



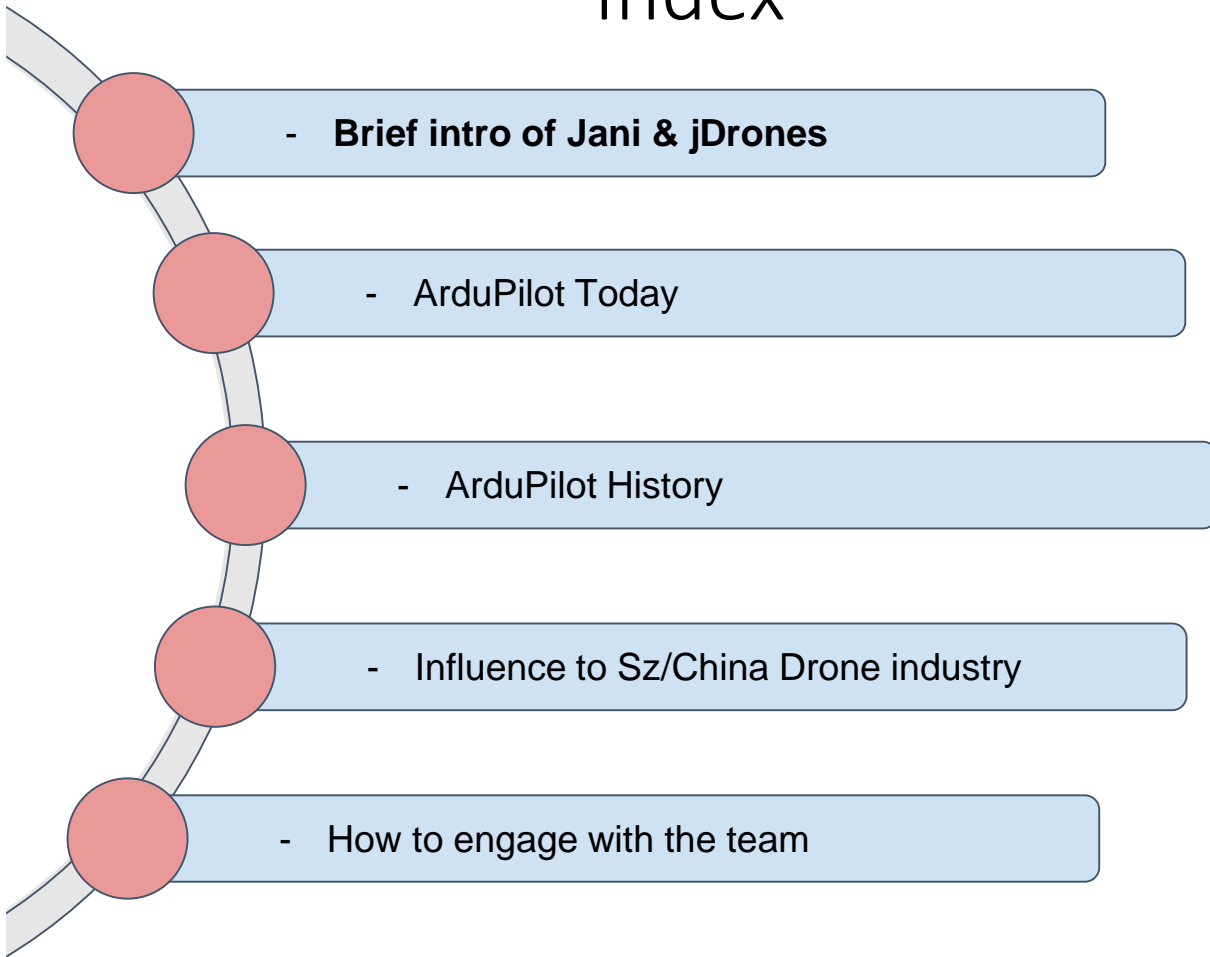
Unmanned Revolution

The Driving force of The Drone Revolution

ArduPilot Unconference 2017
Xiamen, China October 22-23rd 2017

By Jani Hirvinen / ArduPilot Org

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- **Brief intro of Jani & jDrones**

- ArduPilot Today

- ArduPilot History

- Influence to Sz/China Drone industry

- How to engage with the team

jDrones CEO Mr. Jani Hirvinen

- + Experienced technopreneur
 - + +40yrs Aviation, Electronics
 - + +35yrs Computers, Software, Mechatronics
 - + +25 Internet services / data hosting
- + Creator of **ArduCopter**, **MinimOSD**, **IOBoard**, **I2C ESCs**, **Power PDB**,
- + Founding member of: **jDrones**, **DIYDrones**, **DroneCode** and **ArduPilot Organization**
- + **ArduPilot core since the beginning**



“One of his most impressive contributions was the hardware design for the official ArduCopter frames, motors and whole concept including firmwares, which he did almost single-handedly and really accelerated the project”

– Chris Anderson, Founder of 3D Robotics



Speaking of Young People...



