

*SearchWing Augsburg*

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**Architecture**

How should it look like?

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# How are we organised?

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- ❖ Members bring up ideas which are implemented once the idea seems beneficial.
- ❖ Examples:
  - ❖ Protection cap for lower plane fin
  - ❖ 3D printed camera mechanics
  - ❖ 3D printed replacement for central plywood construction.
  - ❖ Telemetry screen on FrSky Remote control
  - ❖ Raspberry Pi image software
  - ❖ Waterproof sealing of fuselage
  - ❖ Return to Ship software enhancement of QGroundControl software
  - ❖ ArduPilot Firmware

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# What is the problem?

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- ❖ Today the technical way to go seems unclear
- ❖ Members have the impression that the project is not well organized / focussed.  
Example countermeasures were:
  - ❖ From Malta: Project Management
  - ❖ Issue tracking via gitlab
- ❖ Members do not have a clear picture what could be done
- ❖ Members impression: Efforts seem useless. Ideas are dumped.
- ❖ Today: Discussions about decision procedures, organization, code of conduct

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# Proposal: More work on overall architecture

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- ❖ Result should be an overall picture how the drone should look like
- ❖ Split in technical subprojects which result in work groups
- ❖ Subprojects should be ready to work on
- ❖ This is all technical but the goals are non-technical:
  - ❖ Members can take work packages (smaller scope)
  - ❖ More fun because it is clear that usefull work is done

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# What works

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- ❖ Mission with ResQship showed general proof of concept
- ❖ Launch from Vessel
- ❖ Landing in Water / Retrieval with RiB
- ❖ Reach and Endurance
- ❖ Image retrieval and manual inspection

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# What does not work?

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- ❖ Björn Adria: Burned Power Module due to Salt Water -> No more flights due to missing replacement.
- ❖ Björn Mediterranean flight 2: Camera cable disconnected probably when battery was changed -> No images
- ❖ Björn Mediterranean flight 3: Servo plug connection problems in aileron. Salt plus connector. -> Plane lost. No more flights.

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# Important Requirements

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- ❖ Stable Operation
  - ❖ Stable Operation
  - ❖ Stable Operation
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- ❖ Nice, but what does that mean???

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# Target Architecture: Requirements

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- ❖ Easy separation of fuselage and wings for transport and storage
- ❖ Easy transport to ship via air and parcel service (battery to handluggage)
- ❖ Waterproof fuselage
- ❖ No critical connectors (servo plugs) in water
- ❖ Electronics
  - ❖ Mechanically robust (connectors / attachment)
  - ❖ Protection against salt water / moisture
- ❖ Easy Charging / Image retrieval
- ❖ QGC: Easy flight plan creation and return to ship



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# Salt Water Protection - Three barriers concept

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Design / Operation: No need to open fuselage  
Reduce number of critical exposed components

Waterproof Fuselage / Minimize entering water

Protect Electronics / Connectors  
by  
Sealing, Housing, reducing connectors

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# Fuselage and Wings

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- ❖ Move aileron servo connector from wing inside fuselage
- ❖ Sealing sleeve around wing / fuselage connection
- ❖ Rubber sealing wing / fuselage
- ❖ Tube in Tube for the wing tubes through fuselage
- ❖ Tube sealing for servo cable
- ❖ Cover extension for the fuselage cover
- ❖ Plan B: Wing split in the middle. Fuselage cutout below wings. New sealing there.
- ❖ Technology: EPP milling for front cover, motor lock and other components
- ❖ Motor: Check for sealed bearing replacement

