SENSORS & SAMPLERS

Examples of drone applications

Today's examples

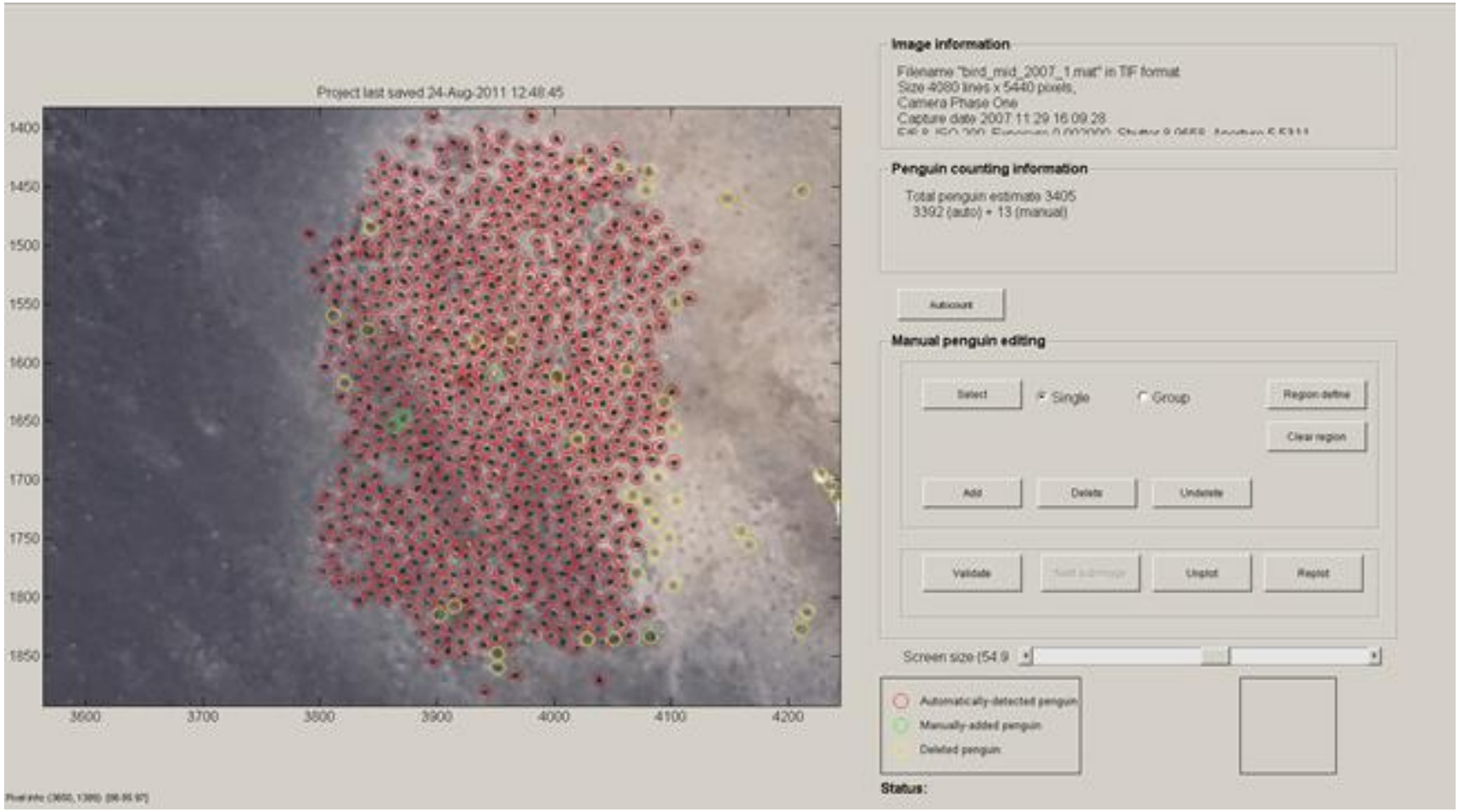
- Standard cameras
- Smart eyes
- Lidar
- Radar