Jani's daughter Ally 3y5m "working" on APM2.5

jDrones in brief

- **Founded at 2010, Fin/Thai company**
- Internationally recognized **Drone developer / manufacturer** (jDrones).
- **Specialized on: Electronics/Robotics**, Sensor networks, telemetry systems, IoT, **Drones (air, land, sea)**
- **Custom R&D: Electronics**, frames (air, sea land), Software engineering, **OEM services**
- **Brands owned: jDrones, jD-UAS, jD-Tactical**
- **ArduPilot** organization, Infrastructure/HW Lead



CEO, Mr. Jani Hirvinen

- Founder of jDrones
- International Patents
- Internationally known UAV/Drone developer



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ARDUPILOT



ARDUPLANE



ARDUROVER



ARDUCOPTER

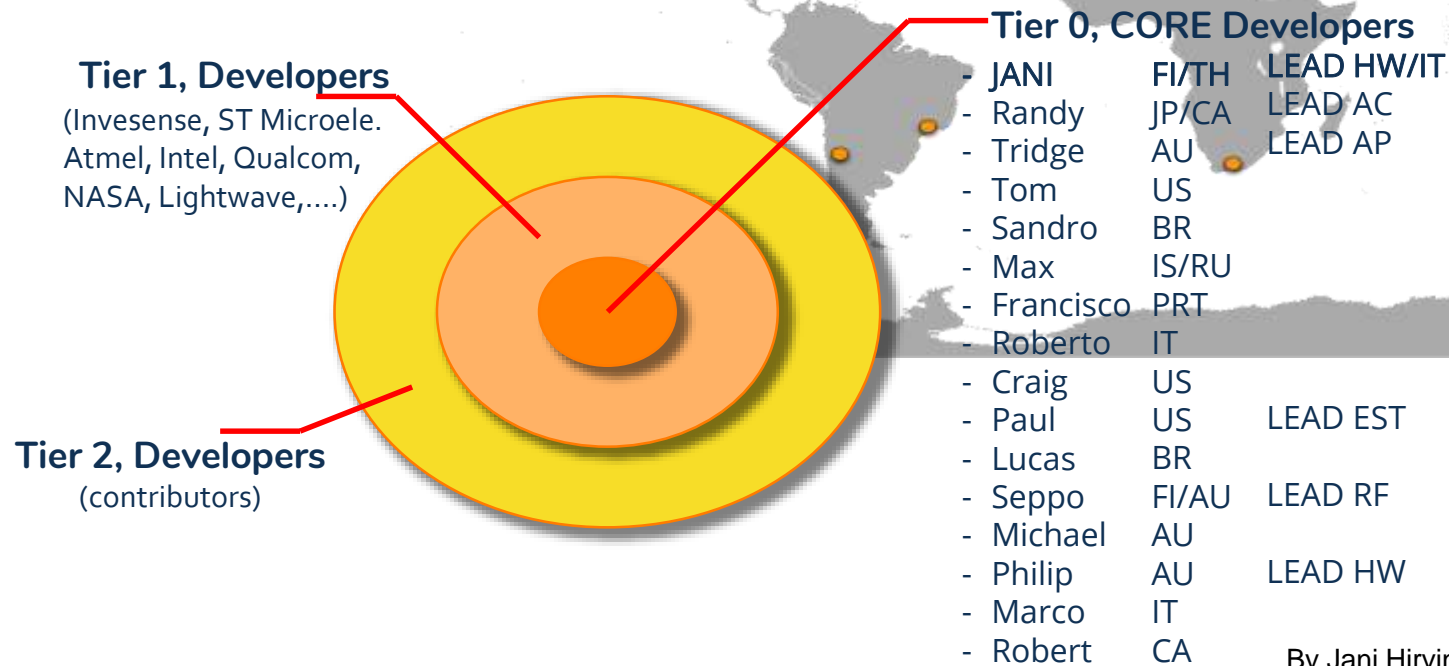


ARDUSUB

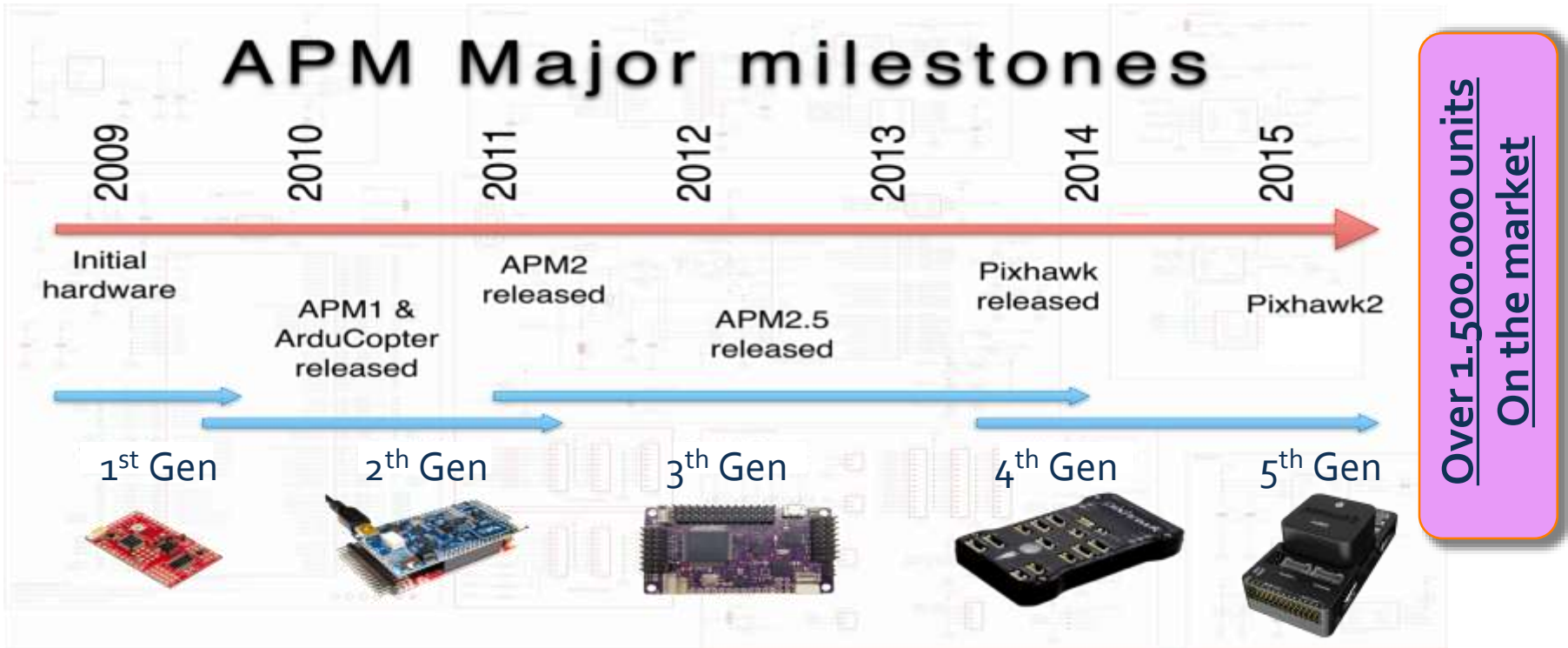


ArduPilot Development group

Total: ~20 nationalities involved,
over 300 people globally



World's Nr.1 Open Autopilot system



ArduPilot Today...



- Multicopters
- Fixedwings
- VTOL / Quadplanes
- Submarines
- Rovers
- Rocket airplanes
- Boats
- Tractors, even full size
- ... and many more

All systems fully autonomous

**From single units
to swarming...**

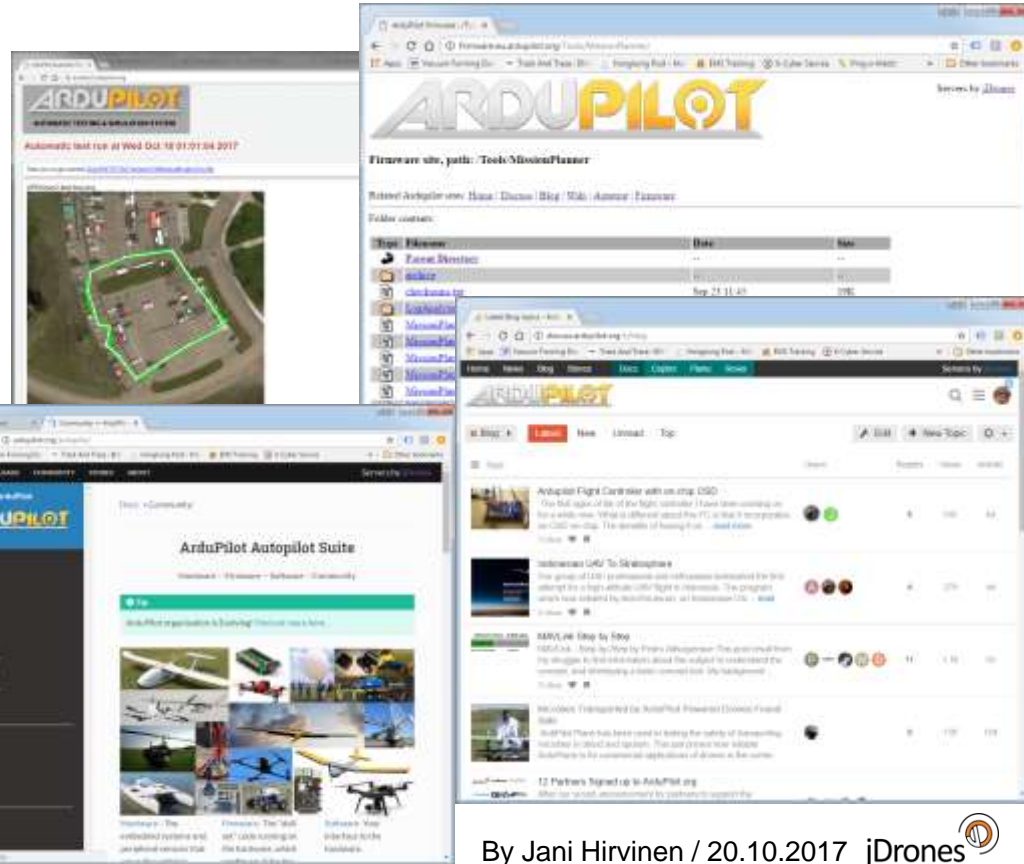
**UAV OBC / AU
Winners -12, -14, -16**



ARDUPILOT

ArduPilot Infrastructure:

Autotest, Firmware, Documentation, Logs processing, discussion forums, generic websites, eMail systems.

