



Credit photo: senseFly

Canton of Vaud: a drone industry booster

“We now practically cover the entire spectrum of technology for small drones: sensors and control, mechatronics, mechanical design, communication, and human interaction.”

*Prof. Dario Floreano,
Director, Swiss
National Centre of
Competence and
Research Robotics*

Engineering Quality, Trusted Applications & Neutral Services

Switzerland offers a unique multicultural and multidisciplinary drone ecosystem ideally located in the centre of Europe. Swiss drone stakeholders have the expertise and experience that can be leveraged by those looking to invest in a high growth industry, develop their own business or hire talent of this new era for aviation. Foreign companies, like Parrot and GoPro, have already started to invest in Switzerland.

Team of teams

Swiss academia, government agencies, established companies, startups and industry associations have a proven track record of collaborating in the field of flying robotics and unmanned systems. Case in point: the mapping solution proposed by senseFly (hardware) and Pix4D (software). Both are EPFL spin-offs, respectively from the Intelligent Systems Lab & and the Computer Vision Labs. They offer a good example of how proximity to universities and the Swiss aviation regulator (FOCA) gave them a competitive and market entry advantage. Within three years the two companies have collectively created 200 jobs in the region and sell their products and services worldwide. Another EPFL spin-off, Flyability, was able to leverage know-how of regionally strong, robust and lightweight structure specialists, Décision and North TPT to produce their collision tolerant drone that won The UAE Drones for Good Award of USD One Million in 2015.

Seasoned lab-to-market technology transfer

Setting up an European presence in Canton of Vaud, Switzerland, provides direct access to a very active ecosystem and multifaceted talent. This powerful synergy accelerates the research, development and sales of new products and services worldwide.

The region offers public and private facilities that cover the whole spectrum necessary to launch new flying robotic hardware and software. The list includes material sciences, aerodynamic simulation and structure testing centres, research in autonomous system, swarming and collaborative systems and flying machine arenas with integrated weather simulation.

Ambitious technological projects are well supported. At the national level, CTI grants are available to encourage higher education institutions and the private sector to jointly carry out application-oriented R&D projects. At the local level the Foundation for Technological Innovation (FIT) has provided essential support to many startups.

This range of institutions, skills and innovation grants has stimulated a steady stream of research in bio-inspired multimodal and collaborative robots. Recent projects in this area include MotionPilot's intuitive man-machine interfaces with haptic feedback, Terrabee's miniature sensors or NCCR's human-drone-dog interaction for complex search and rescue scenarios.

An export-oriented mindset

By its small size, the Swiss domestic market is limited. Therefore all technology companies have to focus from day-one on international business opportunities. The success of senseFly, Pix4D and Flyability is built on a network of hundreds of resellers worldwide.



Flyability's Elios is exploring a crevasse in the Swiss Alps

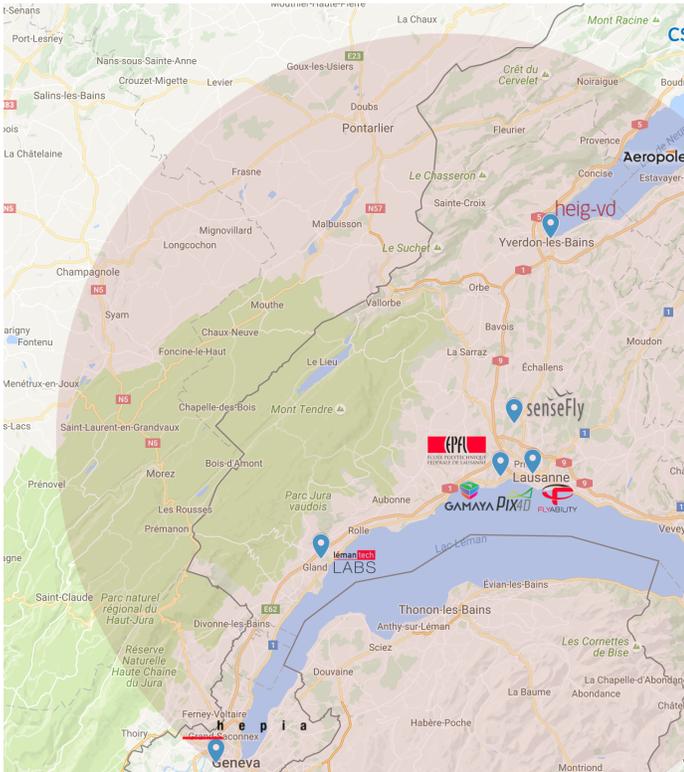
Open-minded aviation authorities

Historically, the Swiss aviation authorities have been open to new users and types of aircraft that want to access national airspace. This has encouraged innovation and helped with public acceptance. Since 2009, the Federal Office of Civil Aviation (FOCA) has hosted the Swiss Drone Day, a sharing and networking event for active members of the research, regulatory and industry communities. FOCA is chairing two out of the six working groups at JARUS, the Joint Authorities for Rulemaking on Unmanned Systems.