Standard RGB cameras

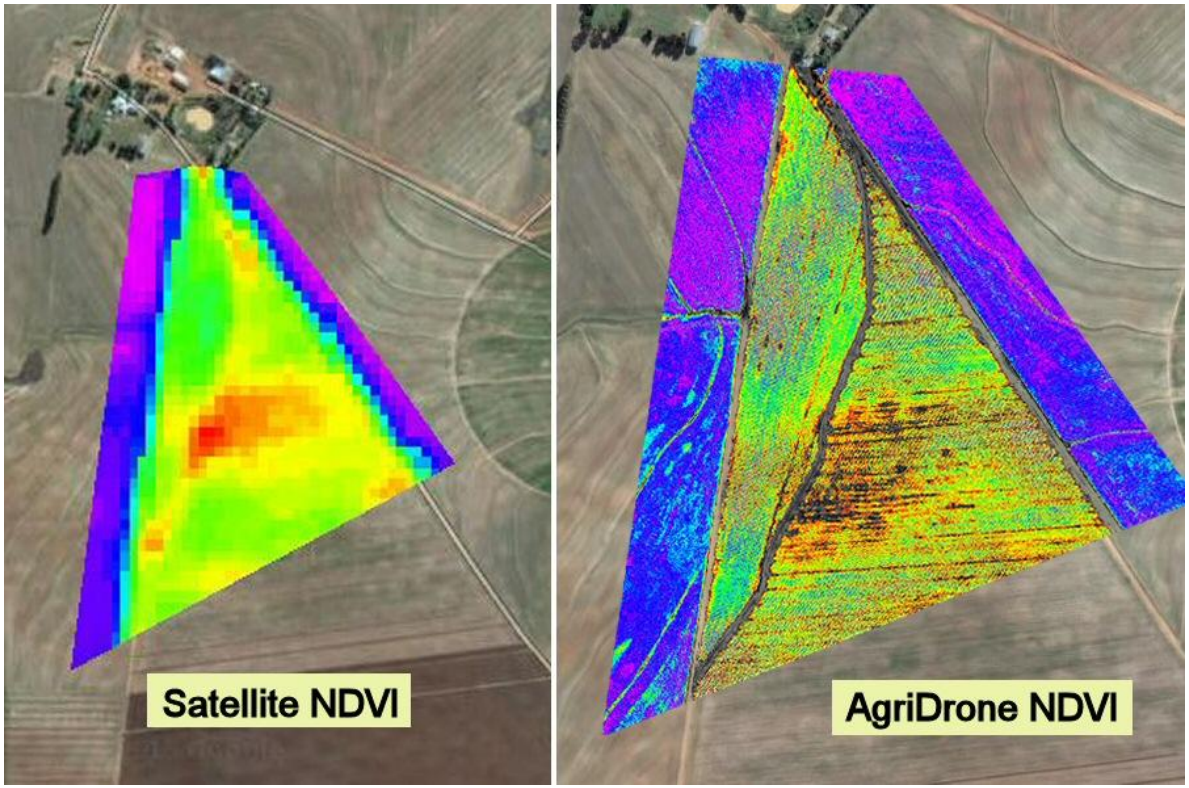
- Standard photography with off the shelf products
- Cameras often included with drones

So what can we do with them?

umbilical design



Normalized Difference Vegetation Index



Smart eyes

Too many plants to classify and investigate in too little time?

Smart eyes
Intelligent Vision System

UNIBAP

Two cameras – separation as human eyes (~7 cm)

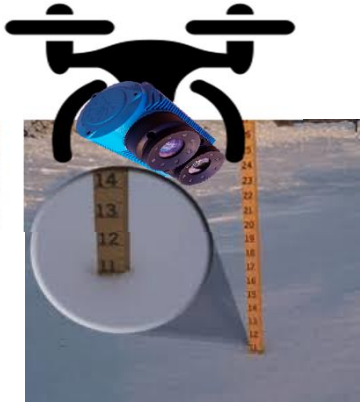
Built in Artificiall Intelligens

Main purpose – offload human inspection

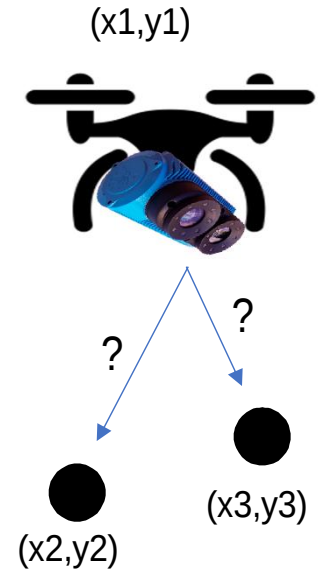
Stereo vision to determine distance

1, 2, 3,....