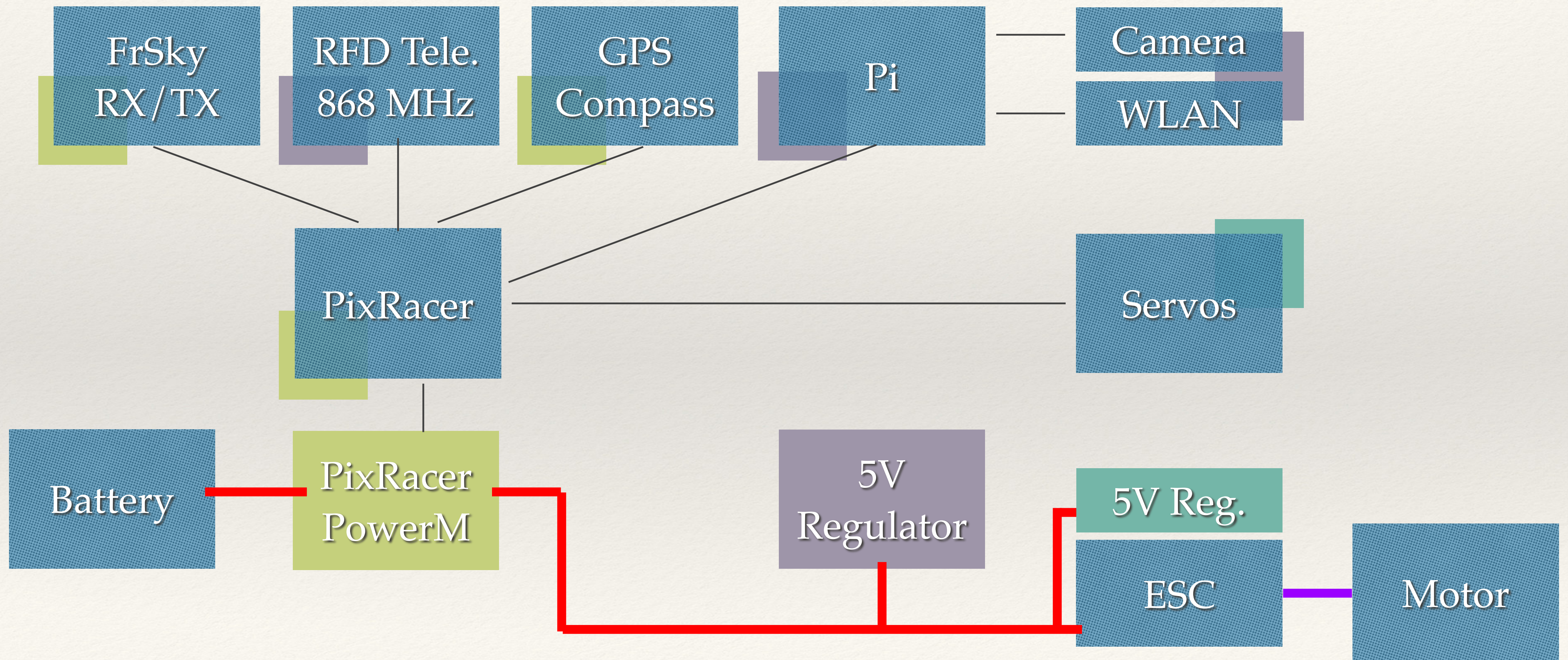
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# Inside Fuselage (Mechanics / Electronics)

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- ❖ Mechanical attachment of the components, e.g. ESC / FrSky RX / Power Modules
- ❖ Sealing / Positioning / Attachment / Housing of the components
- ❖ Electronics development to reduce number of connectors
- ❖ Wireless data transfer for images and log files (WLAN)
- ❖ Keep battery inside concept / Charging without opening
- ❖ Camera Integration

# Overview



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# Logistics (Drone transport)

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- ❖ One drone per box plus basic box including tools and antennas
- ❖ Select carton box which can be used to transport wings + fuselage (one drone)
- ❖ Check against DHL and other carriers (Size, LiPo Battery)
- ❖ Check against flight regulations for Malta air and Lufthansa
- ❖ Select carton transport box for Tool box / laptop / antenna

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# Software / Groundstation

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- ❖ Develop and Release Return to Ship option
- ❖ Develop and Release Easy flight plan creation
- ❖ Predefined search pattern which is adapted to drone reach capabilities.
- ❖ Easy adaption of pattern with respect to ship location (Move complete pattern, Pattern relative to ship position)
- ❖ Laptop and Tablet maintainance
- ❖ Image classification methods manual (and automatic?)

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# Public Relations

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- ❖ Webserver / News
- ❖ Events

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# Camera and Image Recognition

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- ❖ Image classification algorithms for laptop
- ❖ Image classification algorithms onboard
- ❖ Image transfer via mavlink to ground station
- ❖ Wireless image and logfile transfer (See Inside Fuselage)



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# Workgroups

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Fuselage  
and  
Wings

Inside  
Fuselage  
Mechanics  
and  
Electronics

Software  
and  
Ground  
station

Camera  
and  
Image  
Processing

Public  
Relations

Logistics

Integration  
and  
Test Flights

Training