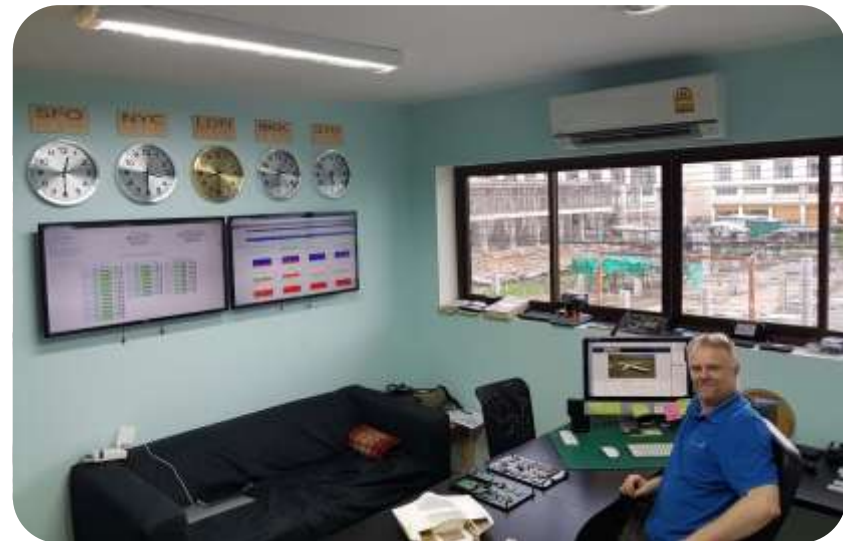
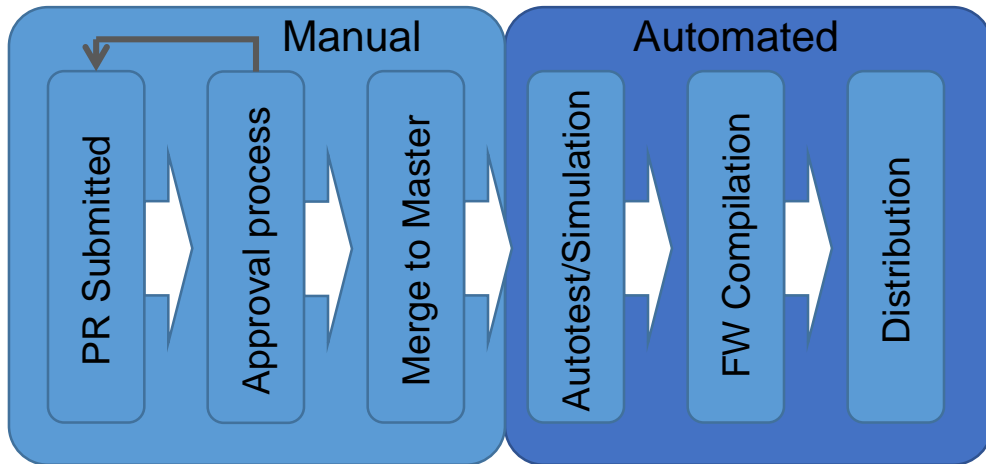


Over +170.000 unique
visitors, +9.000.000 page views /
monthly

ArduPilot “Control Room”

- + Real-Time monitoring
- + Global servers (SG, US, NL, TH)
- + Compilation processes, Simulations
- + Security systems
- + Process flows

Process Flow for Software development



- + ~10 Terabytes / Month
- + +30 firmware versions
- + +29.000 commits in repo
- + Firmware server stats
- + 3.8 TB in last 30 days
- + 18.7 mill requests last 30 days

