



# Fokus-Projekte 2020-2021

Prof. Roland Siegwart

## Fokus-Projekt | was Sie lernen

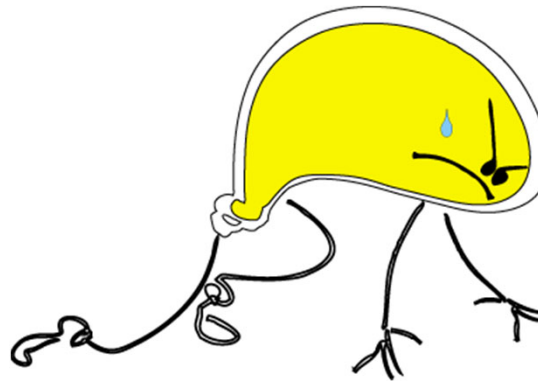
- Wie aus einer Idee ein Prototyp wird?
- Wie wird aus einer Technologie eine Innovation?
- Wie ein komplexes technisches System entwickelt wird?
- Wie man die Grundlagen anwendet.



<http://www.adventuresauce.com>

# Fokus-Projekt | Entwicklung eines Prototypen von A – Z

*in Team von 3 – 8 MAVT und ITET Studierende*



Definition of  
Project

Concept  
Design

System-  
Level  
Design

Detail  
Design

Assembly  
Testing and  
Refinement

## 20 KP, 10 Fokusprojekte

- 14 KP: Projekt, 10 Wochen Vollzeit während eines akademischen Jahres
- 6 KP: Vorlesungen auf Bachelor-Niveau mit benoteter Leistungskontrolle, die von der/dem betreuenden Professorin/Professor für den jeweiligen Studierenden aufgrund der Herausforderungen des Projekts festgelegt werden.
- Die Voraussetzungen für die Zulassung zum Fokus-Projekt sind in den Detailbestimmungen über die Ausführung der Fokus-Projekte enthalten.

[https://ethz.ch/content/dam/ethz/special-interest/mavt/departement-dam/studium/bachelor/documents/MAVT\\_Detailbestimmungen%20Fokusprojekt.pdf](https://ethz.ch/content/dam/ethz/special-interest/mavt/departement-dam/studium/bachelor/documents/MAVT_Detailbestimmungen%20Fokusprojekt.pdf)

- Im HS2020/FS2021 werden insgesamt 10 Projekte angeboten.

Fokus-Project	Professor
Dynamic Quadrupedal Animatronic	Hutter
Bionic Flying Wing	Ermanni
Formula Studente Electric	Mohr
IGNIS – Fire Fighting Drone	Siegwart
Flying Manipulator	Siegwart

Fokus-Project	Professor
ARIS - Rocket Development	Guzzella / Zeilinger
Swissloop	Kochmann
Smart Assist	Meboldt
Paris Hybrid - 4QT hybrid transmission	Kunz
Jethec - electric bush plane e-slinge	Wegener

## Herausforderung

- ***You are in the driver seat!!***
- ***Kein Basteln***, sondern ein ingenieurmässig sauberes Vorgehen
- ***Learning by doing*** – Sie müssen sich viele Informationen selber holen (Tools, Methoden, Fertigungsverfahren usw.).
- ***Hoher Zeitaufwand*** – teilweise schwierig, da Sie über keine Erfahrung verfügen
- ***Arbeiten in Teams*** – Sie müssen für Teilaufgaben die Verantwortung übernehmen, sich aber auch mit ihren Kollegen abstimmen.
- ***Nur für gute Studierende empfohlen!***

→ ***Einmalige Erfahrung / once-in-a-lifetime experience!***

## Termine Bewerbungsverfahren

11. – 15. Mai 2020: Einzelveranstaltungen der Fokus-Projekte via zoom

**31. Mai 2020:** Deadline Bewerbung  
<https://forms.gle/E1Hh7YMNAXAAEL4n8>

- Persönliche Daten
- Wahl von maximal 3 Projekten mit klarere Priorität
- Motivation Letter
- Transcripts Bachelor

**09. Juni 2019:** Mitteilung über Aufnahme in ein Fokus-Projekt

September 2020: Prüfung der Voraussetzungen (BP, Block 1 und 2 bestanden)

September 2020: Start des Projekts

# Application Form



## Focus Project 2020/2021 Application Form

Please fill the following application form until May 31th 2020 and upload all necessary documents. This information will be handled confidentially.

The name and photo associated with your Google account will be recorded when you upload files and submit this form. Not [rolandsi@ethz.ch](mailto:rolandsi@ethz.ch)? [Switch account](#)

Any files that are uploaded will be shared outside of the organization they belong to.

