ARDUPILOT
Versatile, Trusted, Open

Swarm, Light Show, ArduBee

Giorgio Rinolfi, R&D Creative Director
Guglielmo Cassinelli, Software Developer

LUMINOUSBEES

Aerial Media Arts

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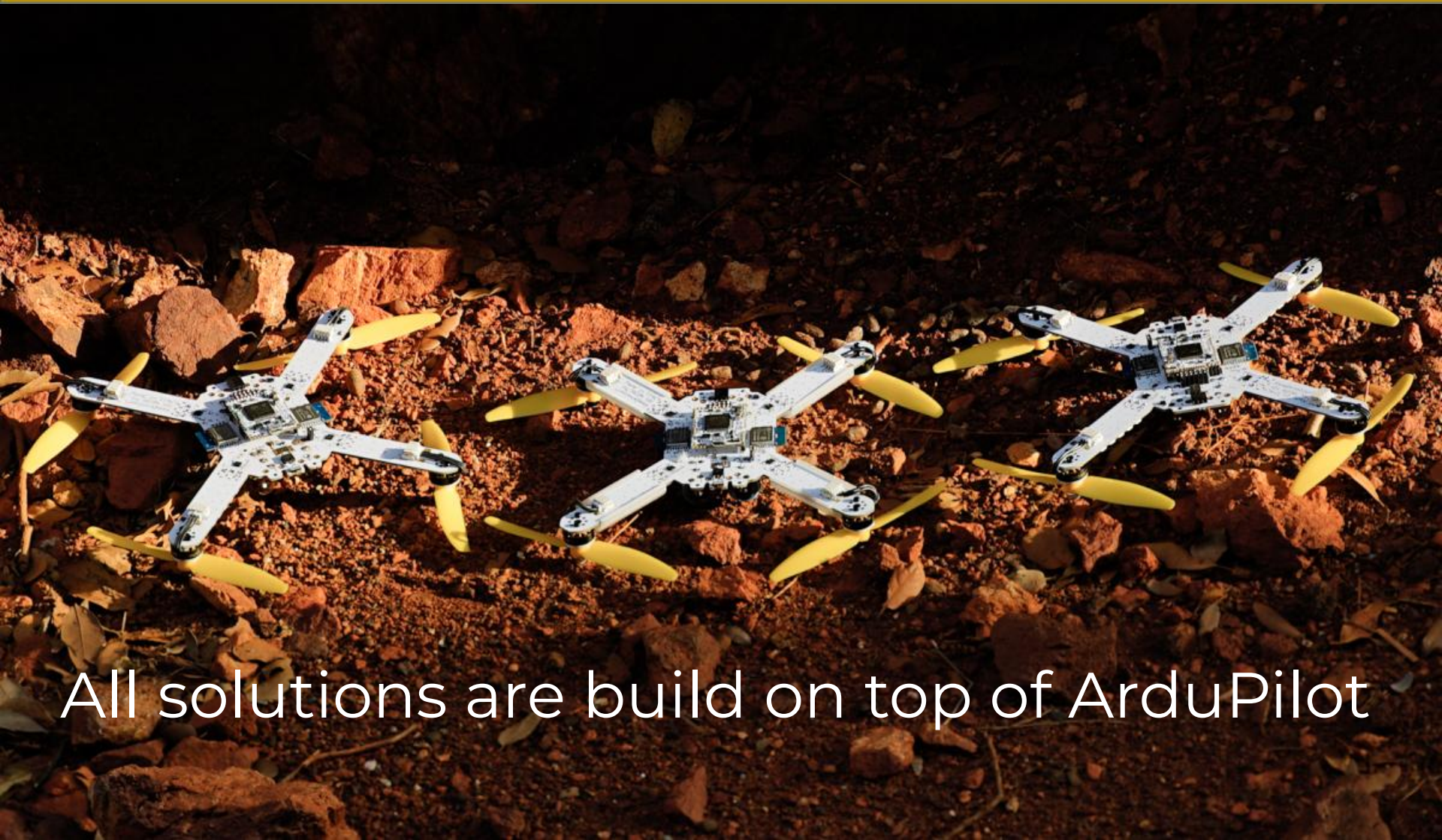

All solutions are build on top of ArduPilot

Aerial data visualization

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DEEP Music on Air

ARTECH 2019

9th International Conference on Digital and Interactive Arts Braga, Portugal

Massimiliano Zanoni, Michele Buccoli, Guglielmo Cassinelli, and Giorgio Rinolfi. 2019. ***Deep music on air****. In Proceedings of the 9th International Conference on Digital and Interactive Arts (ARTECH 2019). Association for Computing Machinery, New York, NY, USA, Article 90, 1–4.*
https://doi.org/10.1145/3359852.3359970

neuron activity level transfers to color range

2014 the beginning

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2016 -2017

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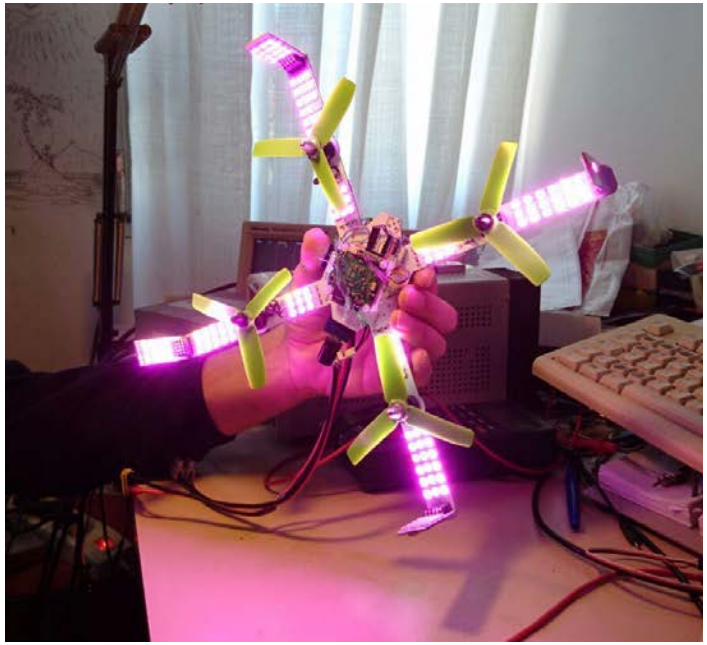
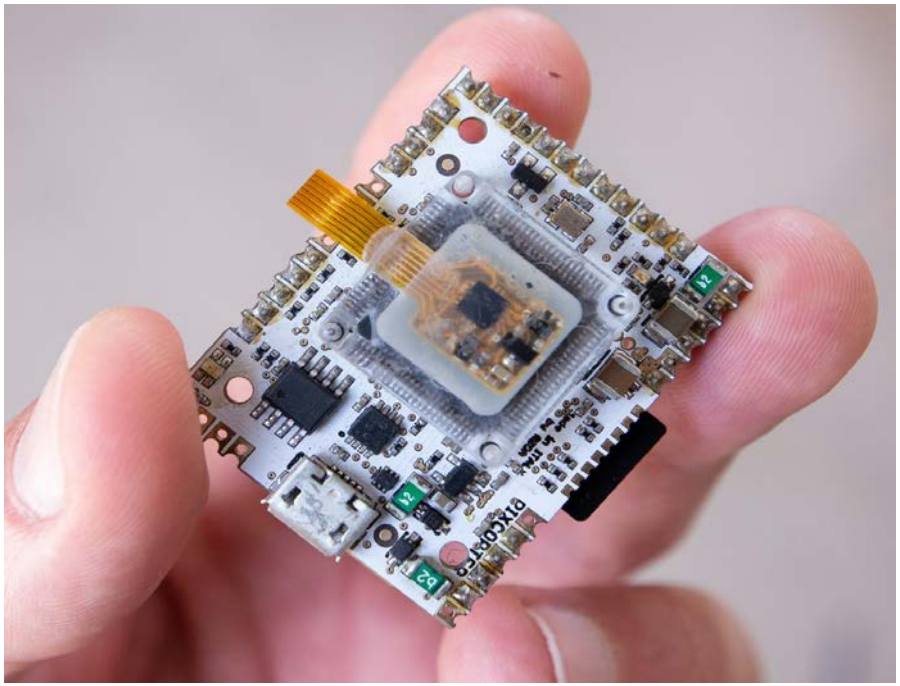
Early prototypes



