Pioneer Fellowships
Developing groundbreaking ideas.
Supporting the entrepreneurs of tomorrow.
New horizons for the ETH startup scene

At the heart of ETH Zurich’s mission is transferring scientific knowledge and cutting-edge technology to the economy and society. To accelerate this process and enhance collaboration with the business world, the university created a new Executive Board domain in early 2021. As its Vice President, I’m delighted to assume responsibility for the ETH Pioneer Fellowships. By supporting the establishment of ETH spin-offs, the ETH Pioneer Fellowships play a pivotal role in the transfer of knowledge and will in future take on a higher profile. The corona-virus pandemic has shown us just how crucial innovative thinking is. Right now, the wealth of entrepreneurial ideas at ETH is at its highest point yet: last year 34 new ventures were founded at the university.

The ETH Pioneer Fellowships are part of a raft of schemes and initiatives to stimulate and foster an entrepreneurial mindset and behaviour at ETH. Among these are the Innovation & Entrepreneurship Lab (ieLab), the Wyss Zurich and the Student Project House. All are geared to helping the entrepreneurs of tomorrow get to grips with entrepreneurship today, and to equipping them with the tools they need for their venture.

Soon to be a new home for these activities and initiatives is the ETH Centre for Students and Entrepreneurs on the Hönggerberg campus. It will form a lively hub for creativity, innovation and entrepreneurship. Here, the best teams will come together and channel research results from ETH into business and society. To make this happen, ETH Zurich relies on donations from external partners.

Our Pioneer Fellows this year are as promising and diverse as their predecessors; prospects are good that they will tell the same story of success. According to a study commissioned by the University of St. Gallen in 2020, ETH spin-offs not only generate many highly innovative jobs, but also attract considerable venture capital from Switzerland and all over the world. In this way, the startup scene at ETH helps transfer innovative technology to society. In our report, we present several Pioneer Fellows from 2020; I invite you to read about their latest projects.

Dear partners, the success of these young pioneers hinges on you, for it is largely due to contributions from private donors that the university can offer fellowships. On behalf of all those whom you support, I sincerely thank you for your commitment. I look forward to working together with you in the future.
Versics

High-speed communication
with electro-optical components

Vast amounts of data are generated every day. Sending and exchanging this data currently consumes around 9 percent of global energy, with the proportion increasing by 20 to 30 percent annually. This is in no small part due to faster data networks and the increasing networking of devices (Internet of Things). Versics is designing communication devices that consume less energy and transport larger amounts of data per unit of time than current commercial solutions. To achieve this, their technology combines the best properties of two materials: the pure electro-optical modulation of traditional lithium niobate devices and the highly scalable fabrication runs of silicon photonics.

Dr Marc Reig Escalé
Department of Physics
Institute for Quantum Electronics
Professor Rachel Grange

versics.com

MiFlow

A mobile tool to enhance user performance and well being

Whether an important exam, a presentation or a key sports match – these are all occasions where you want to do your best. What you achieve here hinges largely on your arousal level: too much and you feel stressed and nervous; too little and you feel listless. To help people prepare for these situations, MiFlow has come up with a novel mobile solution for mental training. The technology here is based on simple measurements of pupil dynamics: our pupils are dilated when we mentally exert ourselves, and small when we are completely relaxed. MiFlow gives immediate, personalised feedback; users can then try to calm down or spur themselves on as appropriate. By training the appropriate responses, users should be able to achieve the right level of stimulation in real-life situations – so that they can perform their best and feel as comfortable as possible.

Dr Marc Bächinger
Department of Health Sciences and Technology
Institute of Human Movement Sciences and Sport
Professor Nicole Wenderoth

Peptide Therapeutics

Remedy for fibrosis

Fibrosis occurs in the advanced stages of many organ diseases and cancers. Here, a pathological accumulation of extracellular matrix leads to a thickening and hardening of the organ, which restricts its function. This pathological tissue prevents the appropriate drugs from reaching the affected cells. As a result, there are currently no truly effective anti-fibrotic drugs, making fibrosis a serious medical challenge.

Mamta Chabria is developing specific peptides to counter the matrix that acts as a barrier and accelerates the progression of fibrosis. This will allow drugs to target precisely the right place – meaning greater efficacy and fewer side effects.

Dr Mamta Chabria
Department of Health Sciences and Technology
Institute of Translational Medicine
Professor Viola Vogel

PIONEER FELLOWSHIP | IMPACT REPORT 2021
Paul Baade
Department of Information Technology and Electroengineering
Institute for Electronics
Professor Vanessa Wood

Manufacturing high-performance batteries cost-effectively

The road to zero-emission vehicles and sustainable transport lies through powerful, cost-effective batteries. Paul Baade is working on a revolutionary manufacturing process based on a solid instead of liquid electrolytes. This makes it possible to adapt the design of the battery cell and produce the functional components in a single step. By eliminating unnecessary production steps manufacturing costs are cut. At the same time, power density is increased, leading to a reduction in charging times.