The authorities are a proactive stakeholder of the ecosystem. Skysoft, a subsidiary of Swiss Air Navigation Service Provider skyguide, is collaborating on the development of drone traffic management solutions.

A broad ecosystem

Other Swiss companies are providing the infrastructure needed for the safe and efficient integration of unmanned aircraft into the national airspace system.



Drone R&D and major companies in a 50km radius (one hour travel time) from Lausanne

SITA, a specialist in air transport communications and IT solutions, is exploring the use of the blockchain to securely identify drones. u-blox and Flarm are developing a solution for the cohabitation of drones and manned aircraft in airspace outside of Air Traffic Control.

Service-oriented companies are also actively participating. SwissRe provides insurance policies for drone manufacturers and operators that go beyond existing regulation. SGS helps companies identify the risks of operating drones and ways of using them to inspect assets and infrastructure.

Global standards for fast adoption

Switzerland is home to many standards bodies, such as ISO, and other international organizations, like ITU, in charge of global interoperability and infrastructure improvements.

With this historical background and the virtuous drone circle flying around Lake Geneva, it was natural for the Global UTM Association to pick Lausanne to establish its

headquarters. The association works at international level to identify actions for a smooth integration of drones into the airspace. The Swiss branch of Viasat, also based in Lausanne, leads the European H2020's Skyopener project which aims at establishing new foundations for the use of Remotely-Piloted Aircraft Systems for civilian applications.

Planning the future of drones from Switzerland

Other companies are investigating the long-term impact and disruptive nature of drones on business and society. Swiss Post has already conducted multiple drone delivery trials, including Beyond Visual Line of Sight (BVLOS) missions.

Droneport is going one step further and is designing the future transport hubs that will emerge to support drone services. Gamaya is working on hyperspectral remote sensing technologies and agriculture big data analytics needed to feed 10 billion people.

OpenStratosphere is developing the technologies that will enable high altitude drones and perpetual flight needed to provide regional satellite-like services.

One stop drone shop

Canton of Vaud has the right workforce, with the right mindset, collaborating on ambitious projects. They are supported by an extensive and effective public-private framework. Join this thriving ecosystem to boost your drone venture!

For more information about developing business activities in the Canton of Vaud, please contact us at:

Economic Development Canton of Vaud - DEV

Avenue Gratta-Paille 2

1018 Lausanne

Switzerland

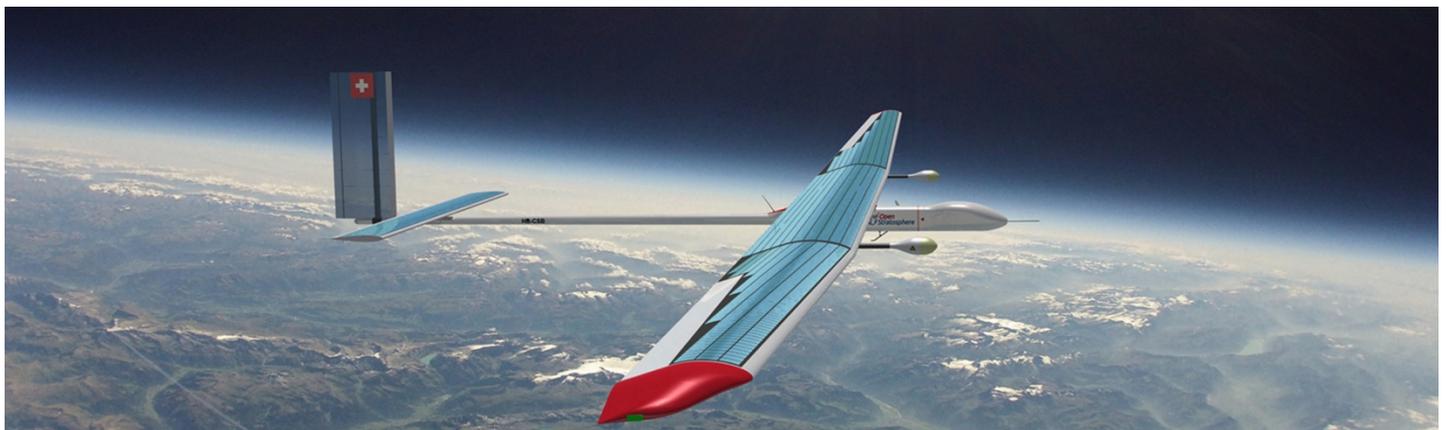
Phone: +41 21 644 00 60

francois.cornu@dev.ch

www.dev.ch

Empowering a Disruptive Industry

Industry drivers	Key factors	Key actors Lake Geneva Area
Unmanned aircraft systems	Smaller and lighter airframes Perpetual flight High altitude missions	senseFly Solar Impulse OpenStratosphere
Enabling technologies	Lightweight materials & structures Complex flight control systems Low power sensing Secured and low latency communication First person view Haptic feedback	Décision Skybotix Gamaya Kudelski LemanTech Lab MotionPilot
Applications	Indoor drone inspection Machine Learning Precision agriculture Aerial imaging Delivery 3D modelling	Flyability Picterra Gamaya Fly and Film Redline Pix4D