169 independent LEDs

External Pixracer, external compass

2018 plug-in FC

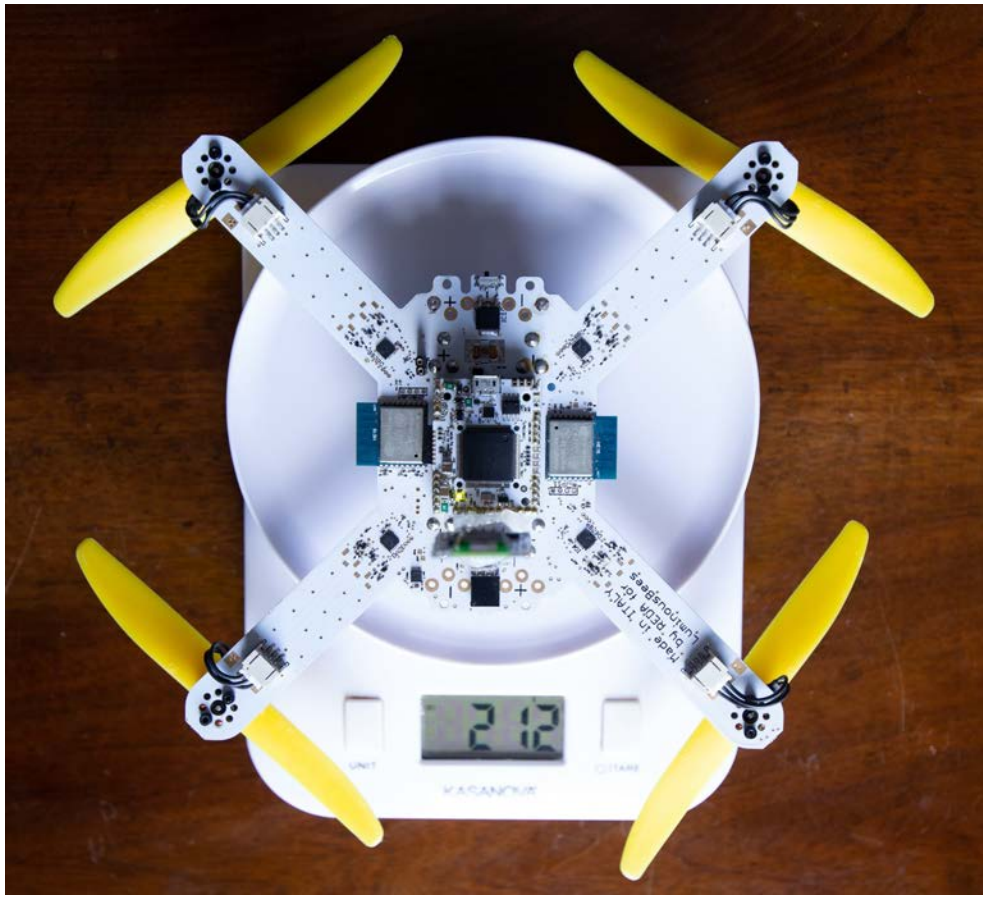


F4 MCU

second IMU
dampened

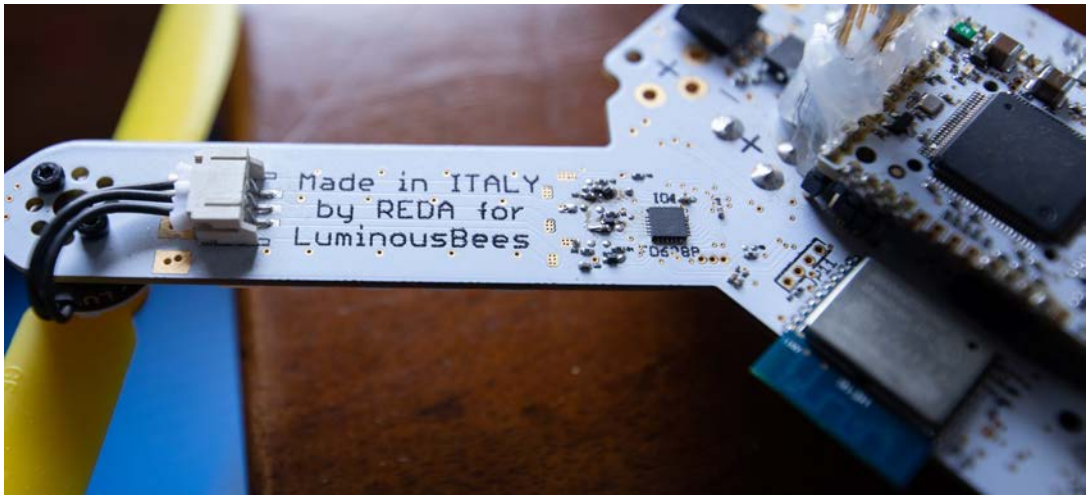
SD card slot

LuminousBee4



Our best 5”