Papaver laestadianum



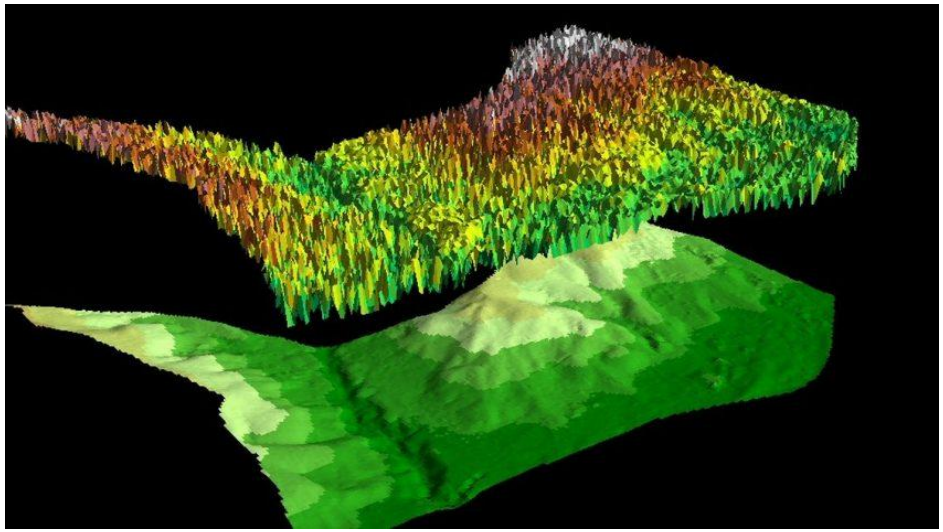
Reading



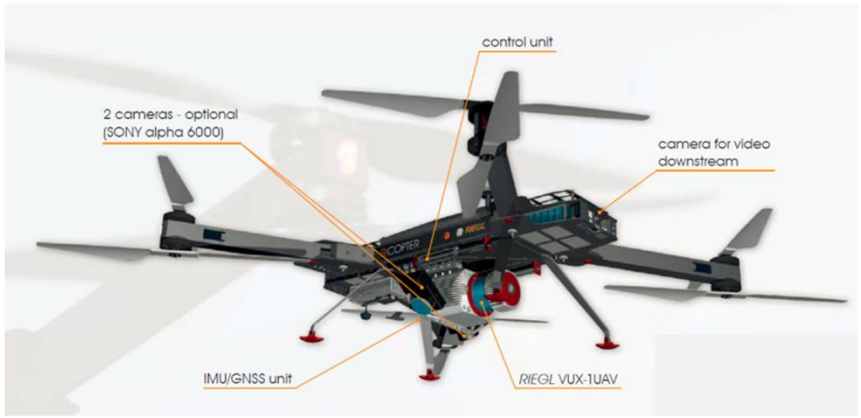
Situation based navigation

Lidar
Light Detection And Ranging

Need for highly accurate 3D terrain models?



Lidar
Light Detection And Ranging



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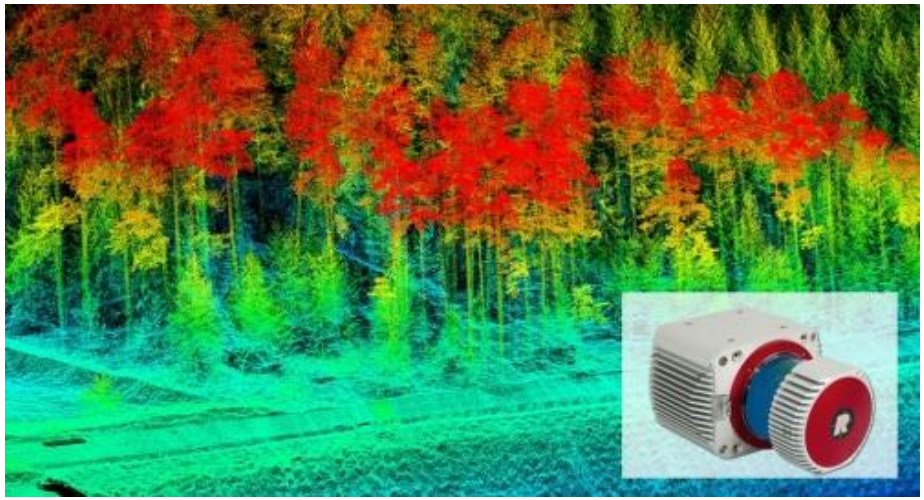


