

KAE MÕS'i

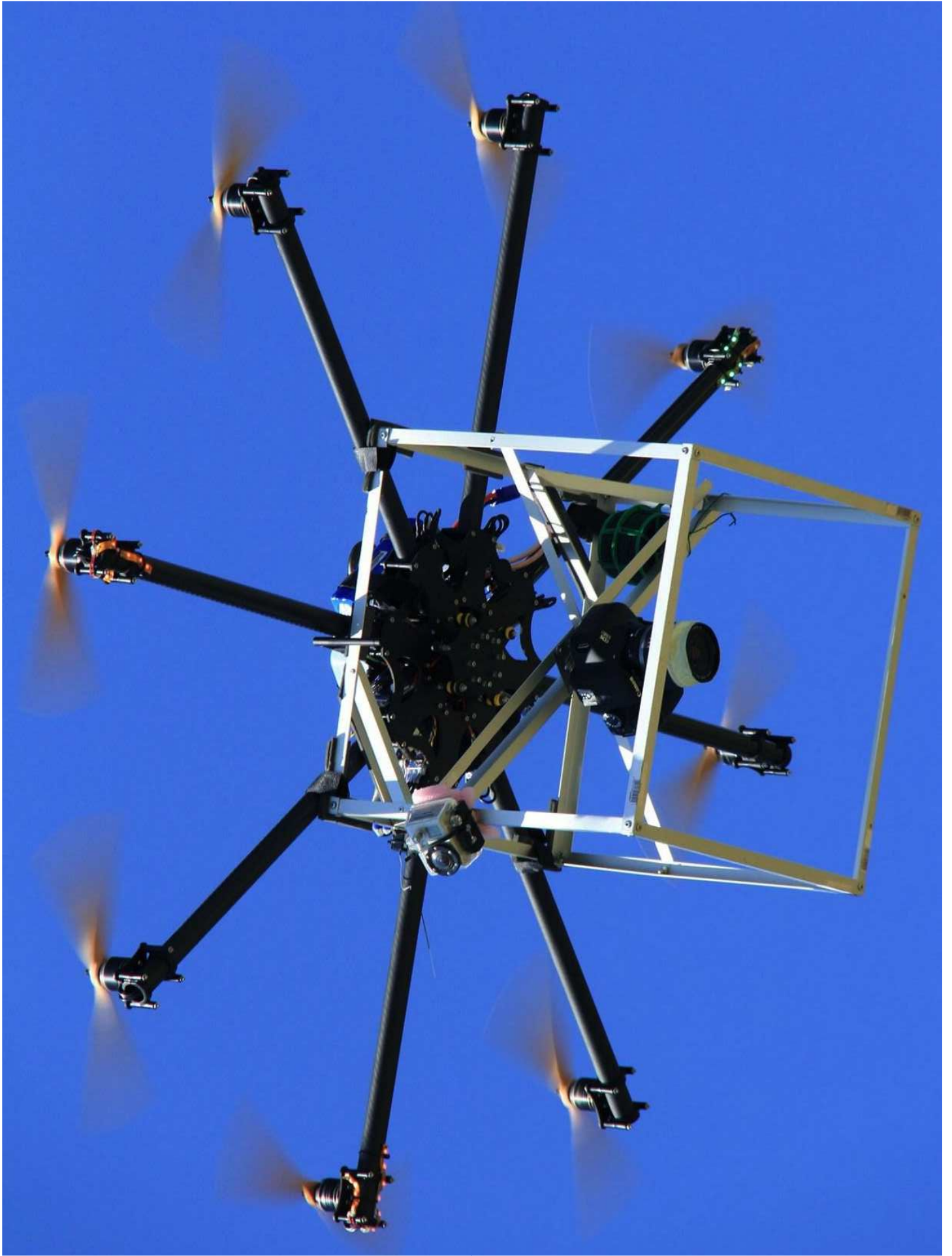
ESTGIS'i suvekool, 