Flying PCB

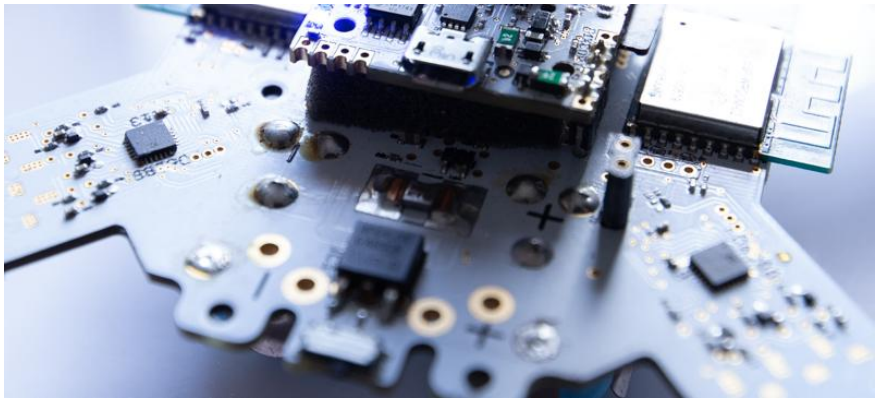


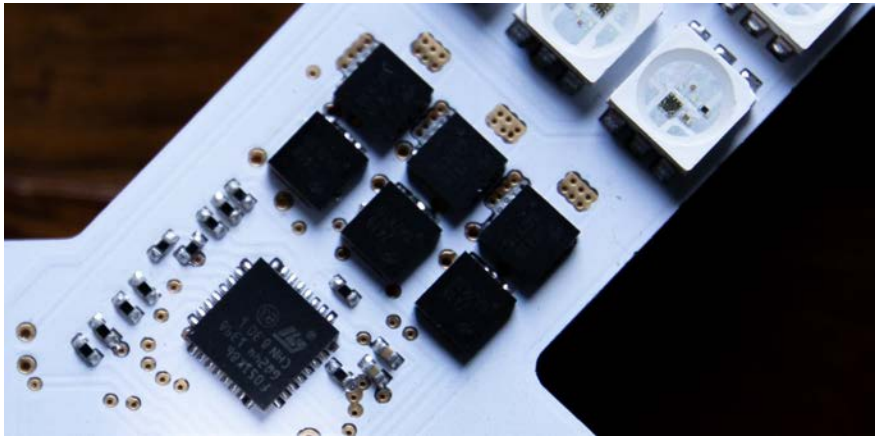
One single piece of electronic

Only the motor cables survive

Ardupilot BlHeli32

Integrated ESC





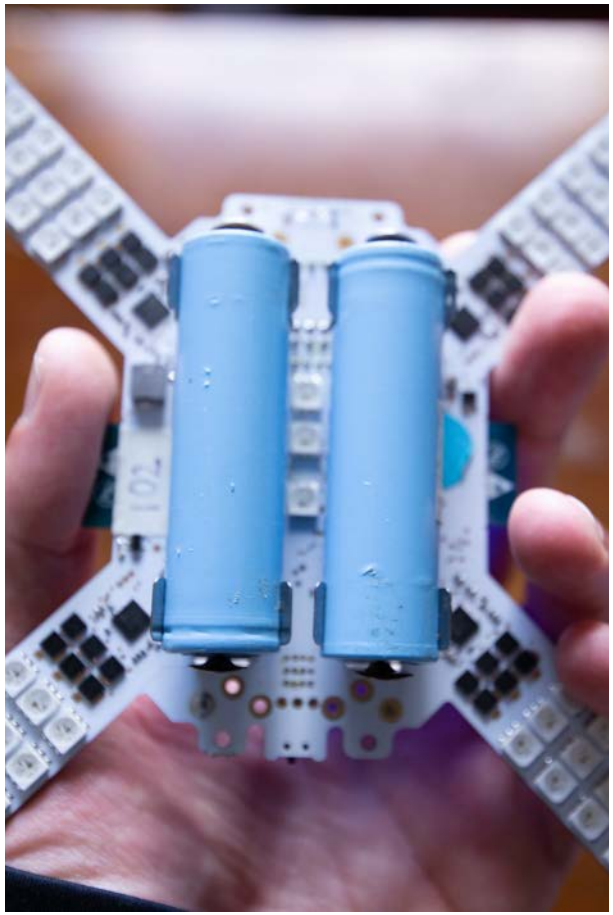
BlHeli32 with telemetry

- RPM
- Current

DSHOT up to 1200

DSHOT 2400 HW

Hovering time



Lightweight

=

great endurance

2 x 18650 3600mAh

45 min

2 x 21700 5000mAh

more than 1h

2018 First LB Swarm

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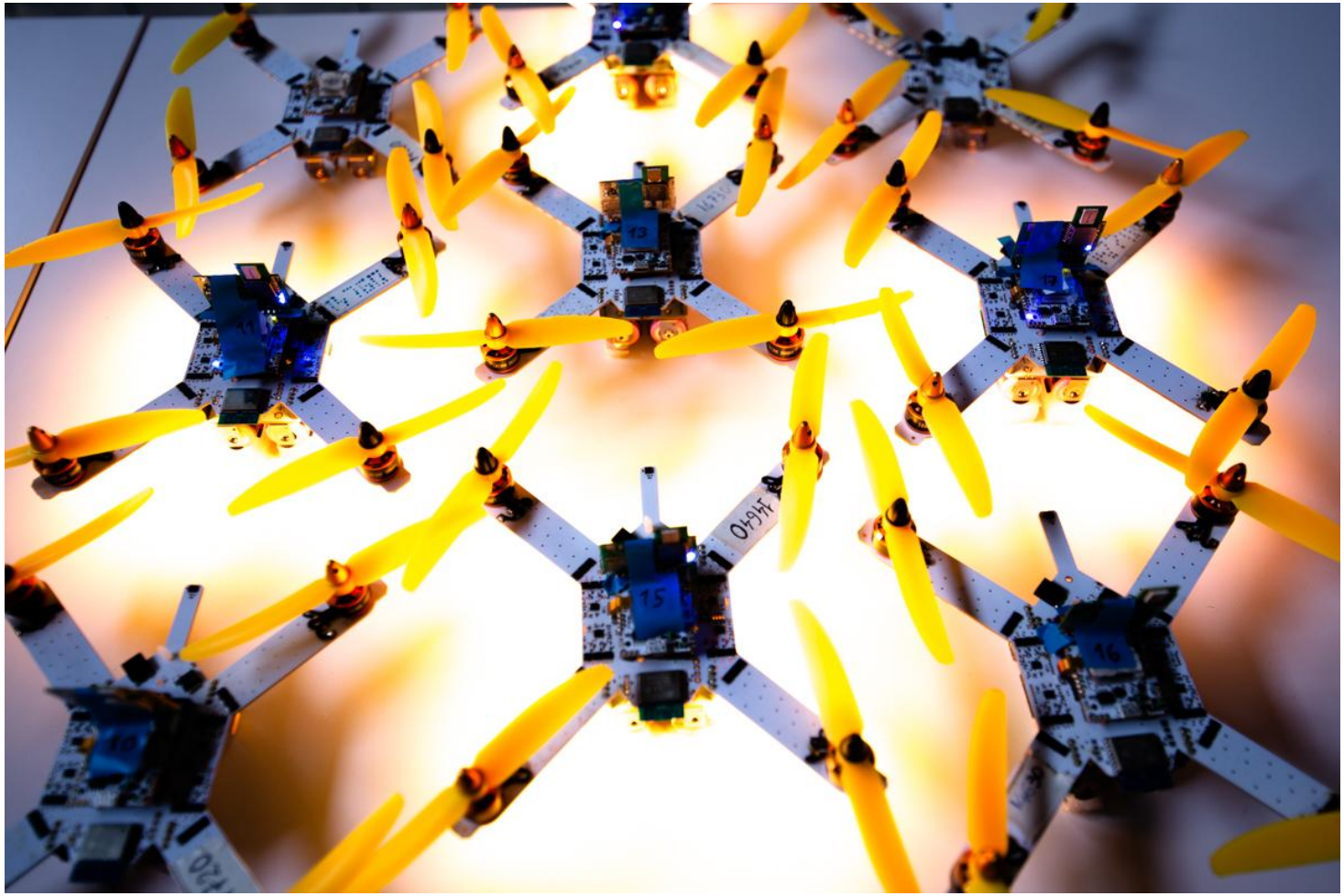