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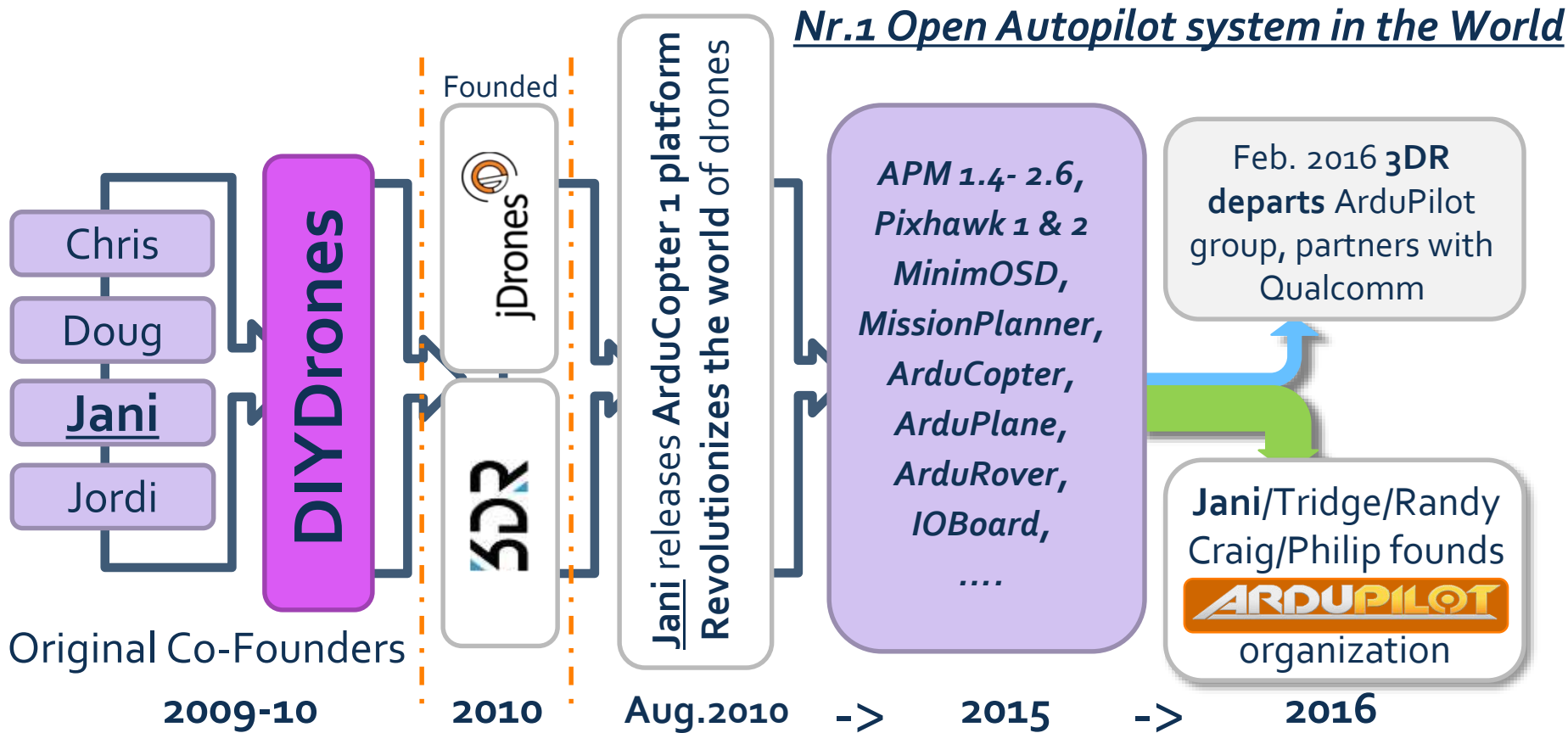
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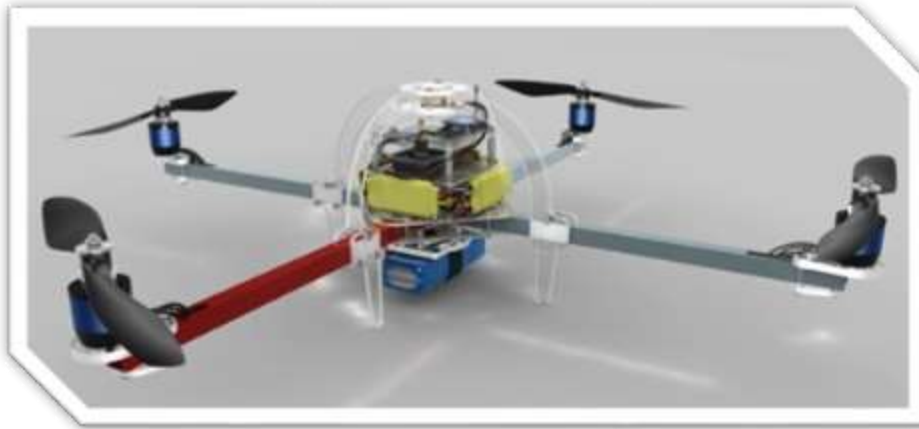
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ArduPilot History, past 7 years



Beginnings of ArduPilot / ArduCopter



Render by S. Benigno

Original ArduCopter in 2010

ArduCopter multicopter that started The Drone revolution,

Original work began under **DIYDrones** community. Idea was to create robust **multicopter platform** that is hackable and parts were easy to replace.

Simple and **practical** system that hit international success and started current **revolution**..

<http://bit.ly/1starducopter>

<http://bit.ly/arducopteralpha>



Sky Viper V2450GPS "ArduCopter" in 2017

Next GEN "micro copters" with **fully capable autopilot** system inside and GPS assisted flight operations, real-time video feed.

Released 2017 by SkyRocket

OSD That changed the FPV world

Video OSD System.

Base of the FPV operations. Nowadays industrial defacto OSD around the world.

Initial proto on early 2010. Production at 2011.

Versions of MinimOSD:

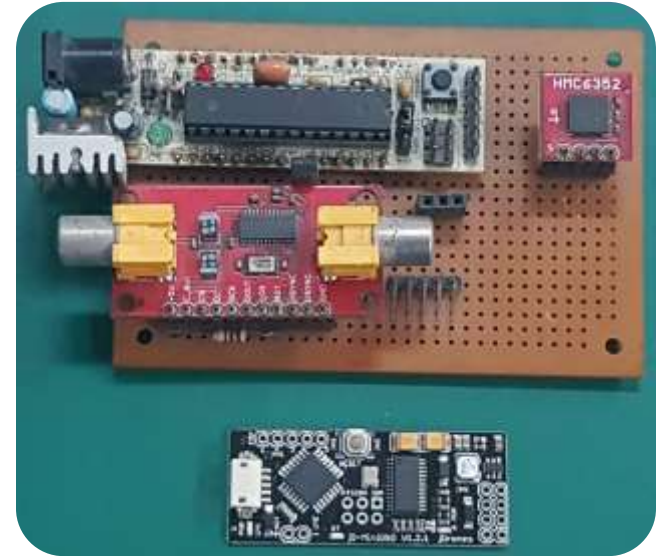
- 1.0 by 3DR, 1.1 by jDrones, 1.2 by jDrones

ArduCAM OSD Software written by

- Sandro Benigno
- Jani Hirvinen

New version under design due MAX7456 chip is EOL. ETA Q1/2018 based on STM32 Architecture.