15.08.2015

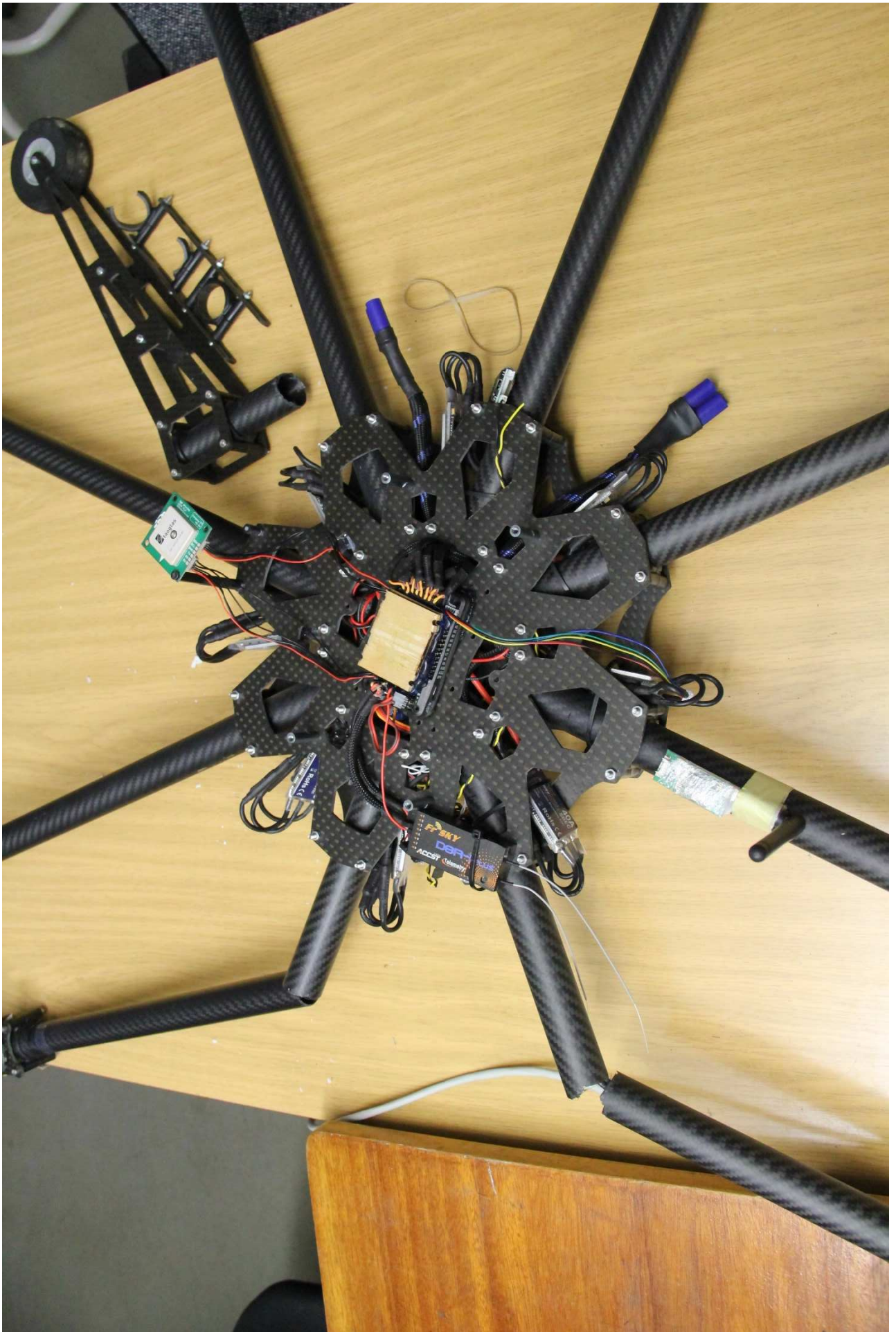
Edgar Sepp