63 indipendent LEDs

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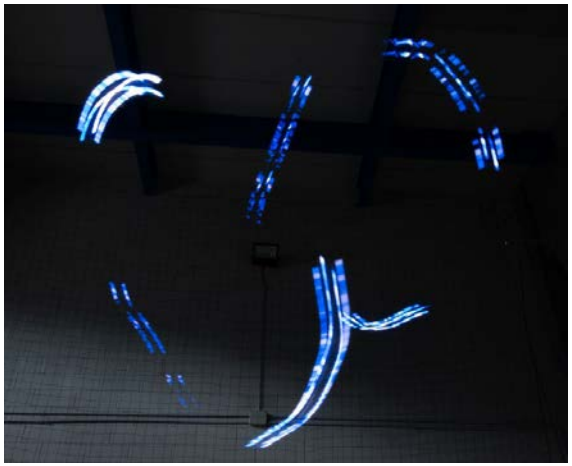
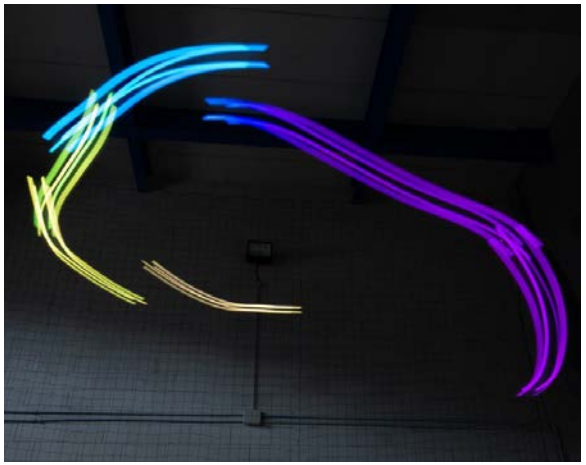
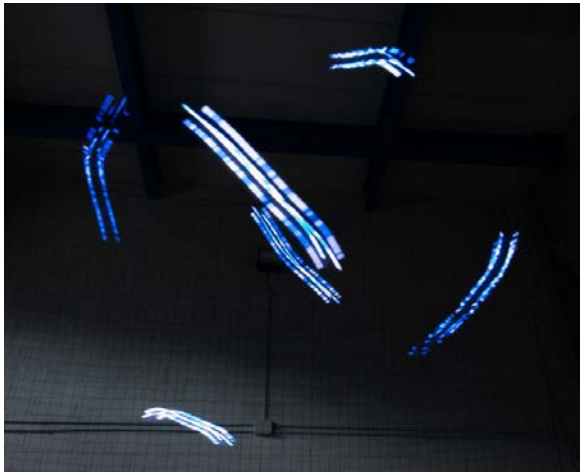

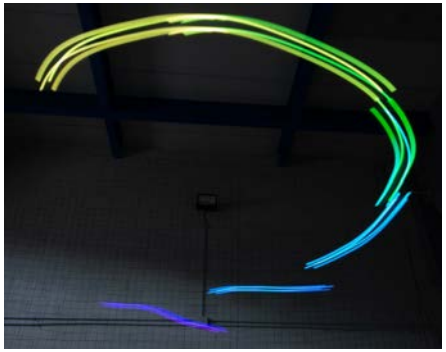

AP Ublox F9 support

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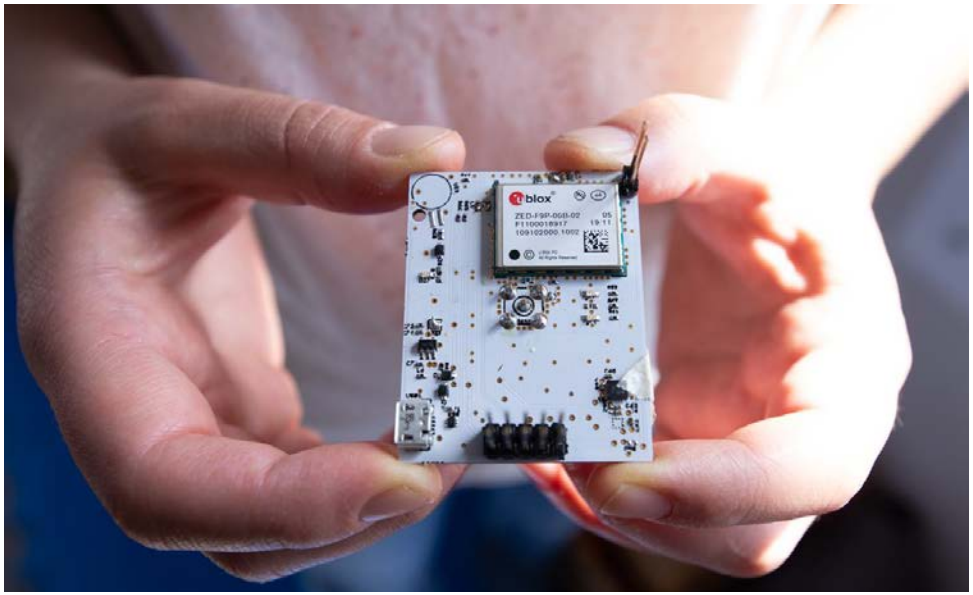