2010



2011

Just a small example of devices created jointly

Saturday 21st Oct, Outside of Hotel



MinimOSD running ArduCAM firmware on HexaCopter

ArduPilot Ecosystem

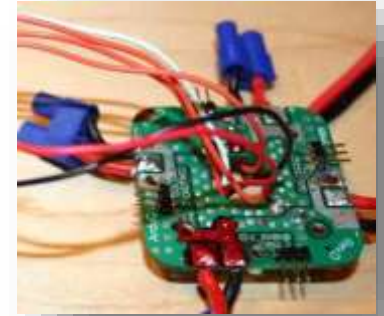
Hundreds of Accessories

- Laser range detectors
- Optical flow sensors
- Communication systems
- ADS-B Transponders
- Autopilots, Video OSDs
- Deployment systems
- Generic sensors



ArduPilot, driving the industry “defacto’s”

- Power PDB, Power modules,...
- UAVCAN ESCs and other peripherals
- Autopilot systems
- Folding frames, side / umbrella
- Protection cages
- OSD systems
- Telemetry systems
- Add-on's:
 - OpticalFlow, Airspeed sensors, external compasses, Displays,.....



And where are we heading?

We are at the beginning of how whole humankind is working...

- Logistics
- Transportation
- Security
- Search & Rescue

Just to name few...



Global UAV Award

23th June 2017 / Shenzhen, China

Mr. **Jani Hirvinen** / **ArduPilot** group receives the **Global UAV award** for the work done in past years. Award was given at Drone World Congress 2017.

Only **5 people** in world have received such an award.

They are (left to right):

- Mr. Tom Verbruggen, CEO of IDRONECT, Belgium
- Mr. Lan Yubin, Professor South China Agri.Univ, China
- **Mr. Jani Hirvinen, ArduPilot Co-Founder, Thailand**
- Mr. Brian Wynne, President and CEO of AUVSI, USA
- Mr. Paul Xu, Vice President of DJI, China

“In recognition of the outstanding contributions to the Global UAV Industry”



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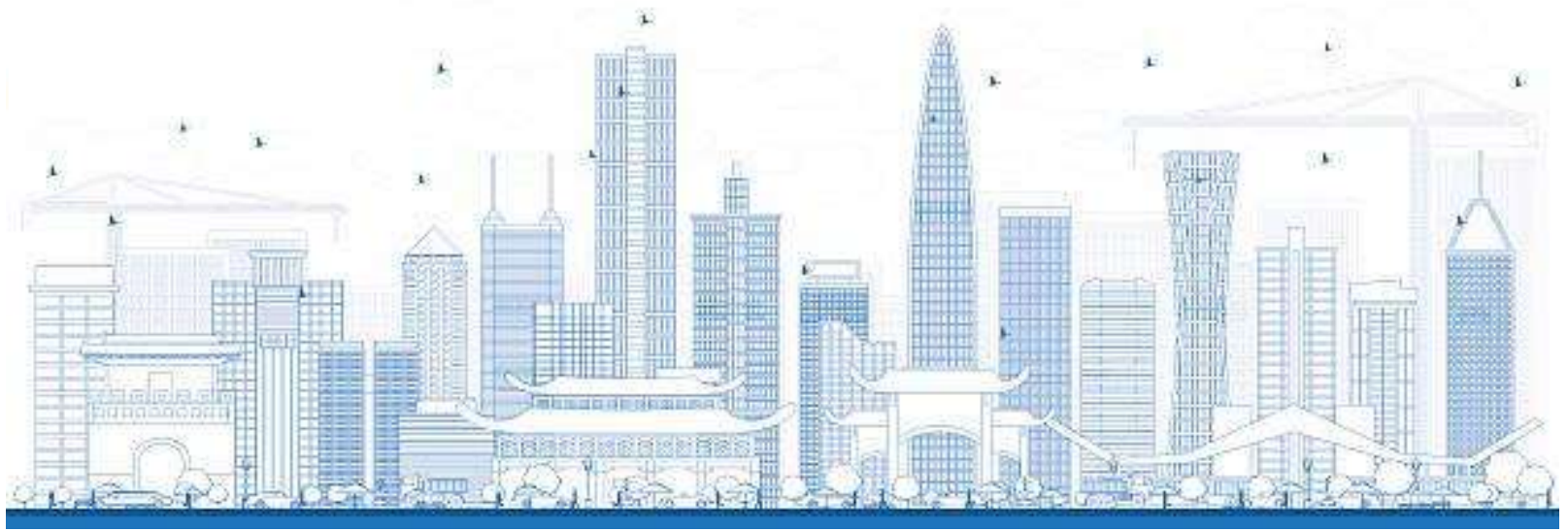
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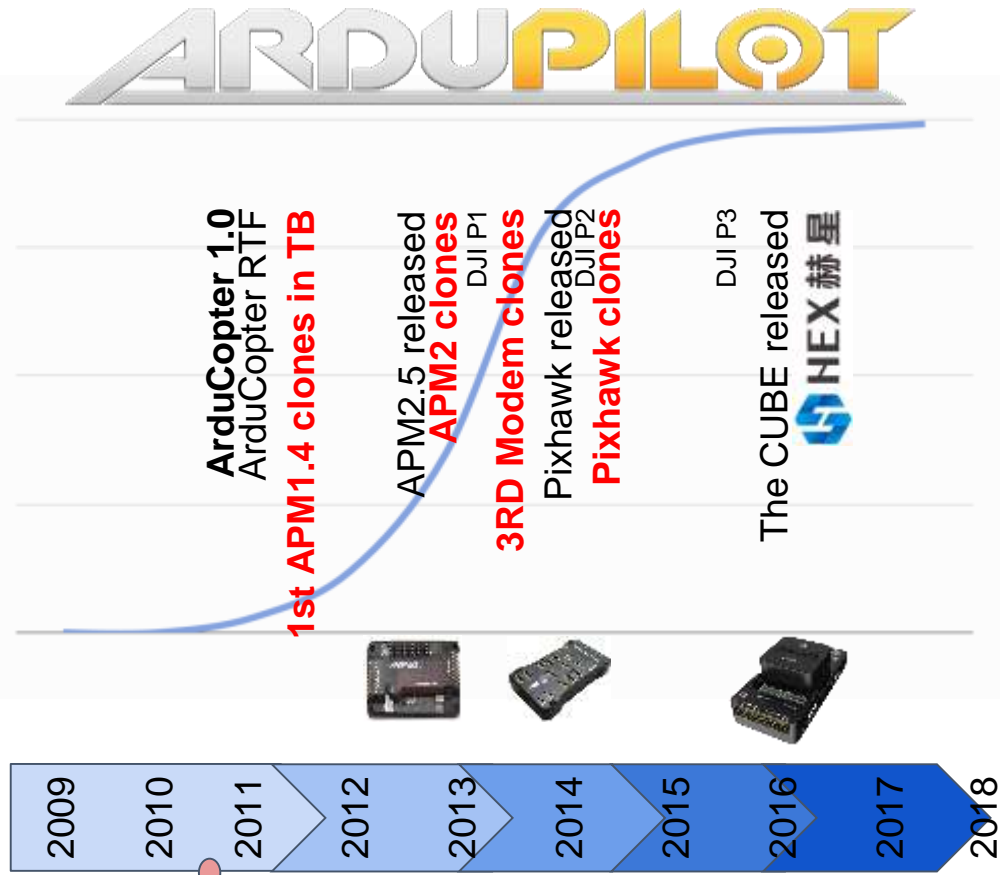
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Influence to China Drone Industry