\* Required

Email address \*

Your email

Surname \*

Your answer

Department \*

MAVT

ITET

Other: \_\_\_\_\_

LegiNr \*

Your answer

Project Priority 1 \*

ARIS - Rocket Development (Guzzella/Zeilinger)

Bionic Flying Wing (Ermanni)

Smart Assist (Meboldt)

Swissloop (Kochmann)

Flying Manipulator (Siegwart)

IGNIS - Fire Fighting Drone (Siegwart)

Dynamic Quadrupedal Animatronic (Hutter)

Formula Student Electric (Mohr)

jethec (Wegener)

I'm very interested in ...

Programming

System Design

Control

Project Management

Other: \_\_\_\_\_

CV \*

[Add file](#)

Motivation Letter \*

Please upload a single motivation letter (you can indicate your interest in multiple projects in one letter)

[Add file](#)

Transcripts Bachelor \*

Please upload the grades from the first two years for your Bachelor studies

[Add file](#)



# Focus Projects ASL & RSL (2016-today)

<http://www.asl.ethz.ch/research/focus-projects.html>  
<http://www.rsl.ethz.ch/education-students/focus-project.html>

2019-2020

- **Drogon**– Drone-Catching Drone
- **Roboa**– Search & Rescue Robotic Tube-Arm

2018-2019

- **Dipper**– Search & Rescue Robotic Arm
- **Adero** – The Delivery Robot

2017-2018

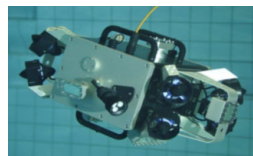
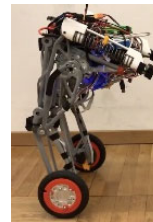
- **Proboscis**– Search & Rescue Robotic Arm
- **Ascento** – Maximum Indoor Mobility Robot

2016-2017

- **ARC** – The Autonomous Race Car
- **Voliro** – The Omnidirectional Drone

2015-2016

- **Scubo** - The Modular Underwater Robot





# Focus Projects ASL & RSL (2006-2015)

<http://www.asl.ethz.ch/research/focus-projects.html>  
<http://www.rsl.ethz.ch/education-students/focus-project.html>

2014-2015

- **Scalevo / Scewo** - The Wheelchair Robot
- **VertiGo** - The Wall Racing Robot



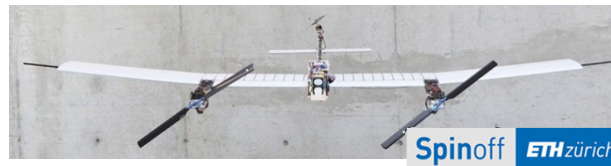
2013-2014

- **BeachBot** - The Sand Drawing Robot
- **Sepios** - The Cuttlefish inspired Robot



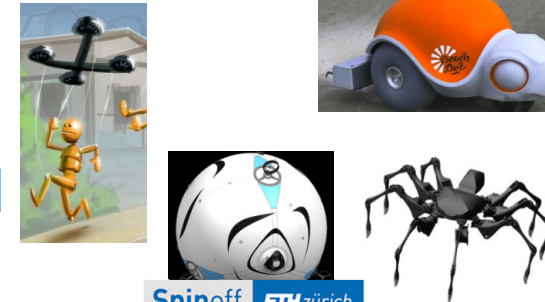
2012-2013

- **PacFlyer / wingtra** - The VTOL Glider
- **PuppetCopter** - The Flying Marionette



2011-2012

- **Skye** - The Blimpbot
- **ARAC** - The Spiderbot



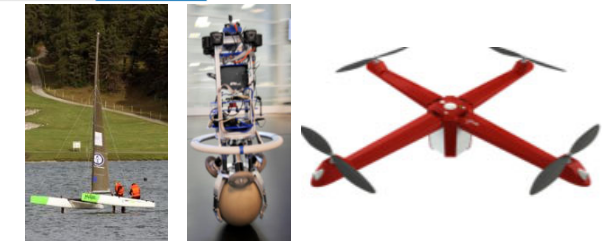
2010-2011

- **Pegasus** - The Running Robot
- **Paraswift** - The Climbing Robot
- **Traloc** - The Rescue Snakebot



2009-2010

- **HyRaii** - The Hydrofoil Sailingboat
- **Rezero** - The Balancing Ballbot
- **Alcedo** - The Flying Avalanche Rescuer



2008-2009

- **Avalon** - The Autonomous Sailing Boat
- **Naro** - The Robot Fish
- **Reely** - The Flying Film Reel
- **Pegasus** - The Hybrid Race Car