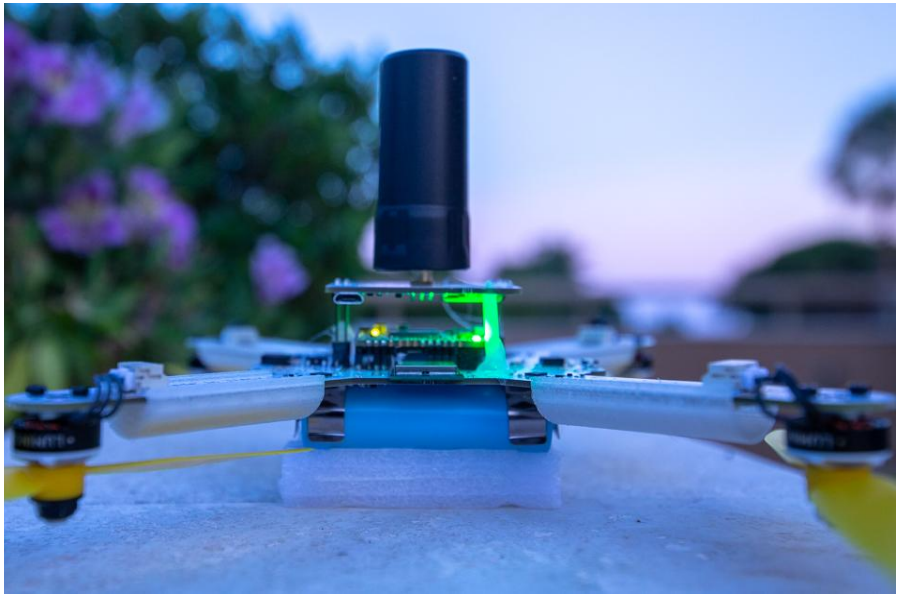

May 2019

Outdoor positioning

Animation Design

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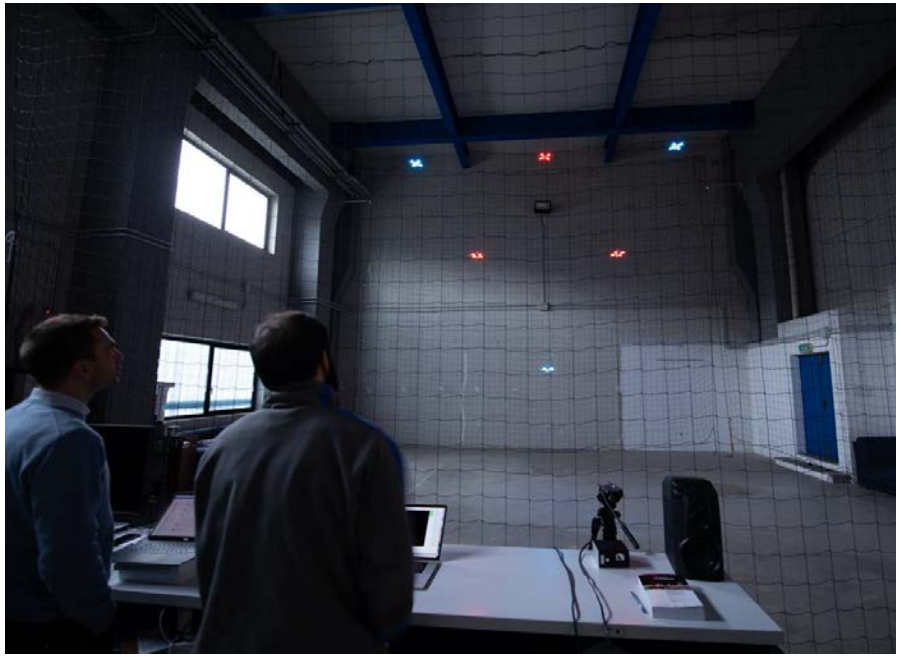

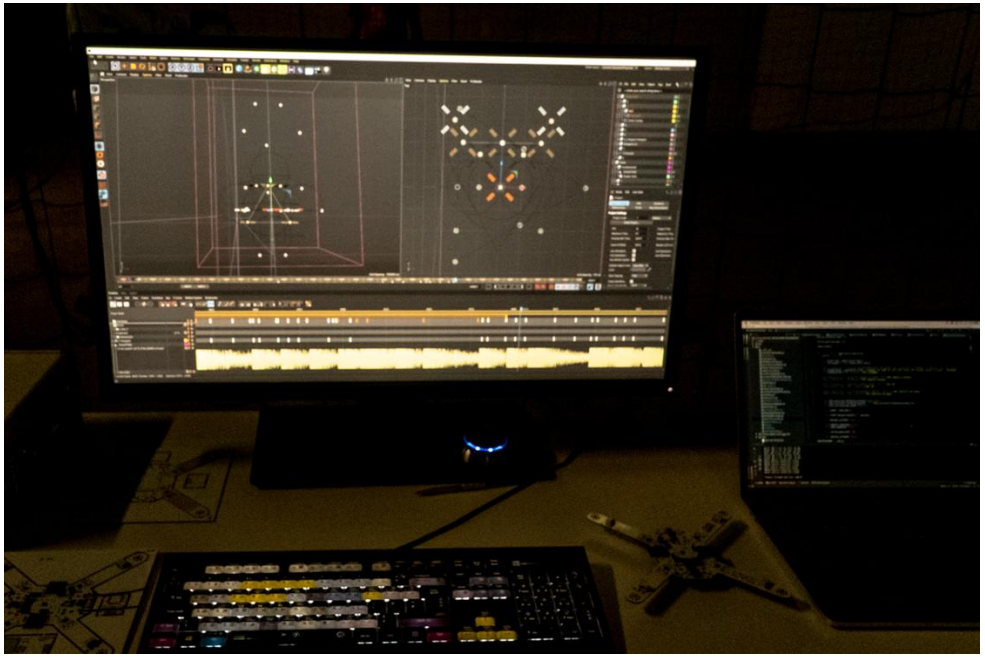

Indoor testing

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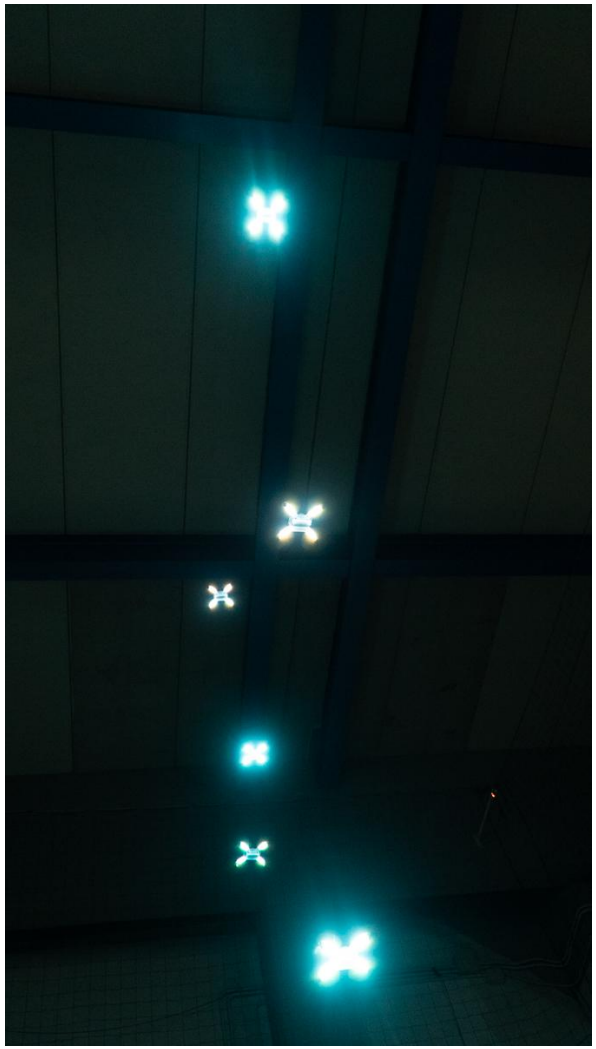