The Retail Revolution

- **ArduPilot & Pixhawk: Clear Nr.1**
MultiWii, OpenPilot CC3D
- Arduino, DJI Accessories, FPV Racers, ESCs, Motors,....
- From 5 - 5000 companies



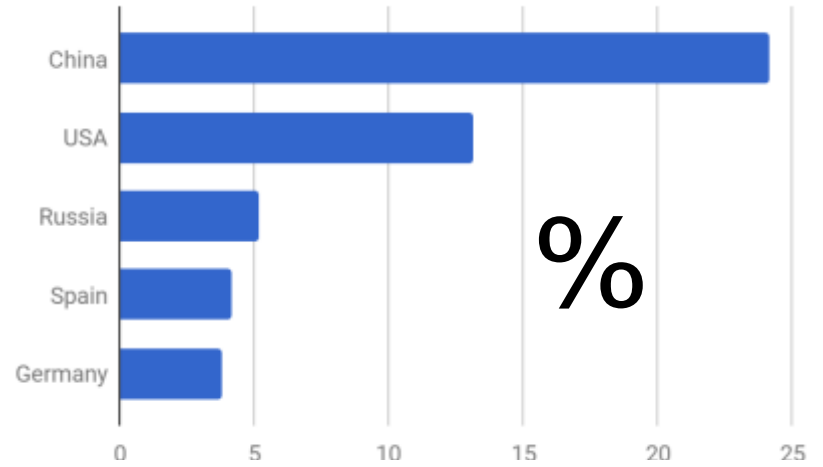
ArduPilot GEO Statistics

China involvement highly endorsed

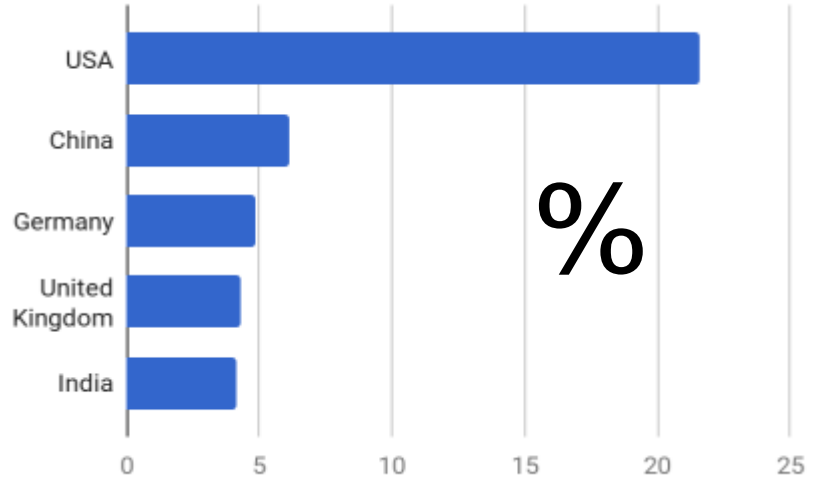
- First Chinese partners 2016
- Biggest user base on MP
- Second biggest on documents
 - Some parts already translated