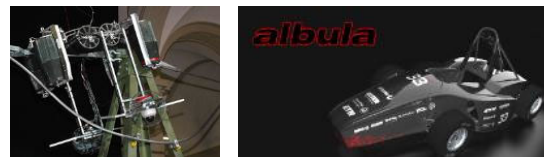
2007-2008

- **A.L.F.** - The Quadruped Robot
- **Maloja** - Formula Student



2006-2007

- **Cable Crawler**
- **Albula** - Formula Student



# Focus Projects Examples

<http://www.asl.ethz.ch/research/focus-projects.html>

## Avalon (2008-2009)



## Rezero (2009-2010)



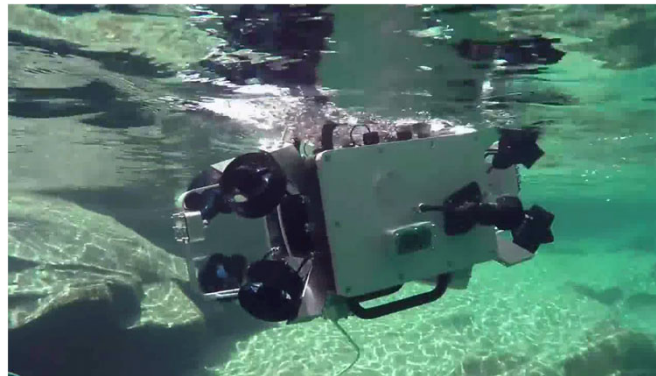
## Skye (2011-2012)



## BeachBot (2013-2014)



## Scubo (2015-2016)

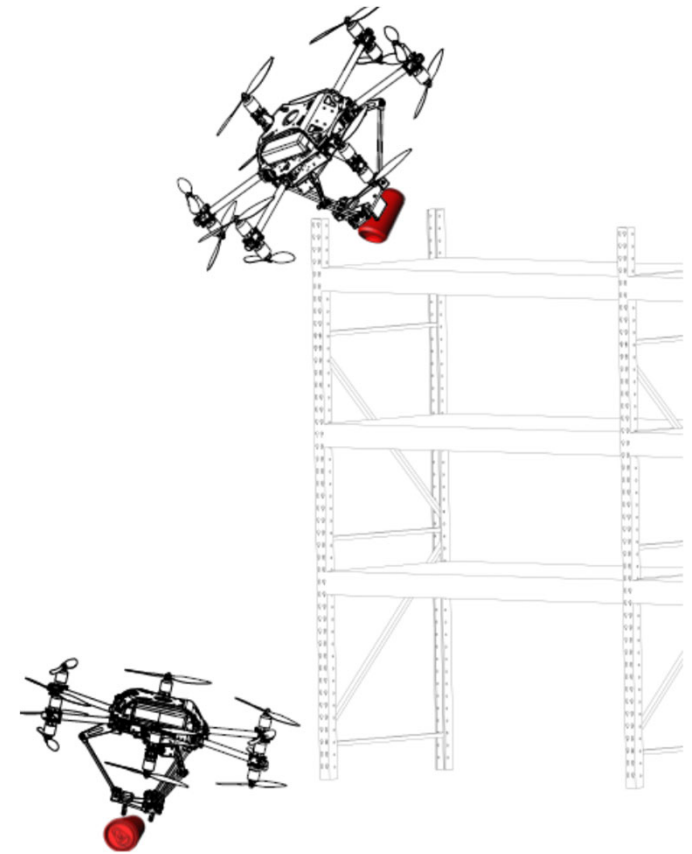
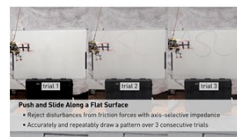


## Ascento (2017-2018)



# The Omnidirectional Flying Manipulator – Focus Project 2020-21

- Goal
  - Development of an integrated design of an omnidirectional flying platform with a parallel manipulator (Delta type)
  - The highly dynamic parallel manipulator should be able to compensate for the imprecision of the omnidirectional flying platform.
- Applications
  - Interventions at heights
  - Pick and place in warehouses
  - Picking of fruits in agriculture
  - ...
- Partners





# IGNIS

ETH Focus Project 2020-21  
Autonomous hybrid vertical take-off and landing (VTOL) aerial vehicle for  
high-precision aerial fire-fighting



*Financially supported by D-MAVT CARES*





## MOTIVATION

- Increasing environmental demands
- Work in a sustainability project

## VISION

- Autonomous fire-extinguishing network in rural areas
- 24/7 usability
- New applications of VTOL UAVs

## CHALLENGES

- Design optimization for maximum speed, range and payload capabilities
- High-performance full flight-envelope control, including precise in-flight release of payloads.
- Efficient fire-extinguishing strategies

## TEAM & PARTNERS

- 4-5 Mechanical & 2-3 Electrical engineers
- Dufour Aerospace: <https://dufour.aero/>
- Armasuisse



Autonomous Systems Lab



DUFOUR AEROSPACE



pgarci@ethz.ch ; morlockj@ethz.ch