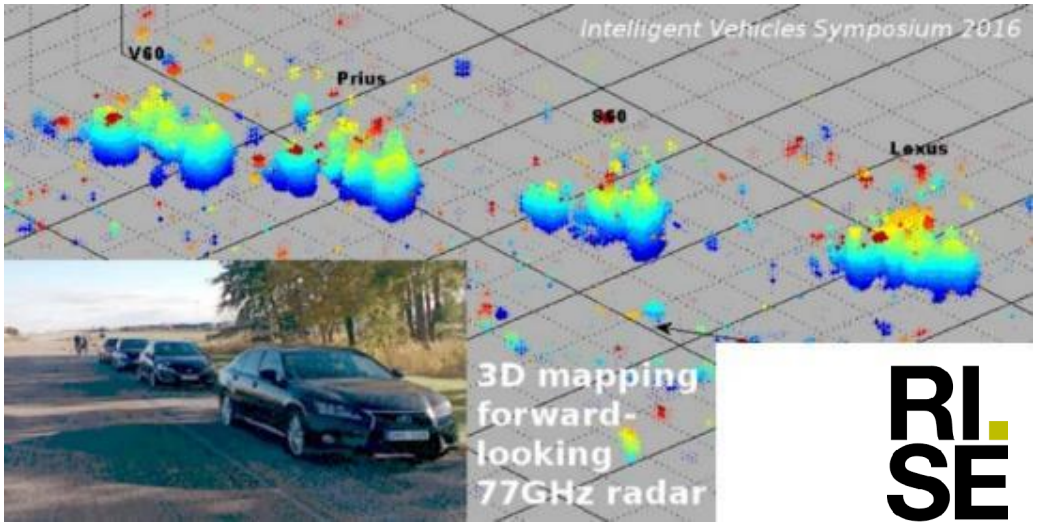
Laser scanning with 5 mm resolution

Radar
Radio Detection And Ranging

Need to create 3D terrain models in harsh weather conditions, cloudy skies or at night time?

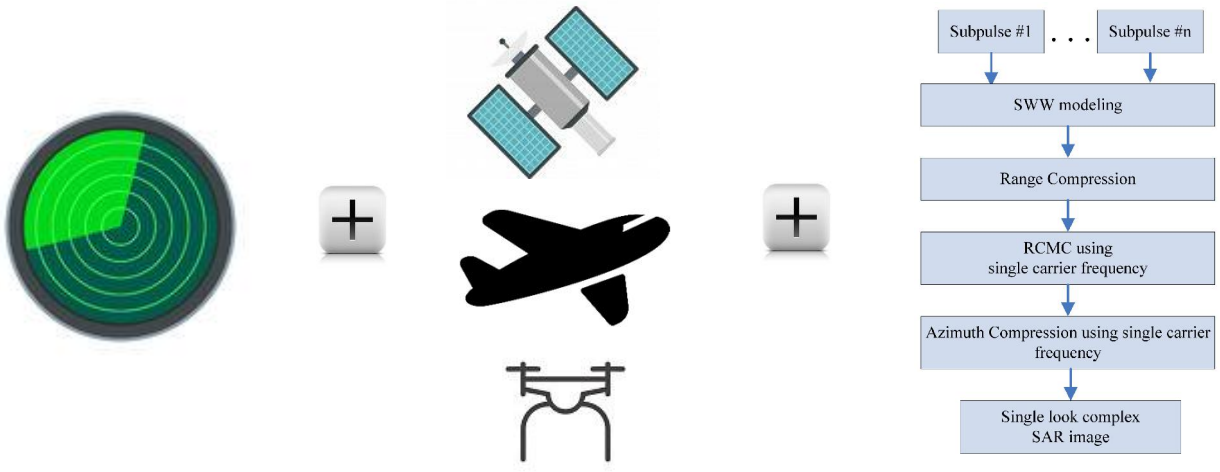
Radar
Radio Detection And Ranging

- Works in rain, darkness, through clouds
- Provides distance & profile

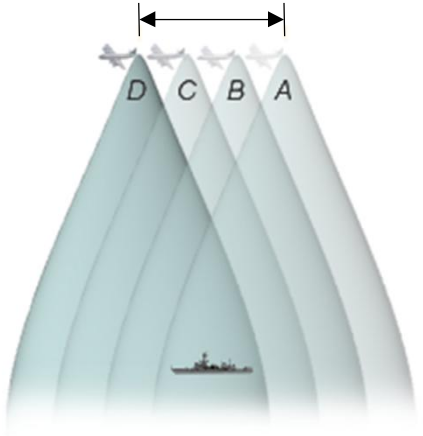


Application: installed at railway crossings to detect people and vehicles

SAR
Synthetic Aperture Radar



Synthetic length/aperture



Areas of applications, examples

Land:	Cover, lake levels, soil moisture
Vegetation:	Forest and crop biomass
Ocean:	Currents, oil spill
Sea ice:	Cover, type, thickness
Snow, land ice:	Cover, melting, snow water equivalent

SAR
Synthetic Aperture Radar

Ongoing research with SAR on a drone platform

X-band: 8-12 GHz
Resolution: ~ 0.3 m
Weight: 5 kg

Time: 25 min

Photo (2D)

SAR image (3D)

UNIVERSITY OF CALGARY

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