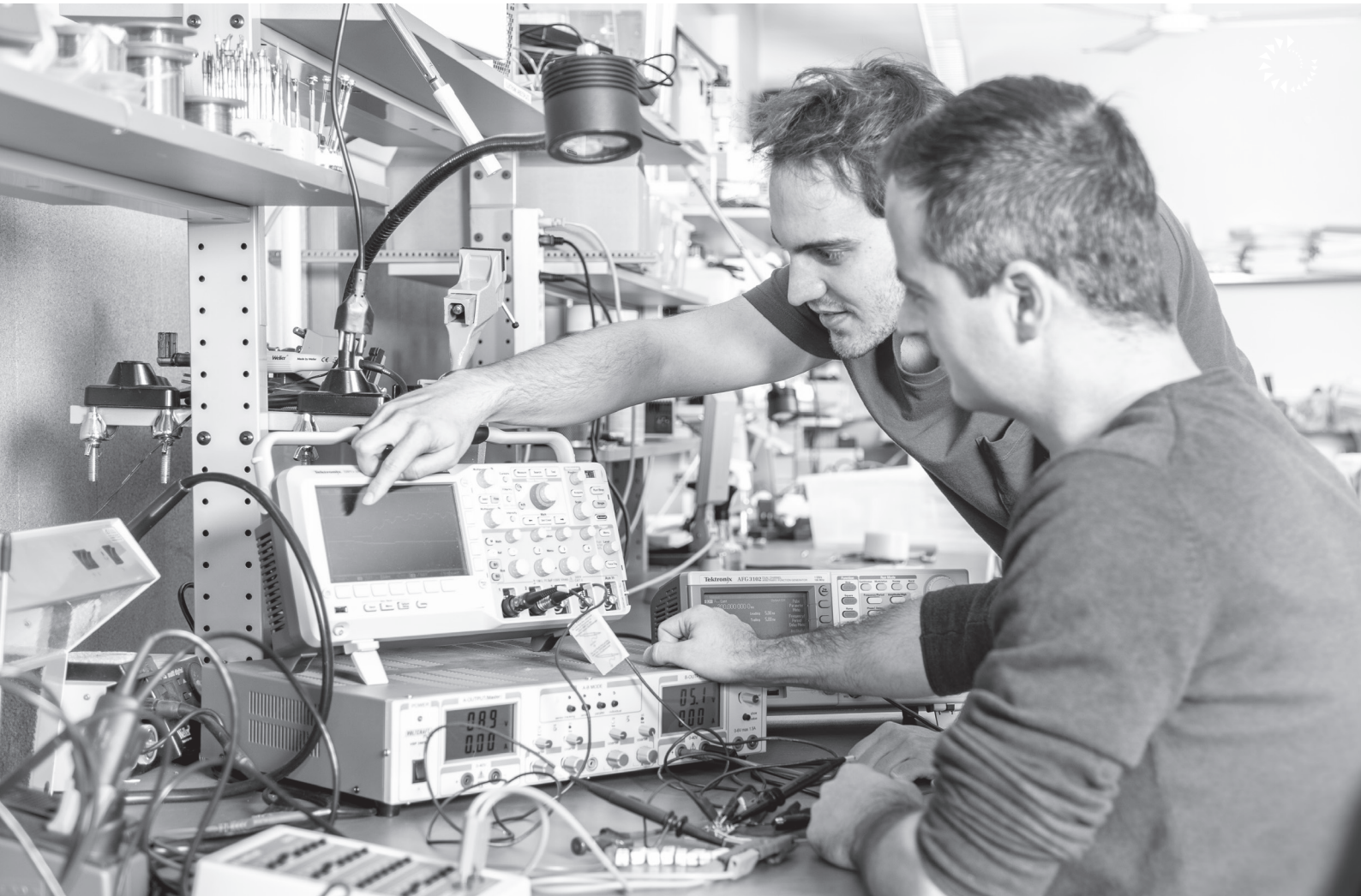


Electronics and software



Challenge >>

Electronics and even software are classified as medical devices. They require a development process which meets the highest technical standards as well as strict regulatory requirements.

$$Z_{th}(t) = \sum_{i=1}^n R_{thi} \cdot \left(1 - e^{-\frac{t}{R_{thi} C_{thi}}}\right)$$

Approach »

Individual, customer-specific development of an optimal solution by highly qualified, experienced engineers applying modern tools.

Services »

- **Development of electronic devices.** We develop analogue and digital systems in accordance with EN 60601-1 and relevant sub-standards. Our development environment enables the efficient generation of schematic, simulation and layout.
- **Small batch PCB.** We produce and assemble your electronic components as prototypes or small batches. Our in-house SMD assembly line for PCBs enables us to guaranty short lead times.
- **Data acquisition.** Design and realization of sensory circuits to record and process physiological information (e.g. temperature, pressure, optical NIRS).
- **Data storage.** Serialization of data in structured files or databases.
- **Control technology.** Connection and activation of actuators (e.g. MEMS) and lasers.
- **Firmware.** Low-level, application-specific programming for microprocessor systems and DSP in C/C++.
- **Software development.** We develop your medical software in accordance with our established development process and consistent with EN 62304.
- **Risk management and software classification.** We assign your software system to the appropriate safety class.
- **Software architecture.** We design your software according to your requirements by using established design patterns and selecting suitable technologies and frameworks.
- **Implementation.** The code is implemented in C++, object-oriented and, thanks to the Qt framework, cross-platform.
- **Documentation.** The documentation of the source code is ensured using Doxygen.
- **Verification.** We generate test plans and carry out statistical and dynamic code analyses as well as unit tests using automated building systems.

- **EMC and safety.** We can apply various pre-tests for EMC and electrical safety conformity assessment.
- **Signal processing.** Development of algorithms (e.g. filtering, Fourier transform).
- **Communication.** Development of proprietary interfaces or integration of existing protocols (e.g. via RS232, Bluetooth, USB, TCP/IP).
- **GUI development.** We design an intuitive graphical user interface taking into account the usability according to EN 62366, configurable and optimized on request for touch screen with scalable user controls.
- **Monitoring.** Jitter-free presentation of curves and digital data.

Trust »

Not only do we develop technical devices but high-quality products for physicians and hospitals – since 1999 and certified according to EN ISO 13485.

Uniqueness »

A leading interdisciplinary team in Switzerland is working for you – practically based and target-oriented.

Do you wish to accelerate the development of your electronic devices and software with established processes?



Contact »

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Carag »

Carag is a leading Swiss engineering company and point of contact for physicians and medtech companies developing high-quality products for cutting-edge medical applications. Carag has an experienced, performance-driven, interdisciplinary team of engineers, physicians, medical technicians, electronic technicians and software developers. The broad range of specialized engineering and consulting services starts with technical feasibility checks and continues with product development through marketing approvals, regardless of the regulatory complexity.