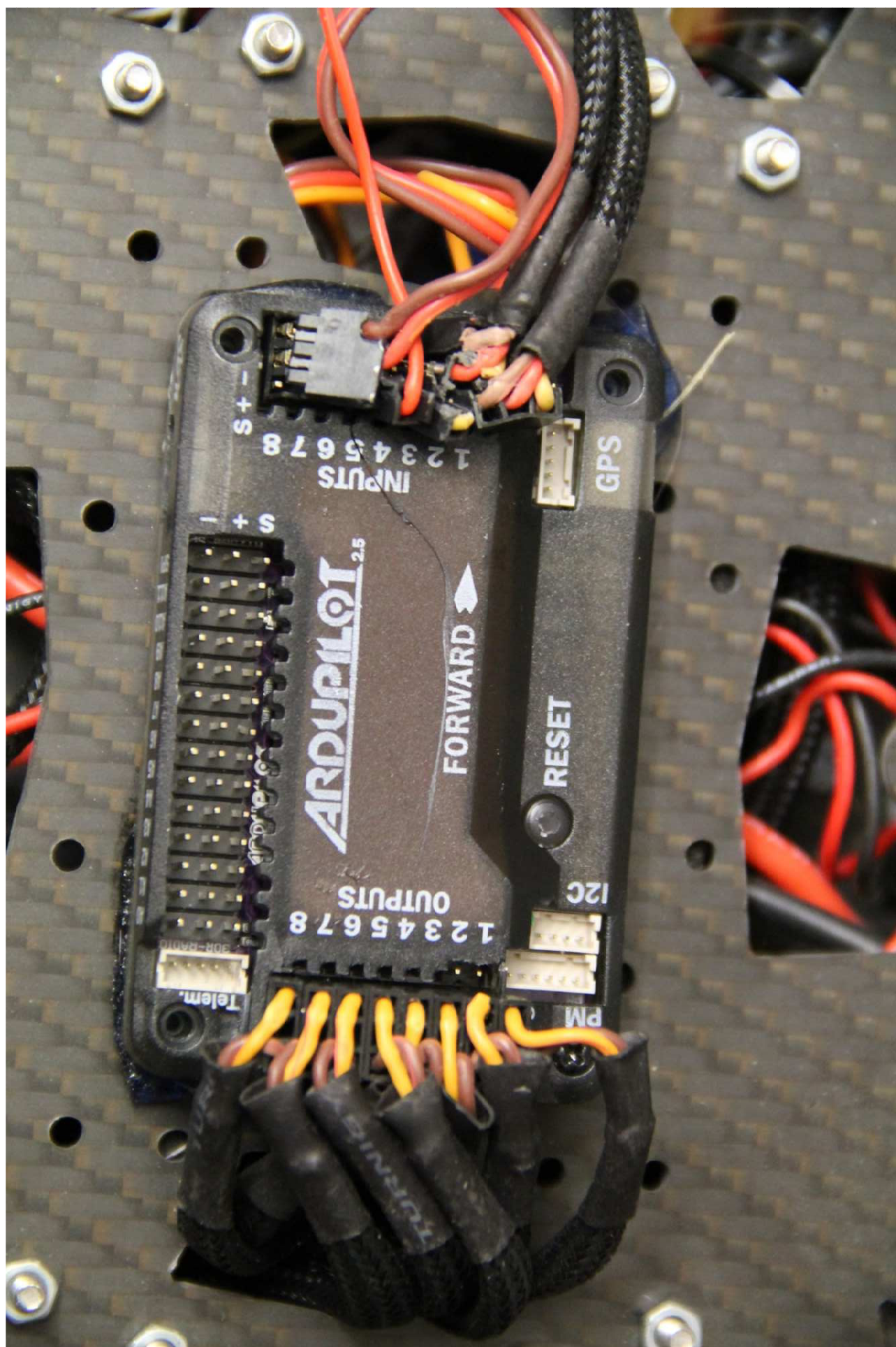
TÜ geoinformaatika