Hélène Iven and Dr Sonia Meller
Department of Environmental Systems Science
Institute of Agricultural Sciences
Professor Emmanuel Frossard
digit-soil.com

Digit Soil
Rapid measurement of soil health

According to the Food and Agriculture Organisation (FAO), a quarter of global agricultural land is already severely degraded, making long-term maintenance of soil health a critical issue. Until now, there has been no simple, quick and reliable way to assess soil health and biology. Digit Soil, developed by Sonia Meller and Hélène Iven, is an easy-to-use, portable sensor that measures the activity of soil enzymes as an indicator of soil health. For their innovation, they miniaturised existing technology, and enhanced it with a new user interface. The handy device replaces bulky, expensive laboratory equipment and can be deployed on-site by farmers, gardeners and researchers. In addition, measurements can be repeated more often, and the workload is far less, as there is no need for sampling, storage and transport.
**Reactivating foetal haemoglobin in B-Haemoglobinopathy patients**

B-haemoglobinopathies are one of the most widespread genetic diseases worldwide. In these hereditary diseases, the structure, function or formation of the B-subunit of haemoglobin is disturbed, so that oxygen transport in the blood is restricted. Today, apart from stem cell transplantation (which is not always successful), there is no effective therapy for the disease. Mandy Boontanrart wants to change this. Her therapeutic approach is based on observations that B-haemoglobinopathy patients with elevated foetal haemoglobin have milder disease symptoms than most others, in whom it decreases sharply after birth. Mandy Boontanrart uses the CRISPR/Cas9 gene editing method to reactivate foetal haemoglobin.

**Teleoperated, semi-autonomous heavy machinery**

Removing unexploded ammunition and clearing roads after natural disasters – these dangerous tasks call for extensive protective measures. But this could be about to change. Dominic Jud and Burak Cizmeci are equipping existing machines with technology that enables them to move semi-autonomously and carry out work remotely. The operator can follow and control what’s happening at a safe distance, via state-of-the-art network and video transmission equipment with motion feedback. The two pioneers have successfully deployed the heavy machinery in test trials, together with SBB and armasuisse.

**Nanoporous graphene for more efficient membranes**

Membranes are indispensable in a wide range of industries and products – such as drinking water supply, medical technology, petrochemistry and sportswear. However, the membrane technologies now on the market must strike a balance between permeability and selectivity, so they are often inefficient, and this makes them costly. To solve this problem, Karl-Philipp Schlichting is developing nanoporous graphene membranes. These transport liquids and gases better and are mechanically, thermally and chemically stable, which makes for a far more efficient separation process. This is particularly expedient for water purification and gas separation (e.g. CO₂ separation in combustion engines) and for medical applications and breathable, waterproof fabrics.
diaxxo (peakPCR)

Rapid detection of pathogens

By means of the polymerase chain reaction (PCR), a specific DNA sequence in a sample can be amplified and detected. This molecular technology is used to track down pathogens in body fluids, food or drinking water. Philippe Bechtold and Michele Gregorini have now developed an inexpensive PCR device that performs DNA analyses in only ten minutes. They have completely redesigned the reaction vessel and made it considerably smaller; fewer reagents are required, and the procedure is considerably speeded up. The compact, easy-to-handle PCR devices are particularly suitable for outpatient facilities such as doctors’ surgeries, and in areas where medical facilities and laboratories are thin on the ground. While their PCR instrument can be used to detect a number of different pathogens, the team is currently focusing on the detection of SARS-CoV-2 and its most common mutations, and on sexually transmitted diseases.

Collaboration with Alexander Tanno, Pioneer Fellow 2020

diaxxo’s Covid-19 testing device is currently being clinically evaluated by an international collaboration of 11 research groups in eight African countries. Also included in the trial is the home health test developed by last year’s Pioneer Fellow Alexander Tanno (startup Hemetron). The two versatile ETH testing technologies will enhance decentralised Covid-19 testing by helping detect local outbreaks faster and contain the pandemic. The focus here will be on remote areas with limited resources. In parallel, Alexander Tanno is preparing a clinical trial with Hemetron at the University Hospital Basel.

anavo

Nanotechnology to boost wound healing

Poorly-healing wounds present a huge challenge to medical professionals. anavo has now developed a solution radically different from those currently in use: it is based on inorganic nanoparticles with antimicrobial, anti-inflammatory and tissue-regenerative properties that adhere tightly to tissue and stop bleeding. What’s more, these materials are inexpensive and easy to produce on a large scale. Set on improving the standard of care for wound patients, Tino Matter and his team are working closely with doctors at the Inselspital in Bern to fine-tune their product.
Successful former Pioneer Fellows

Many Pioneer Fellows from earlier years have founded companies that are now successful. In the following, we present five examples.