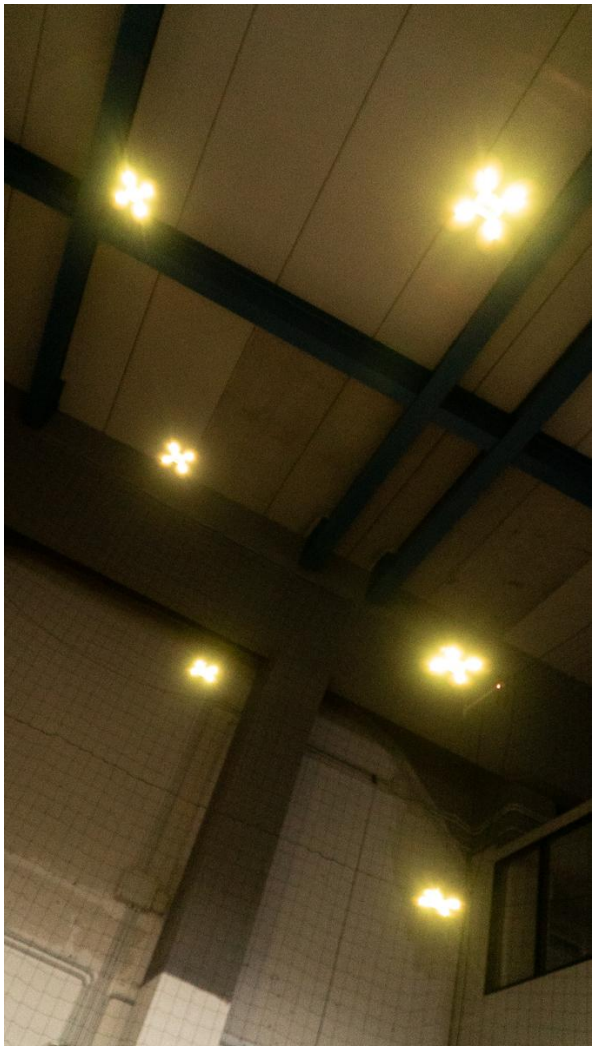

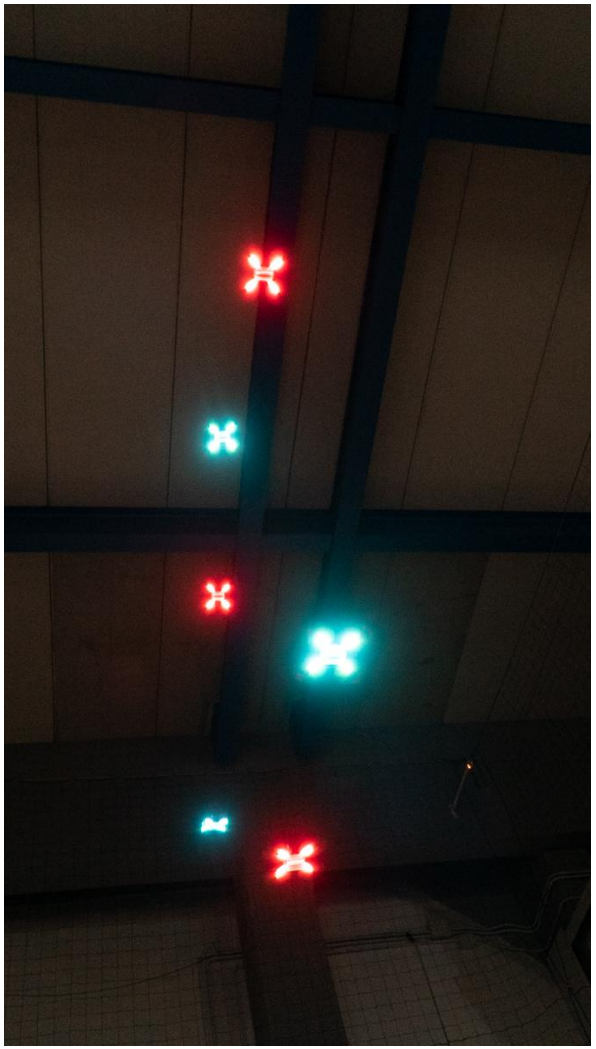

Storytelling with LB swarm

Christmas is in the Air

UWB localization for Swarm

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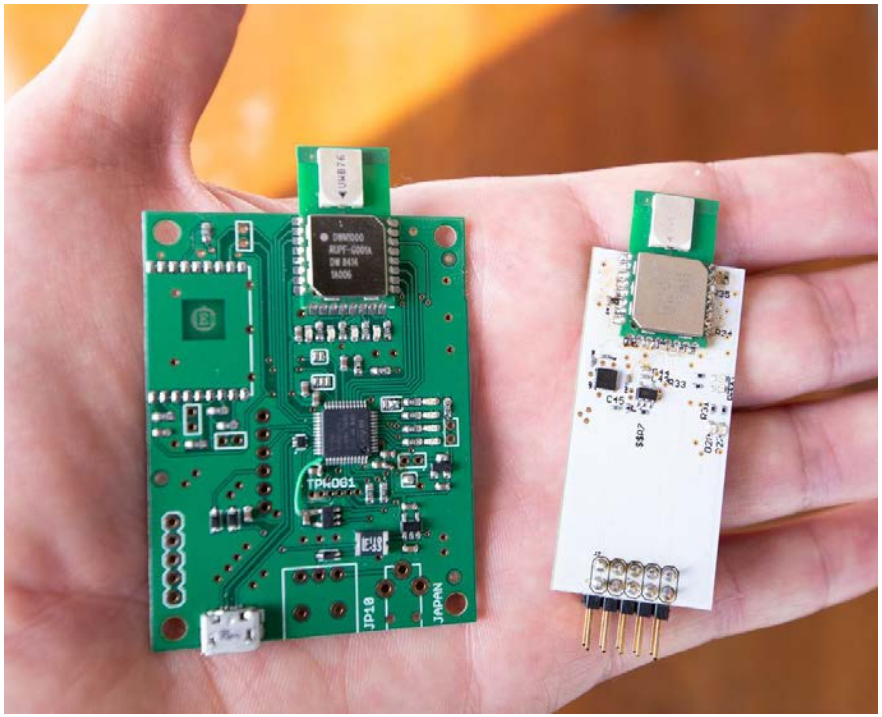
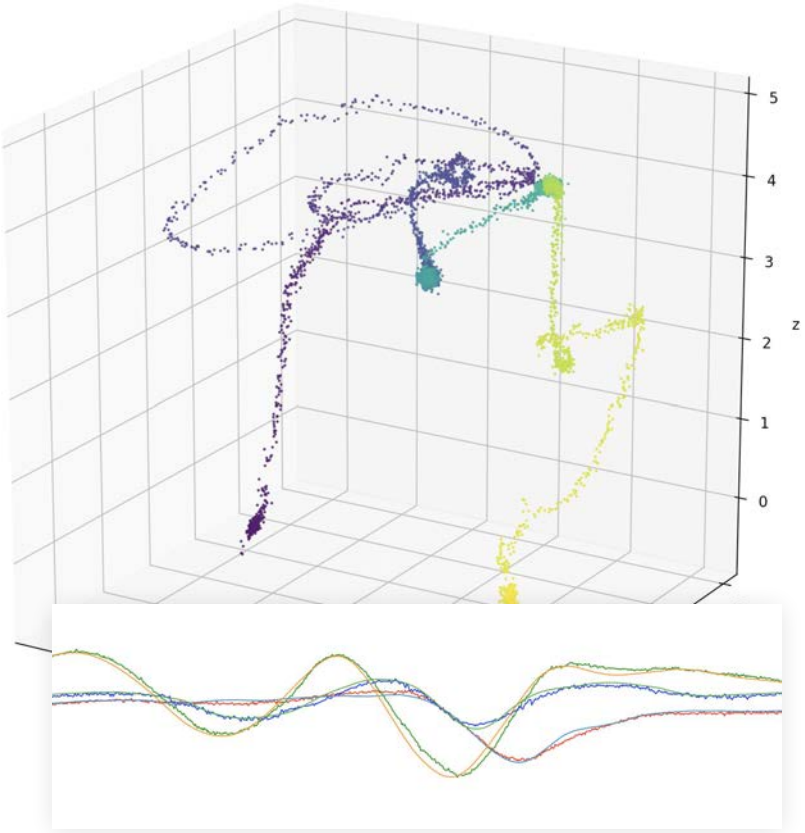


beacon and tag with external compass



positioning error < 5cm

Thank you ArduPilot!

