Goals

- Basic mechanics
- Control
- Design considerations
- Agility
- Component selection
- Effects of size

Frame, motors and propellors

	FRAME + PIXHAWK + PROPULSION	BATTERY	PAYLOAD	TOTAL WEIGHT	MAX THRUST	THRUST/ WEIGHT	Propeller
3DR X8+	1855	817	600	3272	10560	3.227	11" x 4.7"
DJI F550 + E600	1494	721	600	2815	9600	3.410	12" x 4.2"
DJI F450 + E310	826	400	600	1826	3200	1.752	9.4" x 5"
DJI F450 + E600	970	721	600	2291	6400	2.794	12" x 4.2"
DJI F550 + E310	1278	400	600	2278	4800	2.107	9.4" x 5"
DJI F550 + E310 @ 4 cell	1278	600	600	2478	5316	2.145	9.4" x 5"
DJI F550 + E305 @ 4 cell	1134	600	600	2334	5100	2.185	9.4" x 5"

DJI F450 frame

http://www.dji.com/

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Basic Hardware

Pixhawk

- $200, 38g
- 168 MHz / 252 MIPS Cortex-M4F
- Sensors: 3D ACC / Gyro / MAG / Baro
- Integrated backup, override and failsafe processor with mixing
- microSD slot, 5 UARTs, CAN, I2C, SPI, ADC, etc

Intel NUC i7

- $480, 200g
- 5th Generation Intel Core i7-5557U processor, 3.1 Ghz
- Max memory 16GB
- 4 x USB3, 2 x USB2 ports
- Internal support for M.2 SSD card & SATA3 for 2.5" HDD/SSD
- 12V DC

Processing and Communication

UART

PWM

2.4 GHz
R/C

900 MHz
Telemetry

Outdoor Platform

Outdoor Test

DJI F450 platform + E600 motors + 600 gram payload + 721 gram battery
Thrust/Weight ratio greater than 2.7

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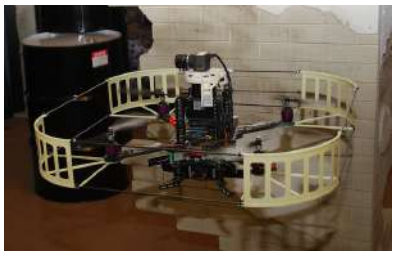
Sensors and Power



- Laser scanner
  - 270 gm
  - 10 W for operation plus 50-60 W for mobility
  - Range 30 m

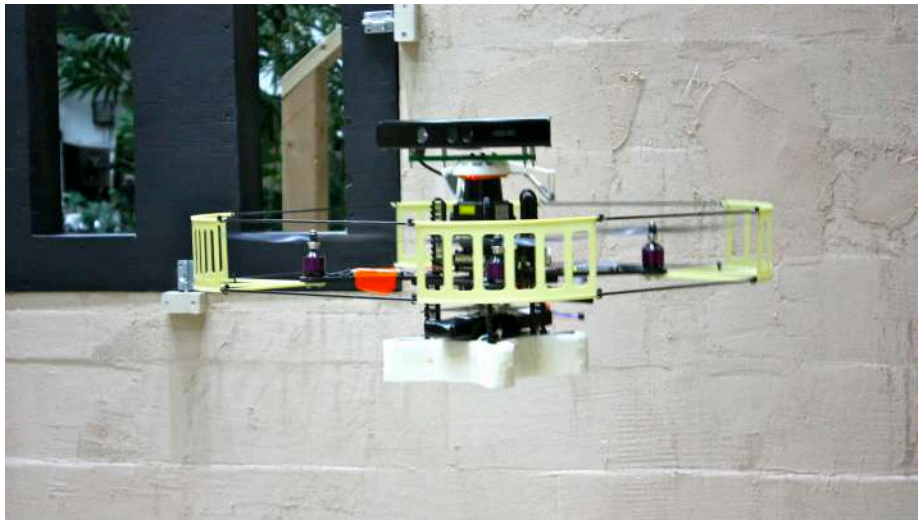
- Cameras
  - 80 gm (including frame, each camera 25 g)
  - 1.5 W for operation plus 15 W for mobility
  - Range 10-15 m

Examples

1750 g (laser, 3 cameras, GPS, IMU)

650 g (camera, IMU)

740 g (2 cameras, IMU)



1800 g (laser, Kinect, IMU)