OpenStratosphere, the Swiss High Altitude UAV startup (Background © Simon Locher)

Directory

Research and Development

EPFL - Computer Vision Lab

EPFL CVLAB BC 309 Station 14 1015 Lausanne
Head of Lab: Pascal Fua
Website: cvlab.epfl.ch

The lab proposes solutions to detect flying objects when they occupy a small portion of the field of view and are filmed by a camera that itself moves as well as algorithms to render coarse 3D models of target objects (Realistic Synthetic Data Generation).

EPFL - Embedded Systems Laboratory

ELG 130 Station 11 1015 Lausanne
Head of Lab: David Atienza Alonso
Website: esl.epfl.ch

The Embedded Systems Laboratory (ESL) focuses on the definition of system-level multi-objective design methods, optimization methodologies and tools for high-performance embedded systems and nano-scale Multi-Processor System-on-Chip (MPSoC) architectures

EPFL - Distributed Intelligent Systems and Algorithms Laboratory

GR A2 474 Station 2 CH-1015 Lausanne
Head of Lab: Alcherio Martinoli
Website: disal.epfl.ch

DISAL's research mission focuses on the development of design, modeling, control, and optimization methodologies for distributed, intelligent systems. A special emphasis is currently set on distributed cyber-physical systems such as multi-robot systems, sensor and actuators networks, and intelligent vehicles.

EPFL - Geodetic Engineering Laboratory

Address: EPFL ENAC TOPO Bâtiment GC Station 18 CH-1015 Lausanne
Head of Lab: Bertrand Merminod
Website: topo.epfl.ch

The TOPO lab competencies includes geodesy (surveying and cartography) and the development of algorithms in field of geodesy, as well as Integration and calibration of sensors for UAVs and ultralight aircraft.

EPFL - Laboratory of Intelligent Systems

LIS-IMT-STI, MED1 1126 Station 9 EPFL 1015 Lausanne
Head of Lab: Dario Floreano
Website: lis.epfl.ch

The lab designs flying robots, with rich sensory and behavioural abilities that can change morphology to smoothly and safely operate in different environments. These drones are conceived to work cooperatively and with humans to power civil applications in transportation, aerial mapping, agriculture, search-and-rescue, and augmented virtual reality.

EPFL - Laboratory of Polymer and Composite Technology

EPFL-IMX - LTC MXG 340 Station 12 1015 Lausanne
Head of Lab: Jan-Anders E. Månson
Website: ltc.epfl.ch

The lab creates the scientific base for the next generation of materials and processes in the field of polymers and composites. Its Industrial Implementation Group collaborates closely with partners on the implementation of innovative technologies.

CSEM - Swiss Center for Electronics and Microtechnology

Rue Jaquet-Droz 1, 2002 Neuchâtel
Head of Lab: Mario EL-Khoury
Website: www.csem.ch

CSEM is a national innovation accelerator and acts a catalyst for the transfer of technologies and know-how from fundamental research to industry. The Center is specialized in Microsystems Design and Process, Microsystems Integration and Packaging, Nanosurface Engineering as well as Biosurface Engineering.

HEIG-GE - Fluid and Energy Mechanics

Route du Pont-Butin 7 CH-1213 Petit-Lancy Genève
Head of Lab: Flavio Noca
Website: www.cmefe.ch

The laboratory currently houses aerodynamic and hydrodynamic facilities, as well as a computational infrastructure. It has the largest wind tunnel in the French-speaking part of Switzerland, with wind speeds up to 250 km/h. Members of the lab actively work on drones aerodynamics and flight control systems.

HEIG-VD - Non-destructive Testing and Materials Testing

CP 521 Route de Cheseaux 1 1401 Yverdon-les-Bains
Head: Jean-Pascal Reymondin
Website: comatec.heig-vd.ch

The labs spreads over 180m² and is able to perform a wide variety of tests: Dye penetrant inspection, ultrasound, x-ray, bond testing, eddy currents, acoustic emission, and more.