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Hwdef = easy setup for HW development

CompassPerMotor for small drones

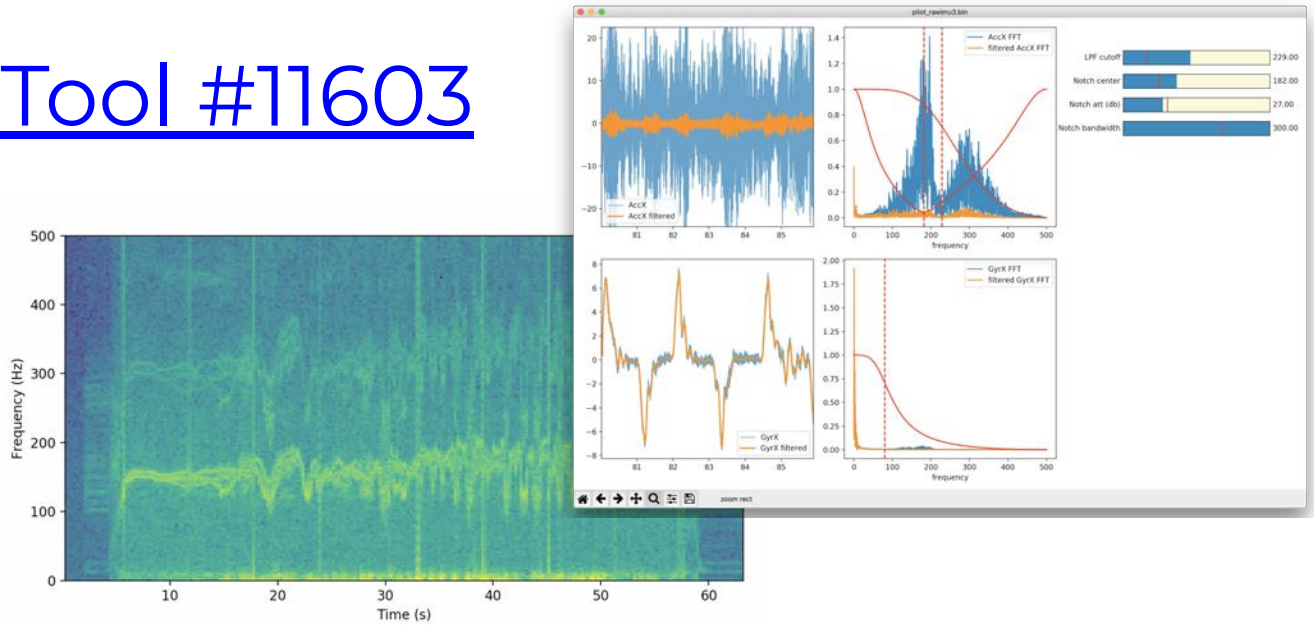
Harmonic Notch Filter

Neopixel integration with Lua scripting

And much more...

Contributions

[FilterTestTool #11603]



Other minor contributions:

waypoint radius min, SITL on MacOS bugfix, Accel notch filter, beta testing...

A tiny ArduPilot platform

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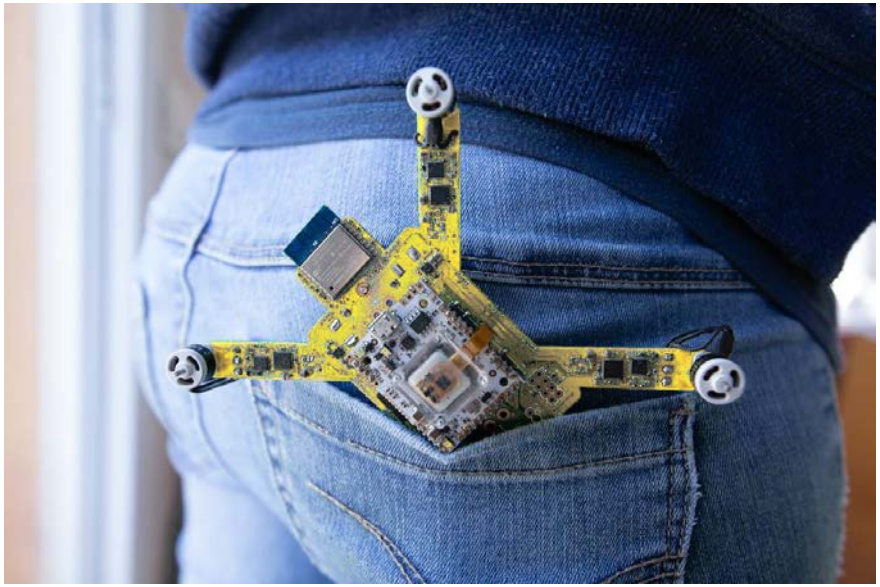
ARDUBEE



Ready for everyone:

- Education
- Research
- Advanced DIY
- Fun
- Develop with ArduCopter

ARDUBEE
3” ArduCopter

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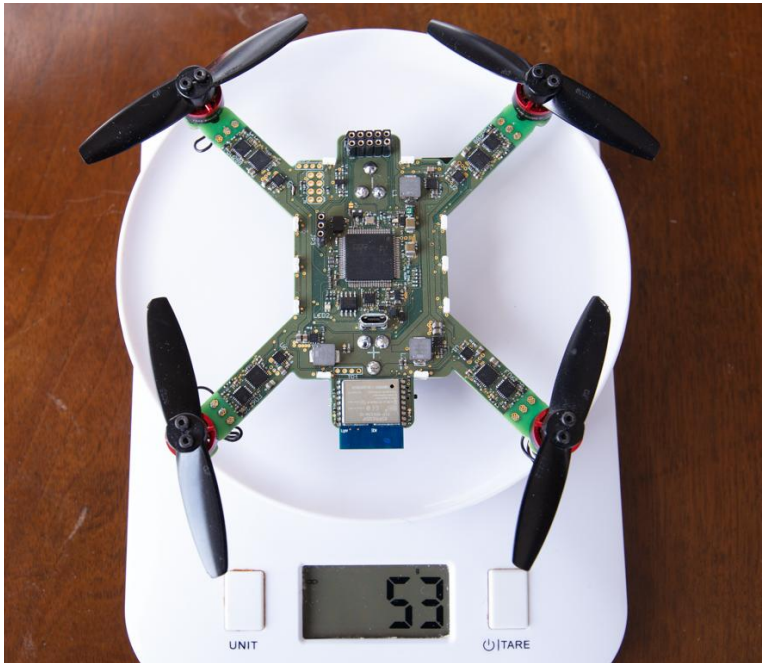
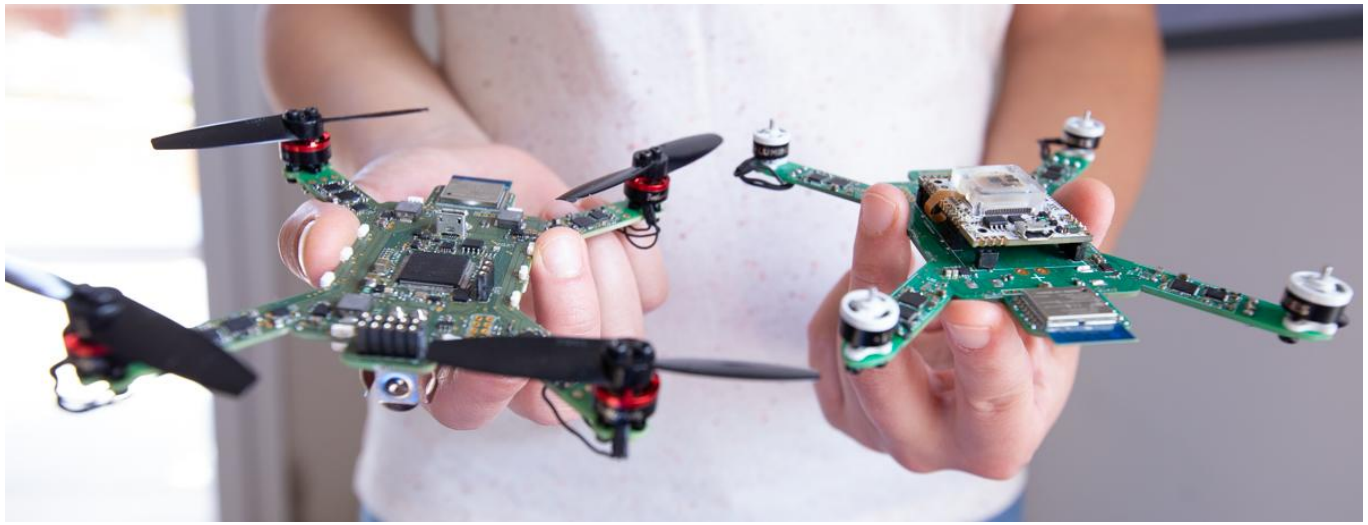
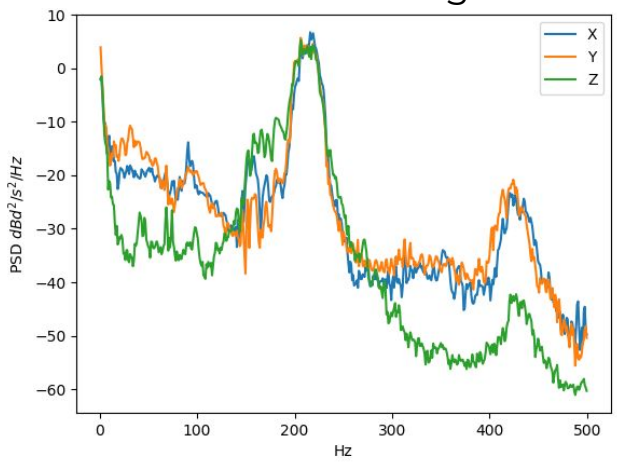


without and with battery

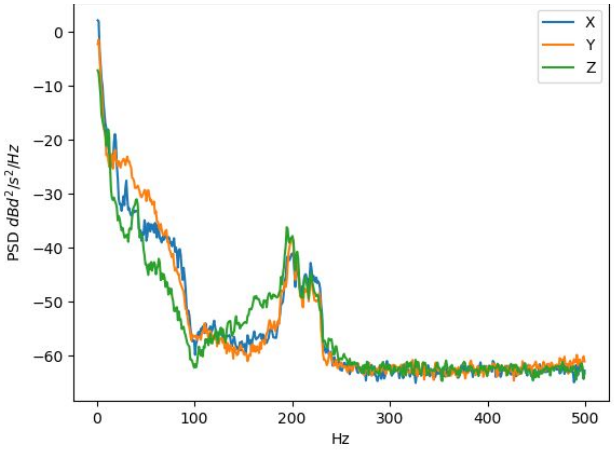
INS_HNTCH_ Harmonic Notch Filter



Pre filtering



Post filtering



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Deep integrated electronics

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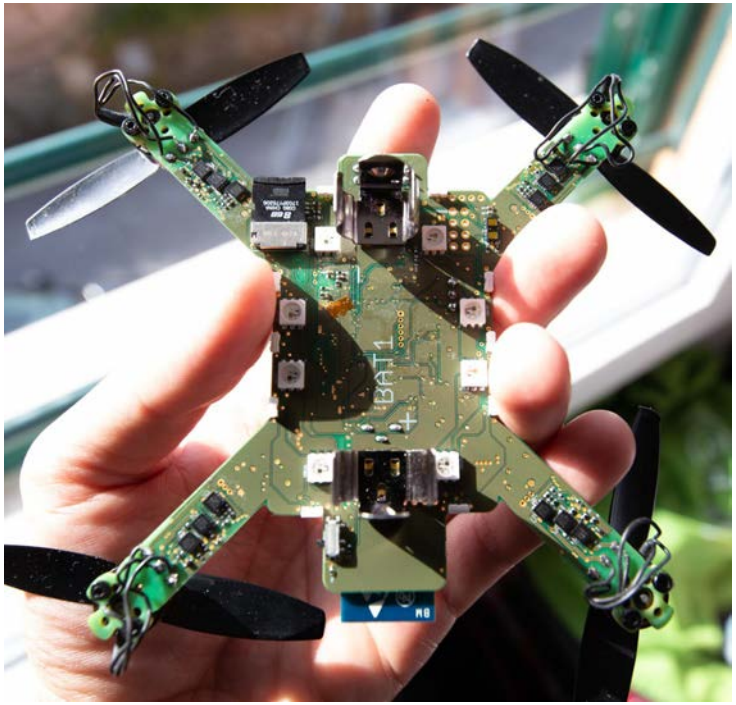
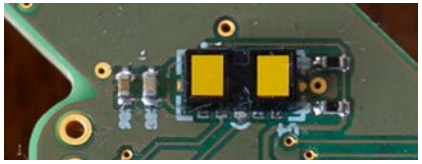
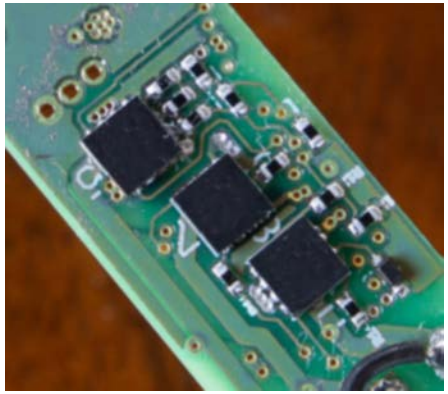
Bosch **IMU**
High precision **barometer**
WiFi telemetry





On board
rangefinder



Esc telemetry with individual motor RPM and current

plug-in **RC Radio**

Future Software development

Refine integration of UWB localization library and disclose to ArduPilot community

Use ExtNav and EKF3

UWB localization system tools

More Position Controller tuning

Other indoor/tiny-drones oriented improvements

Future Hardware development

ArduBee pluggable add-ons:

- Avoidance (8 rangefinders)
- Micro-camera
- Optical flow
- GPS
- Propeller guards
- … (requests?)

ARDUBEE

If you're interested

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Kickstarter launching soon

We need your support
to bring ArduBee to life

https://forms.gle/9koNbFMUFvGsoNCSA

Thanks!

Contact us at luminousbees@gmail.com
More on www.luminousbees.it