“The Pioneer Fellowship propelled us from research on walking robot technology to its commercial application. It provided immediate financial support at a very early stage, a valuable network, and a quality label that helped us attract funding for setting up a successful company.”

Marco Hutter

Robotic quadrupeds as helpers for humans

ANYbotics designs autonomous, four-legged robots that can be deployed in challenging environments, for example, to inspect industrial facilities or collect data in remote or dangerous locations.

The latest generation of the robotic quadruped, ANYmal, was recently launched as a certified product and is already in use around the world for the autonomous inspection of power plants and industrial facilities. The up-and-coming company is based in Zurich and employs more than 50 people.

Marco Hutter has been Assistant Professor at the Institute of Robotics and Intelligent Systems and Head of the Robotic Systems Laboratory since 2015. In 2019, he received one of the coveted and prestigious ERC research grants. He is now a board member of ANYbotics.
Dr Sabrina Badir  
Pioneer Fellow 2014  
Pregnolia (founded 2016)  
pregnolia.com

“As a scientist, I was concentrating on the technological development of my product; I had neither the expertise nor confidence to set up a company. The Pioneer Fellowship equipped me with the support and resources I needed to found a medical technology startup based on my scientific work.”

Sabrina Badir

Dr Philipp Furler  
Pioneer Fellow 2016  
Synhelion (founded 2016)  
synhelion.com

“Many excellent lab inventions don’t make it onto the market because resources for developing prototypes are lacking, especially at the beginning. Fortunately, my project was supported by a Pioneer Fellowship and the Swiss Federal Office of Energy. This meant I was able to develop the prototype located on the roof of ETH – and prove the feasibility of the ‘fuel from air and sunlight’ concept! I’m really grateful that I was able to achieve this turning point.”

Philipp Furler

Detecting preterm births early

Pregnolia has developed a device that enhances medical care during pregnancy: the Pregnolia System precisely measures the stiffness of the cervix, which is considered an important indicator of the risk of premature birth. Up until now, cervical stiffness could only be estimated by palpation. The device is already being used in clinical trials in Switzerland and the USA. Pregnolia, based in Schlieren near Zurich, employs ten people. Sabrina Badir is CEO and Chairman of the Board of Directors.

A clean alternative to fossil fuels

Synhelion’s technology produces synthesis gas from air and sunlight, and converts it into fuel for combustion in conventional engines. As CO₂ is captured from the air during the production process, the fuel is CO₂-neutral. Zurich Airport AG has agreed to purchase the entire annual volume of sustainable fuel produced at the first industrial plant from 2023 on. Synhelion is based in Lugano, Switzerland and employs 12 people. Philipp Furler serves as CTO.
From zero to a hundred percent – in half the time

The Aligned Graphite Technology (AGT) developed and marketed by Battrion promises more cost-effective and environmentally friendly batteries, with a far shorter charging time. At the heart of Battrion’s patented technology are platelet-shaped graphite materials, which improve the microstructure of the negative electrode – the bottleneck that impedes rapid charging. This simultaneously reduces costs, improves the CO₂ balance of the battery cell, and meets growing performance and safety requirements. The company operates in Dübendorf near Zurich and licenses its technology for worldwide markets. Martin Ebner was CEO at Battrion from 2015 to 2020; since the beginning of 2021, industry expert Markus Vollstedt has headed the business, while Ebner takes care of technical challenges as CTO. Battrion currently employs 14 people.

“Thanks to the Pioneer Fellowship, my career has forged ahead – there could have been no startup without it!”

Martin Ebner

Reaching new heights with spectrometers – Sensirion acquires IRsweep

Founded in 2014 by Pioneer Fellows Andreas Hugi and Markus Geiser and their colleague Markus Mangold, IRsweep designs, produces and sells optical sensor solutions. Their compact spectrometers are based on QCL infrared frequency comb technology, developed by Andreas Hugi during his doctoral studies in physics at ETH. A core application of IRsweep’s technology is the analysis of fast reactions in research and industry.

In May 2021, it was announced that Sensirion Holding AG, a leading provider of environmental and flow sensor solutions and originally an ETH spin-off, would acquire IRsweep.

Sensirion and IRsweep are fine examples of how ETH spin-offs create fresh jobs and put Switzerland firmly on the map as a hub for innovation.

“Support from the Pioneer Fellowship right at the outset was key in helping us turn our research ideas into a product. It meant we were able stand on our own two feet early on and approach customers as an independent company.”