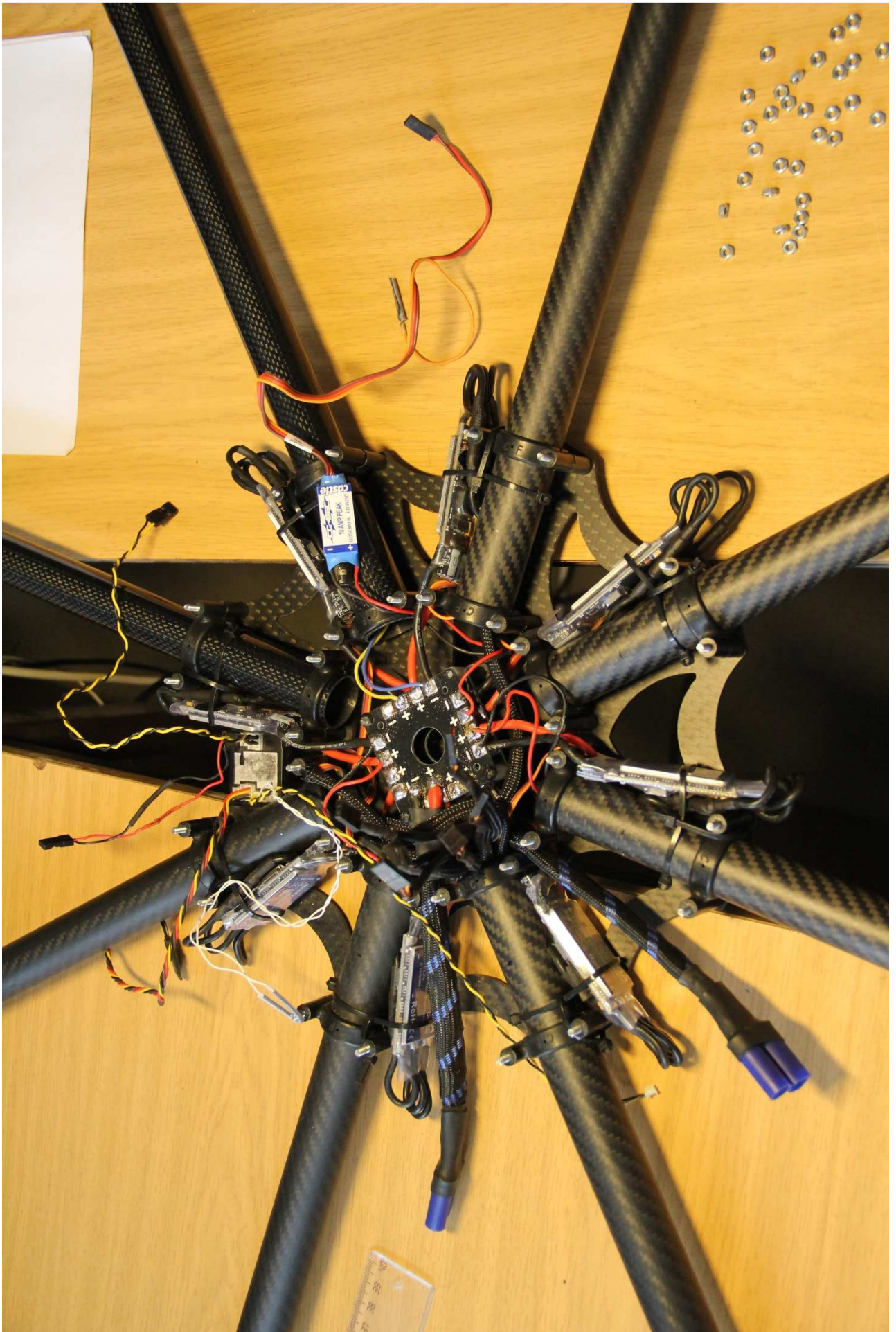


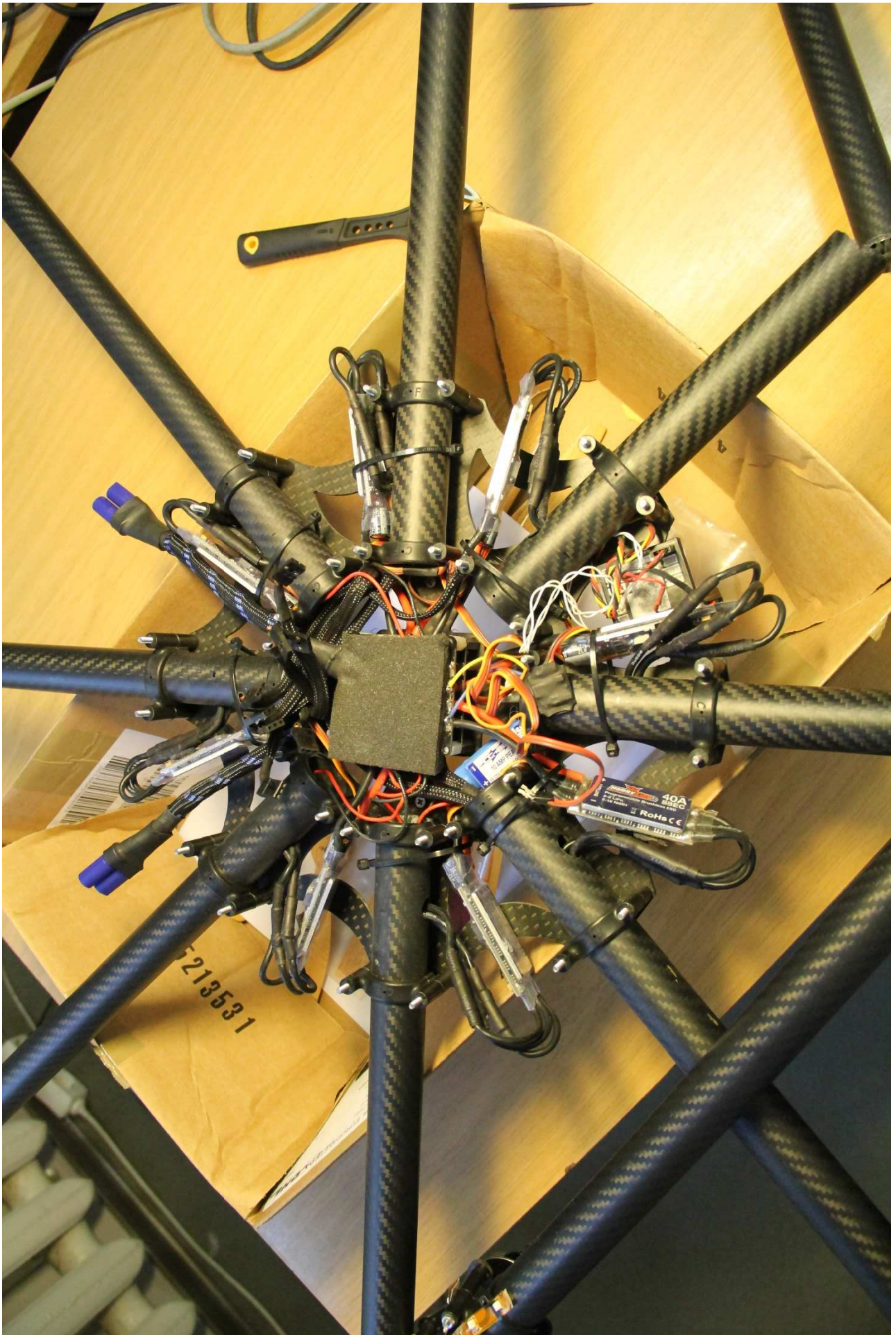