NCCR Robotics

NCCR Robotics MED 1 1526 Station 9 1015 Lausanne
Head of Lab: Dario Floreano
Website: www.nccr-robotics.ch

The Swiss National Centre of Competences in Research (NCCR) Robotics federates 20 research labs from four Swiss academic institutions around a strong motto: "Intelligent robots for improving the quality of life". The NCCR Robotics has an industry liaison programme. It is a fee-paying corporate membership programme for industries and institutions interested in robotic technologies and innovations. The programme is committed to the transfer and exchange of knowledge through conferences, laboratory visits, sourcing of talents and licensing opportunities.

LemanTech Lab

Box 49 Chemin du Vernay 72 CH-1196 Gland
Head of Lab: Yann Oeffner
Website: www.lemantechlabs.ch

Started by ex-software developers from the Test and Measurement field, Lemantech labs provides innovative design, development, and production of embedded systems for drones and scientific measurements. They are the R&D department of drone racing company ImmersionRC

Manufacturers & Solution Providers

Flyability

Avenue de Sévelin 18, 1004 Lausanne
CEO: Patrick Thévoz
Website: www.flyability.com

Flyability is developing safe, collision-tolerant robots to visit inaccessible places, replacing dangerous human operations with unmanned devices.

Pix4d

EPFL Innovation Park, Route Cantonale, 1015 Lausanne
CEO: Christoph Strecha
Website: pix4d.com

Pix4D commercializes an advanced photogrammetry software to create professional orthomosaics, point clouds, models and more.

Gamaya

EPFL Bâtiment C Innovation Park 1015 Lausanne
CEO: Yosef Akhtman
Website: gamaya.com

Gamaya provides solution for large-scale monitoring and diagnostics of crops for precision agriculture.

Teamnet

EPFL Innovation Park, CH-1015 Lausanne
CEO: George Stan
Website: www.teamnet.ro

Teamnet has opened an entity in Lausanne in order to be closer to the dense drone ecosystem.

OpenStratosphere

EPFL Innovation Park Building C 1015 Lausanne
CEO: Simon Johnson
Website: openstratosphere.com

OpenStratosphere is an independent company that designs, builds and operates regional fleets of stratospheric drones with the highest quality and safety.

senseFly

Route de Genève 38, 1033 Cheseaux-sur-Lausanne
CEO: Christophe Zufferey
Website: www.sensefly.com

senseFly develops and produce aerial imaging drones for professional applications.

Latest Startups

Motion Pilot

Website: motionpilot.ch

The MotionPilot team is developing a smart radio controller to interface with every kind of drone. Their latest design uses haptic feedback technology providing for FPV racers and recreational pilots.

Picterra

Website: www.picterra.ch

Picterra is a Swiss remote sensing company providing Satellite and UAV based services.

Ecosystem

Aeropôle

Aéropôle, 1530 Payerne
Contact: Guillaume Chassot
Website: www.aeropole.ch

With a total surface of 400'000m², Aeropole.ch is the home of technologically advanced projects, as well as companies and organisations within and related to the Aviation & Aerospace Industry. The parc has a direct access to a 3000m runway and a controlled airspace.

Décision

Chemin des Larges-Pièces 2 1024 Ecublens
CEO: Bertrand Cardis
Website: www.decision.ch

Décision was the primary supplier of carbon structures for the Solar Impulse project.

Global UTM Association

EPFL Innovation Park, Building C, 1015 Lausanne
Secretary General: Benoit Curdy
Website: utm.aero

The goal of the association is to identify actions to be taken to safely and efficiently integrate UAS into civil airspace. Its working groups draft and distribute compliant blueprints, standards and protocols for UTM systems, in collaboration with regulators and other stakeholders worldwide.

Redline

CE 3 301 Station 1 CH-1015 Lausanne
Contact: Jonathan Ledgard
Info: <http://afrotech.epfl.ch/page-115280-en.html>

Red Line accelerates the development and deployment of robotics technologies in order to save lives and improve economic outcomes in off-grid areas..

SolarImpulse

EPFL Innovation Park, Building C, 1015 Lausanne
Contact: André Borschberg
Website: www.solarimpulse.com

Solar Impulse is a Swiss long-range experimental solar-powered aircraft project, and also the name of the project's two operational aircraft.

SITA Lab

Chemin de Joinville 26, 1216 Genève
Contact: Stéphane Cheikh
Website: sita.aero

SITA Lab is SITA's strategic technology research arm. Their role is to stimulate technological innovation in the air transport industry. The lab is actively investigating drone-related opportunities.

SGS

Place des Alpes 1, 1201 Genève
Contact: Benoit de Courcelle
Website: www.sgs.com

SGS is actively investing in UAV solutions. As a world leader in quantifying and qualifying risk management and protection strategies in all areas of general aviation and RPAS activities, they aim to set the benchmark for RPAS standards.

ViaSat

EPFL Innovation Park, Building J, 1015 Lausanne
Contact: Gontran Reboud
Website: www.viasat.com

ViaSat Antenna Systems S.A is focused on the design and development of innovative antenna subsystems for mobile satellite telecommunications.