Andreas Hugi
A new Centre for Students and Entrepreneurs

More than 30,000 people study, research and work at ETH Zurich. Most are young and talented, and brimming with ambitious ideas and drive. Alongside their studies or work, many get involved in student organisations, pursue their own projects in the Student Project House or embark on entrepreneurial ventures. The new ETH Centre for Students and Entrepreneurs is to be built on the Hönggerberg campus. It will provide a forum for the various student and entrepreneurial organisations, associations, activities and initiatives and evolve into a new hotspot of creativity, innovation and entrepreneurship. Here, ETH Zurich’s young talents can inspire each other, network beyond their discipline and organisation, and create something new. There is as much scope for entrepreneurial drive and craftsmanship as for student creativity and conviviality.

The Pioneer Fellows and spin-offs are part of this vibrant ecosystem of ingenuity and inventiveness, as are the Innovation & Entrepreneurship Lab (ieLab), the ETH Entrepreneur Club and ETH juniors. The new ETH Centre for Students and Entrepreneurs provides young and aspiring entrepreneurs an ideal framework to develop, ensuring talented individuals encounter entrepreneurship at an early stage and get to grips with setting up a company.

Construction work is scheduled to start in 2024, and the centre should be ready for occupancy in 2027. Although the federal government and ETH are covering most of the costs, we need additional partners to help finance this hub for youthful creativity and innovation.

More on this promising project:
hic.ethz-foundation.ch

“This new centre has the potential to become a creative entrepreneurial hotspot for ETH and Switzerland as a hub of innovation.”

Professor Joël Mesot,
President of ETH Zurich
The Pioneer Fellowship: startup assistance for young entrepreneurs

Through the Pioneer Fellowships, ETH Zürich supports ambitious young researchers seeking to turn their ideas into marketable products and services. Twice a year, an ETH Zürich jury selects the most promising projects. The researchers receive startup capital and take part in an 18-month mentoring and training programme. This comprehensive support creates the ideal conditions for their journey towards becoming a successful company. The programme is funded by foundations, companies and more than 70 individual donors. To date, funding has been provided for more than 110 projects, from which more than 70 companies have emerged. These considerably boost the competitiveness and prosperity of our country. In order to accompany promising, talented young people on their journey to independence, your ongoing active support is vital!

www.ethz-foundation.ch/pioneer-fellowships

Facts & Figures

The Pioneer Fellowship: startup assistance for young entrepreneurs

Success in figures since the programme launch in 2010

- more than 20 fellowships currently awarded
- more than 110 fellowships awarded since 2010
- over 70* companies founded by fellows

* ETH spin-off is an official ETH designation. Some newly founded companies from ETH have not yet been granted this label.

Pioneer Pledge

For the Pioneer Pledge, young entrepreneurs from ETH Zurich make a non-binding promise to engage in philanthropic activity for ETH. It is up to them to choose when and for what. With this public declaration, they commit to championing an interconnected, sustainable startup scene at ETH.

The following ETH founders currently support talented individuals at ETH:

- Pascal Mathis, co-founder of GetYourGuide
- Tobias Rehn, co-founder of GetYourGuide
- Enkelejda Miho, founder of aiNet
- Denis Steinemann, co-founder of Virtamed
- Anton Gunzinger, founder of Supercomputing Systems
- Cristian Grossmann, co-founder of Beekeeper
- Christoph Barmet, founder of Skope
- Kevin Sartori, co-founder of Auterion
- Vincent Forster, co-founder of Versantis
- Michael Hagander, co-founder of Microcaps

Some newly founded companies from ETH have not yet been granted this label.

Spin-offs established at ETH Zurich, 2000–2020

“...The Pioneer Fellowship not only helped move our startup idea right through from research project to product. More importantly, it got us asking the right questions, which meant we could see the full scope of things. The Fellowship also gave us the chance to build up our network, and this was crucial for founding the company. As an alumnus, I’m delighted I can now support other ETH entrepreneurial initiatives through the Pioneer Pledge...”

Michael Hagander, Microcaps
Thank you

Without the generous support of numerous alumni and alumnae, individuals, companies and foundations, the Pioneer Fellowships would not be possible.

Our special thanks go to:

AdNovum Informatik | Adrian Weiss Stiftung | BASF Schweiz Forschungsstiftung | Blooming Juniper Foundation | Dätwyler Stiftung | Fondation Alcea | Hauser-Stiftung | Huawei | IMG Stiftung | Palmary Foundation | SCS Swiss Child Support Foundation | Stiftung ACCENTUS, Verena Guggisberg-Lüthi Fonds | Walter Fust | Professor Anton Gunzinger | Hansruedi Kaiser | Gottlieb Knoch | Gerhard E. Schmid | Professor Roland Yves Siegwart | Professor Hugo Tschirky (d.) | Hans Wiedemar
Become part of the future's most innovative start-ups.

Support the ETH Pioneer Fellowships at www.ethz-foundation.ch