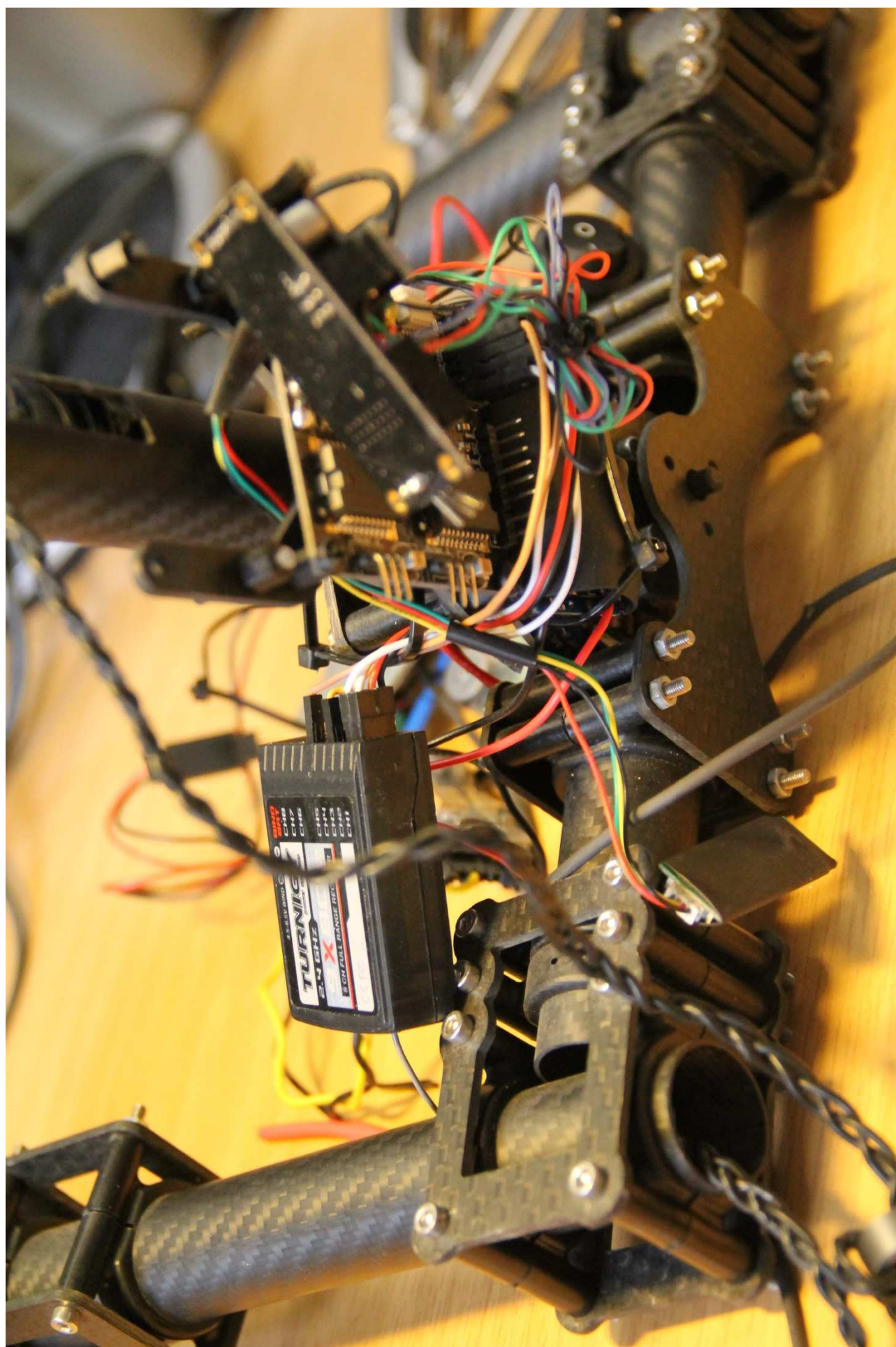


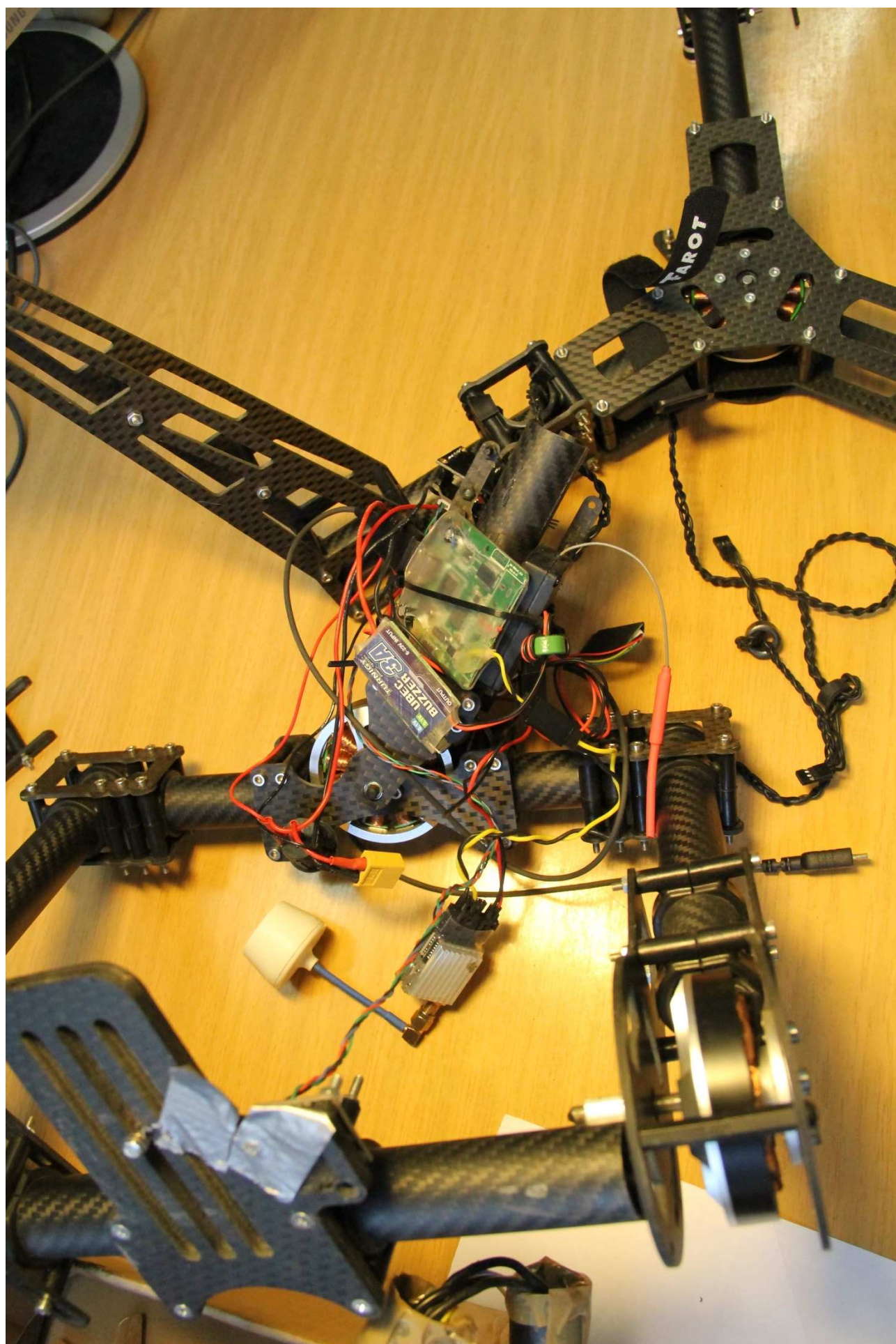


