

Since its establishment in 1971, the Department of Electronics and Informatics (ETRO) has embraced an interdisciplinary approach. Today, it is the largest department within the Faculty of Engineering at the Vrije Universiteit Brussel, bringing together a critical mass of over 150 researchers from across the globe. The research group ETRO.RDI - where RDI stands for Research, Development, and Innovation - comprises approximately 160 collaborators, including many from outside the department.

“We organize three master’s programs: the Master of Science in Electrical Engineering, the Master of Science in Applied Computer Science, and the Master of Science in Biomedical Engineering,” explains Prof. Dr. Ir. Johan Stiens, head of both the ETRO department and the ETRO.RDI research group. “ETRO is at the forefront of breakthrough innovations and open-minded education. Our strong connections with the Faculty of Medicine and Pharmacy and with the university hospital foster unique interdisciplinary skill development and a holistic approach to technological problem-solving. We are recognized for our capacity to experiment, our tradition of out-of-the-box thinking, our cosmopolitan mindset, our teamwork, and our enthusiasm to explore new R&D areas.”



Prof. Stiens demonstrates a LiDAR-based technology for the inspection of e.g. cavity walls (FTI festival, 2024). © Thierry Geenen / VUB

Research facilities

The ETRO department prepares qualified professionals for leadership positions in industry, business, government, and education. It offers a broad range of courses taught in both English and Dutch, accessible to both international and national students. “Our students benefit from access to an extensive array of research facilities, empowering them to become responsible, critically-minded citizens and lifelong learners.”

The department boasts advanced infrastructure for digital visualization and plays a prominent role in international standardization initiatives such as the JPEG standards and the development of printer drivers.

In the realm of R&D, ETRO distinguishes itself through its state-of-the-art facilities and its proactive approach to unexplored research territories. “Our laboratories cover a wide

spectrum of foundational and generic technologies, including micro- and optoelectronics, embedded electronics, communication and networks, multidimensional signal processing and data representation, big data, computer vision, artificial intelligence, and machine learning,” notes Stiens.

Over the years, the department’s areas of expertise have expanded significantly. Research themes now include healthtech and biotech, smart manufacturing, climate and meteorology, smart cities and the environment, security and surveillance, and even cultural heritage and creativity.

In the field of security and surveillance, ETRO focuses on anomaly detection systems based on multimodal visual inspection of production tools, systems, and outputs. ETRO.RDI also develops nano- and optoelectronic sensor systems, as well as acoustic and ultrasonic sensing technologies. “This includes work on physical interfaces, smart data acquisition systems, analogue and digital embedded electronics, and communication techniques. Our telecom research covers aspects of 5G and 6G, conducted in collaboration with imec. In the area of smart networks, we design embedded systems for wireless sensors and stimulators, optical networks, the Internet of Things, edge computing, encryption techniques, and web applications.”

Motivation

“Our motivation is to contribute to the improvement of the health and well-being of citizens with technological solutions and to contribute to the reduction of costs in the healthcare sector. We do this through advanced medical image analysis, clinical decision support, more precise digital interventions based on augmented and virtual reality, neurophysiological and rehabilitation engineering, multimodal physiological monitoring via wearable (opto)electronic medical devices.”

“ETRO’s R&D activities span both fundamental and strategic basic research. These efforts are recognized university-wide and supported by multiple Strategic Research Programs (SRPs) in collaboration with other engineering departments. ETRO is also acknowledged as a Group of Excellence in Applied Research (GEAR), funded by the Flemish Industrial Research Fund (IOF). This status has led to – until now eight – successful spin-off ventures and the creation of new employment opportunities.”

Networks

“Ambitious research projects require robust national and international networks,” says Stiens. “With this vision, we established long-term strategic partnerships with both academic and industrial research institutions.” Key collaborations include the Interuniversity Microelectronics Centre (imec, Belgium) and the Royal Meteorological

Institute of Belgium. Joint laboratories have been established with institutions such as Ghent University, University College London, the University of Patras (Greece), the École Polytechnique Fédérale de Lausanne, and Duke University (USA).

EqcoLogic

[EqcoLogic](#), the first ETRO spin-off, was launched in 2005, by Prof. Maarten Kuijk, Roger Vounckx, and Prof. Stiens himself. “It is a fab-less semiconductor company, specializing in high-speed, low-power analogue and mixed-signal ICs for digital signal equalization. In 2013, EqcoLogic was sold to Microchip Technology.”

Universum Digitalis

[Universum Digitalis](#) (°2008) is the brainchild of Frederik Temmermans and Iris Vanhamel,” explains Vice-Rector Peter Schelkens. “Their company provides digital solutions for the cultural sector. They developed high-resolution visualization technology for paintings and created, among other projects, the [Ghent Altarpiece website](#), capturing image data at a scale of billions of pixels. Their work has also supported the Bruegel exhibition in Vienna and the digitization of another van Eyck-work, The Madonna of Chancellor Rolin for the Louvre in Paris.”

Swave Photonics

In 2022, imec and the VUB jointly founded [Swave Photonics](#). “Swave manufactures spatial light modulators—chips that precisely control light. By dividing light into minuscule segments and manipulating them individually, the technology enables the creation of holograms for holographic displays with 180-degree viewing angles. The pixels measure only a few hundred nanometres – ten times smaller than what competitors can achieve.”

More spin-offs

Other ETRO spin-offs include:

[Optrima/ Softkinetic](#) (°2009) enables fully immersive, transparent and intuitive user experiences by providing 3D real-time hardware for interactive digital entertainment, consumer electronics, fitness/health equipment and industrial manufacturers. In 2015, Softkinetic was sold to Sony.

[Exia](#) (°2013) develops blind spot sensors to enhance road safety and reduce damage using innovative sensor technologies. The company is a strong example of how academic research can lead to successful industrial valorisation. Interestingly, the

original research project behind Exia focused on developing detectors for early-stage dental caries.

[M2Wave/Aquantis](#) (°2014) uses new insights into dielectric sensing at millimetre wave frequencies to offer novel cutting-edge sensor modalities for monitoring industrial processes and to bring novel analytical instruments for the life science industry. M2Wave has been acquired by the Swiss based company Aquantis.

[Lumency](#) (°2016) Provides embedded electronics and ICT solutions for smart cities, including wireless sensor arrays and smart actuators for buildings, lighting, and environmental monitoring.

[Say It Labs](#) (°2019) combines speech recognition technology with speech and language therapy, packaged in an interactive video game.



ETRO.RDI research group

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