Mission Planner Top5



Document site, Top 5



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ArduPilot is open source software

https://github.com/ArduPilot/ardupilot

ArduPilot / ardupilot

Unwatch

556

★ Unstar

2,425

Fork

5,081

Code

Issues 853

Pull requests 97

Projects 4

Wiki

Pulse

Graphs

Settings

ArduPlane, ArduCopter, ArduRover source <http://ardupilot.org/>

Edit

26,791 commits

20 branches

148 releases

291 contributors

GPL-3.0

Branch: master












New pull request

Create new file

Upload files

Find file

Clone or download

 tridge mavlink: added C++11 generator ...	Latest commit d002643 35 minutes ago
 .github	updated contributors url. Was pointing at missing file, now its at la... 10 months ago
 APMrover2	Rover: add available memory to PM message 4 days ago
 AntennaTracker	Tracker: update rangefinder declaration a month ago
 ArduCopter	Copter: version to 3.6-dev a day ago
 ArduPlane	Plane: fixed attitude logging for tailsitters 2 hours ago
 ArduSub	Sub: Implement JSButton function to toggle between forward/lateral input 2 days ago
 Tools	default-params: Added parameter files for octa and octa-quad 2 days ago
 benchmarks	waf: add gbenchmark Waf tool a year ago
 docs	docs: Fix typos 11 months ago
 libraries	DataFlash: added Log_Write_AttitudeView 2 hours ago



ArduPilot & Open source

ArduPilot is the **world's most widely** used **open source** flight code

- **Non-Profit company**, part of Software-In-The-Public-Interest (SPI)
- Estimate **1,500,000+ users** globally on multiple platforms
- **Supports:** Multicopters, Airplanes, Rovers, Blimps, Trackers
- **Complete ecosystem** around main project, **MAVLink, AP SYNC,....**
- **Financially** supporting **partner network** is growing (30+ partners)



enRoute

AUAVA

LiveLink



HEX 赫星



Engaging with the team

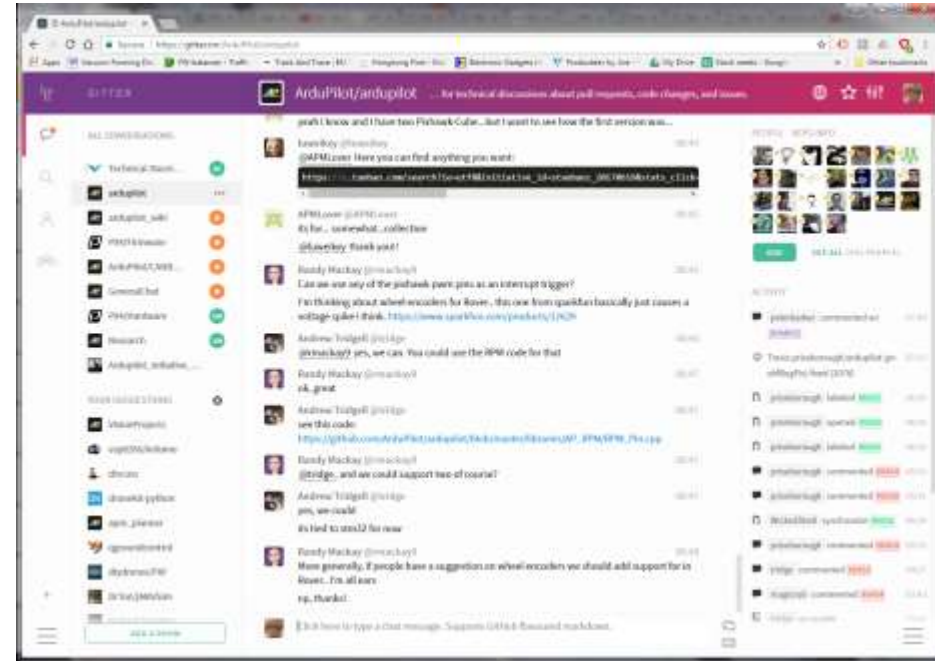


1. **Company** puts in at least **one developer** to work on company's priorities.
2. **Developers review** each other's work, **Senior Developers** making the **final** decisions.
3. **Weekly** and ad-hoc **meetings** make the team function just like any other team.
4. **Company** dedicates **one developer** who is fluent in English speaking as a company representative on weekly meetings and to engage often with other members.

"If no English speaking inhouse, use consulting firm if necessary"

Where to find more?

- ArduPilot wiki:
 - ardupilot.org
- Support forums:
 - discuss.ardupilot.org
- ArduPilot software:
 - github.com/ArduPilot/ardupilot
- Developer chat:
 - gitter.im/ArduPilot/ardupilot
- Other: ardupilot.org/copter/docs/common-contact-us.html



Thank you !

For questions and more, please stop the “smurf” after the presentation.

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