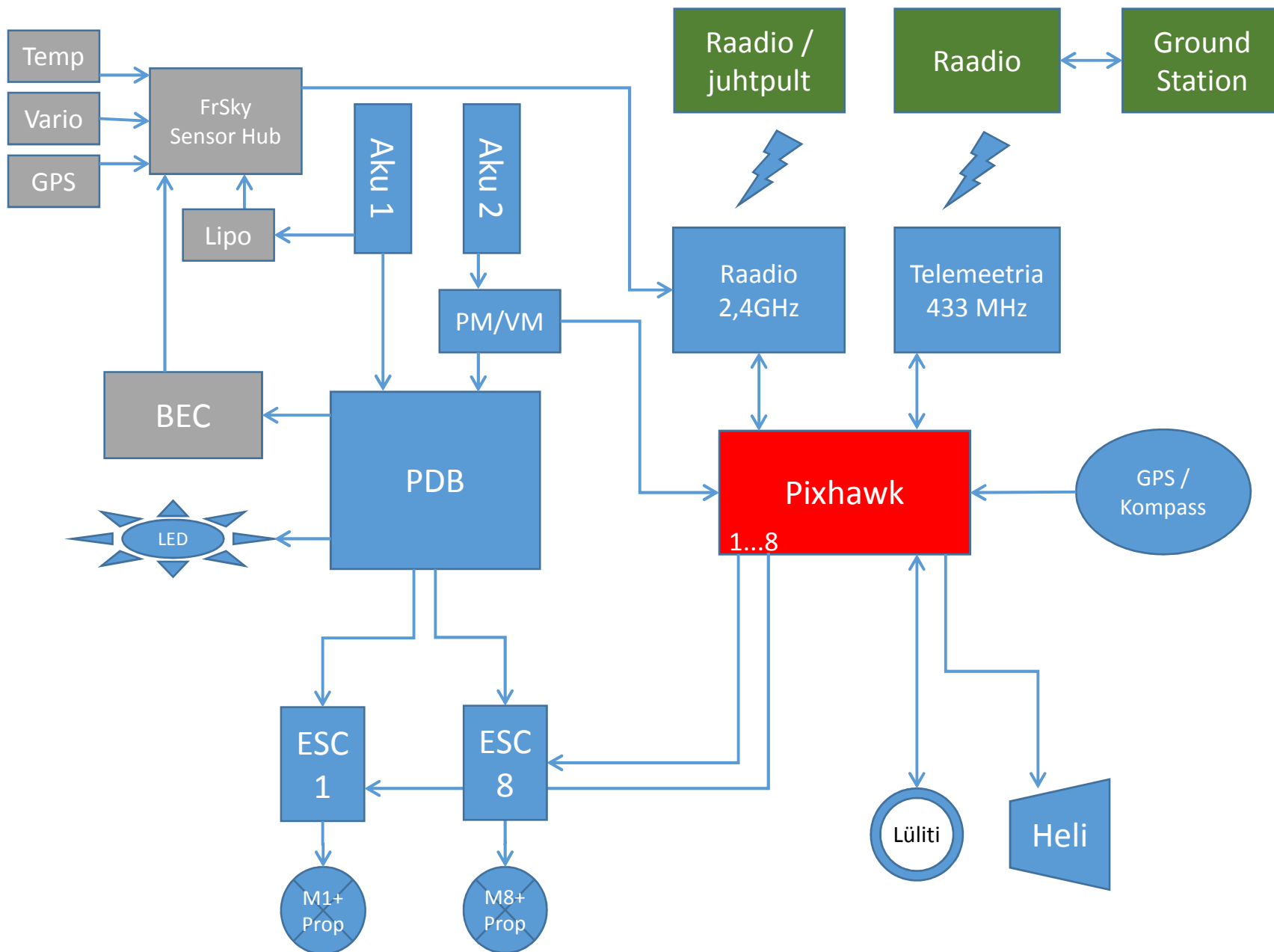














Mis puudu?

- Raam
- Kaamera
- Kaamera alus

Akud

LiPo



Capacity: **8000mAh**

Voltage: **4S1P / 4 Cell / 14.8v**

Discharge / C-rating: **30C Constant (40C Burst)**

Weight: **845g (including wire, plug & case)**

Dimensions: **166x69x35mm**

Propellerid

- Xoar 13x5 Wood Precision Propeller Pair [XR-13x5-WPJPN]
- Pikkus (length) x Tõus (Pitch), tollides
- Kinnituse läbimõõt /tüüp
- Materjal: plastik, puu, süsinikfiiber...



Mootorid

- T-Motor MT2814-10 KV770
- MT – seeria
- 28 – mootori/rootori läbimõõt
- 14 – rootori kõrgus
- 10 – poolide arv või juhtme keerete arv ümber pooli
- KV770 – teoreetiline pöörlemiskiirus 1V voolu korral kui ei oleks takistust



tehnilised näitajad

Notes: The test condition of temperature is motor surface temperature in 100% throttle while the motor run 10 min.

Näide 1

Item No.	Volts (V)	Prop	Throttle	Amps (A)	Watts (W)	Thrust (g)	RPM	Efficiency (g/W)	Operating temperature(°C)
		T-MOTOR 13*4.4CF	50%	6.5	96	800	5500	8.32	58
			65%	10.9	161	1180	6540	7.31	
			75%	14.9	221	1400	7250	6.35	
			85%	19.9	295	1700	8000	5.77	
			100%	23.6	349	1860	8400	5.33	
Notes: The test condition of temperature is motor surface temperature in 100% throttle while the motor run 10 min.									

- Kui meie kopter töötab 75% võimsusega
 - Mootorid kokku: $8 \times 14,9 \text{ A} = 119,2 \text{ A}$
 - Meil on 2 x 8000mAh akut $\rightarrow$ 1h jooksul 16A voolutugevuse
 - Lennuaeg: $16 / 119,2 = 0,134...h \rightarrow 8,05$ minutit
 - $8 \times 1400g = 11,2 \text{ kg}$
 - Kui mudel kaaluks 6,4 kg?... siis $6,4 / 8 = 800g$
 - Lennuaeg: $16 / (8 \times 6,5) = 0,308 \rightarrow 18,5$ minutit

Näide 2

Item No.	Volts (V)	Prop	Throttle	Amps (A)	Watts (W)	Thrust (g)	RPM	Efficiency (g/W)	Operating temperature(°C)
		T-MOTOR 13*4.4CF	50%	6.5	96	800	5500	8.32	58
			65%	10.9	161	1180	6540	7.31	
			75%	14.9	221	1400	7250	6.35	
			85%	19.9	295	1700	8000	5.77	
			100%	23.6	349	1860	8400	5.33	
Notes: The test condition of temperature is motor surface temperature in 100% throttle while the motor run 10 min.									

- Kopteri õhkutõusmisel kasutan 100% võimsust
 - Iga mootor tarbib 23,6 A voolu → kokku $23,6 \times 8 = 188,8$ A
- Missuguseid A talub minu ESC, kas on piisav varu (20%)?
 - 40A
- Mul on aku 5000mAh ja 30C? Kas see peab vastu?
 - $5 \text{ Ah} \times 30 = 150$ A max voolutugevus
 - Burst rate 40C → $5 \times 40 = 200$ A
- Kua ta selliselt töötaks?
 - $5 / 188,8 = 0,026$ → 1,6 min (teoreetiline) Kas lendu ka tõuseks?

548

Restricted Demo Version

[sign-up](#) for full version from only \$0.99

xcopterCalc - Multicopter Calculator

[sign-up](#) for full version from only \$0.99Login: eMail * password * ☐ remember me - [Forgot password?](#)[News](#) | [Help](#) | Language: english ▼

all data without guarantee - Accuracy: +/-15%

General	Motor Cooling: medium ▼	# of Rotors: 4 flat ▼	Frame Size: 400 mm 15.75 inch	Model Weight: 850 g 30 oz	incl. Drive ▼	Field Elevation 500 m ASL 1640 ft ASL	Air Temperature 25 °C 77 °F	Pressure (QNH): 1013 hPa 29.91 inHg
Battery Cell	Type (Cont. / max. C) - charge state: select... ▼ - normal ▼	Configuration: 3 S 1 P	Cell Capacity: mAh	Total Capacity: mAh	Resistance: Ohm	Voltage: V	C-Rate: C cont. C max.	Weight: g oz
Controller	Type: select... ▼	cont. Current: A	max. Current: A	Resistance: Ohm				Weight: g oz
Motor	Manufacturer - Type (Kv): select... ▼ select... ▼ search... Prop-Kv-Wizard	KV (w/o torque): rpm/V	no-load Current: A @ V	Limit (up to 15s): W ▼	Resistance: Ohm	Case Length: mm inch	# mag. Poles:	Weight: g oz
Propeller	Type - yoke twist: custom ▼ - 0° ▼	Diameter: 11 inch	Pitch: 4.7 inch	# Blades: 2	PConst / TConst: 1.3 / 1.0	Gear Ratio: 1 : 1	calculate	

Remarks:

Battery	Motor @ Optimum Efficiency	Motor @ Maximum	Motor @ Hover	Total Drive	Multicopter
Load: - C	Current: - A	Current: - A	Current: - A	Drive Weight: - g	All-up Weight: - g
Voltage: - V	Voltage: - V	Voltage: - V	Voltage: - V	- oz	- oz
Rated Voltage: - V	Revolutions*: - rpm	Revolutions*: - rpm	Revolutions*: - rpm	Current @ Hover: - A	add. Payload: - g
Capacity: - mAh	electric Power: - W	electric Power: - W	Throttle (log): - %	P(in) @ Hover: - W	- oz
Energy: - Wh	mech. Power: - W	mech. Power: - W	Throttle (linear): - %	P(out) @ Hover: - W	max Tilt: - °
Flight Time: - min	Efficiency: - %	Efficiency: - %	electric Power: - W	Efficiency @ Hover: - %	max. Speed: - km/h
Mixed Flight Time: - min		est. Temperature: - °C	mech. Power: - W	Current @ max: - A	- mph
Hover Flight Time: - min		- °F	Efficiency: - %	P(in) @ max: - W	est. rate of climb: - m/s
Weight: - g			est. Temperature: - °C	P(out) @ max: - W	- ft/min
- oz			- °F	Efficiency @ max: - %	with Rotor fail: -
			specific Thrust: - g/W		
			- oz/W		

Motor Characteristic at Full Throttle



Lennuplaneerimine

- Teooria ja praktika
- Praktika ja kogemused
- Failsafe seaded
 - Akupinge jälgimine – min väärtus – pöördub tagasi koju / maandub
 - 13,3 V (3,3V cell'i kohta 13,2V)
 - GeoFence – lennuala piiritlemine
 - Aku mahutavuse muutus
 - GPS signaali kadumine → Alt hold
 - Raadiosignaali kadumine → RTL

Lennuplaneerimine

- Automaatrežiimil lendamise kiirus
- Orientatsiooni muutmine lennu ajal: ära muuda, vaata järgmise punkti suunas
- Laskumise ja tõusmise kiirus
- Erinevad lennurežiimid
 - Stabilize
 - Altitude hold
 - Loiter
 - Auto
 - Return to Launch

Mission Planner 1.3.28 build 1.1.5624.13992

FLIGHT DATA

FLIGHT PLAN

INITIAL SETUP

CONFIG/TUNING

SIMULATION

TERMINAL

HELP

DONATE

COM4

57600

CONNECT

Distance: 0.6286 km

Prev: 9966220.77 m AZ: 50

Home: 4788981.28 m

Zoom

Grid

View KML

GEO

58.394380

26.739779

52.26m

Status: loaded files

Load WP File

Save WP File

Loaded Lend_1_ver3.txt

Read WPs

Write WPs

Home Location

Lat 58.39425960

Long 26.73723578

Alt (abs) 100

Waypoints

WP Radius 45

Loiter Radius 2

Default Alt 100

Alt Warn 0

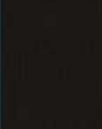
Spline

Verify Height

Add Below

	Command	Dela		Lat	Long	Alt	Delete	Up	Down	Grad %	Dist	AZ
1	TAKEOFF	0	0	0	0	60	X			-93.4	42.8	271
2	WAYPOINT	0	0	58.3942652	26.7365009	60	X			-93.4	42.8	271
3	WAYPOINT	0	0	58.393172	26.735787	60	X			0.0	128.5	199
4	WAYPOINT	0	0	58.393174	26.736361	60	X			0.0	33.5	90
5	WAYPOINT	0	0	58.3940600	26.7369139	60	X			0.0	103.7	18
6	WAYPOINT	0	0	58.3940965	26.7373645	60	X			0.0	26.6	81
7	WAYPOINT	0	0	58.393262	26.736876	60	X			0.0	97.1	197
8	WAYPOINT	0	0	58.393436	26.737622	60	X			0.0	47.6	66
9	WAYPOINT	0	0	58.3943411	26.7379975	60	X			0.0	103.0	12
10	RETURN_TO_LAUNCH	0	0	0	0	0	X			0.0	103.0	12

©2015 Google - Map data ©2015 Terra Atlas, Imagery ©2015 TerraMetrics



EOS 550D

Sensori suurus	22,30	14,90	mm
Pikslite arv	5184	3456	px

crop faktor

fookuskaugus	1,00	18,00	mm
lennukõrgus		140,00	m
mõõtkava 1:		7777,78	

Kaadri ulatus m	173,44	115,89	m
GSD	3,35	3,35	cm

Lennukiirus	5,00	m/s	Kestus (mir Piltide arv
Lennudistants	1600,00	m	5,33 64

Pildistamine ja kattuvused

Lennujoonte vahe	70	m	103,44	59,64	Põikikattuvus
Pildistamise intervall	5,00	s	90,89	78,43	Pikikattuvus







Aitäh!

Edgar Sepp

TÜ geoinformaatika





M2