16 Feb '19

C3	9	wht	A
C4	10	grn	B
C6	11	yel	X

5 wks

180m
200K

200,000.

Wed call from Michelle @ GM
13 Feb '19

girls noticed

(3) drinking fluids trouble.
SLP
speech
Lang pathologist.
consistency.

Wed
Michelle
Thirsd
(1) wound nicely but smell / drainage
capsules sprinkle flagile
urine stool.
(2) .125mg Hydromorphone. .25 .5 x 2/day.
dressing.

0.1 / 5x10^6

14 Feb '19

- [x] rotate image
- [ ] auto null
- [ ] edit angles
- [x] edit focus.
- [ ] geo list.

20.14 3.24 1910
45.42 1.35 2020

3.2	PE
20.5	PE86
16.9	Users.
8.6	Win.old
18.6	Win
6.2	Pdata
39.2	Qt.

10 Feb '19

- [x] ~~ftp~~
- [x] VNC
- [x] compile Bode.
- [x] new MEC
- [x] leds
- [ ] leds timeout
- [ ] posn targets.
- [ ] slave mode
- [ ] controls : intermittent
- [x] flat style
- [x] new monkey build
- [x] V'mba cleanup
- [x] new mTurk build

focus int
focus m
focus min, max

angle ypr
slave pos

standby
autonull

LEDs.
cam
gps
vnav. present aligned, fix
gyro

20x20 leds.

1934 @ 23m
2044 @ ∞

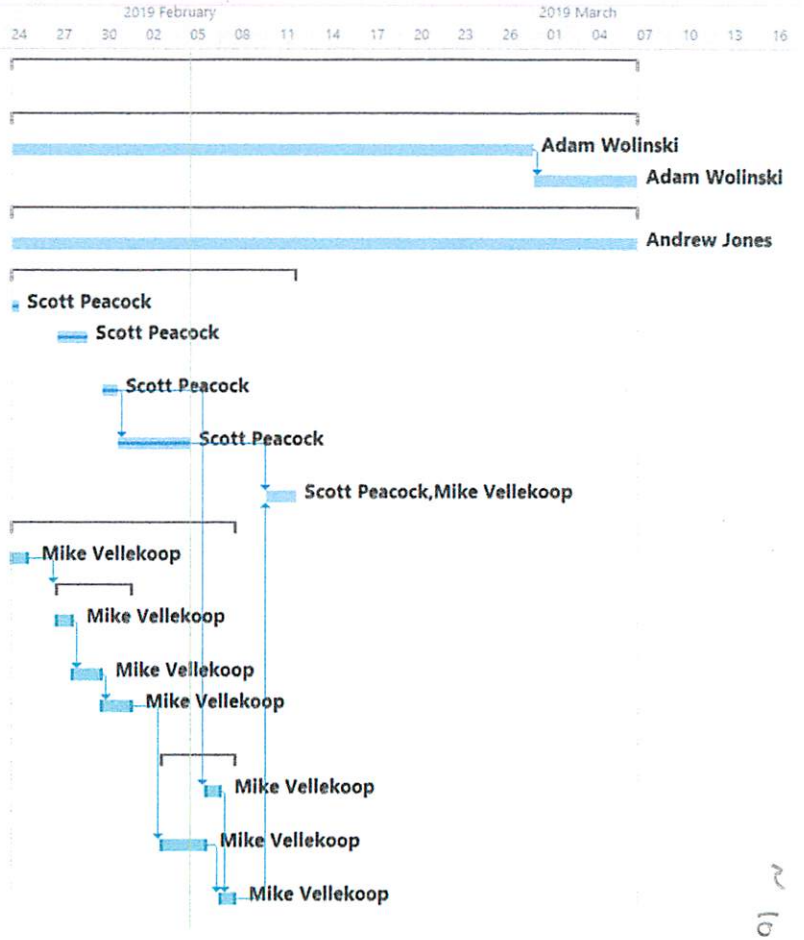
B = 2044
m = -2530

~~1912x~~
1936 x 1216

Vn solution
Vn err
Vn

1934
1.26
23.37

		Task Mode	Task Name	Duration	Start	Finish	Prede	Resource Names
1			**Aethon Gimbal Development - Sprint 1**	**30 days**	**Fri 19-01-25**	**Thu 19-03-07**		
2			**Adam's Tasks**	**30 days**	**Fri 19-01-25**	**Thu 19-03-07**		
3			Design Slipring and Flex	25 days	Fri 19-01-25	Thu 19-02-28		Adam Wolinski
4			Send PCB Design Out	5 days	Fri 19-03-01	Thu 19-03-07	3	Adam Wolinski
5			**Odin Tasks**	**30 days**	**Fri 19-01-25**	**Thu 19-03-07**		
6			Communication with Gimbal	30 days	Fri 19-01-25	Thu 19-03-07		Andrew Jones
7			**Mechanical Tasks**	**13 days**	**Fri 19-01-25**	**Tue 19-02-12**		
8	✓		Creat Gantt Chart	3 hrs	Fri 19-01-25	Fri 19-01-25		Scott Peacock
9	✓		Design Power Harness for Road Test	2 days	Mon 19-01-28	Tue 19-01-29		Scott Peacock
10	✓		Prosilica GT1930LC EF Arrival	1 day	Thu 19-01-31	Thu 19-01-31		Scott Peacock
11	✓		Camera Mount Design & Fabrication	3 days	Fri 19-02-01	Tue 19-02-05	10	Scott Peacock
12			Road Test	2 days	Mon 19-02-11	Tue 19-02-12	11,22	Scott Peacock,Mike Vellekoop
13			**Mike Vellekoop Tasks**	**11 days**	**Fri 19-01-25**	**Fri 19-02-08**		
14			Code in Hard-Stops	1 day	Fri 19-01-25	Fri 19-01-25		Mike Vellekoop
15			**Impove Accuracy**	**5 days**	**Mon 19-01-28**	**Fri 19-02-01**	**14**	
16			Translational Offset to Antenna	1 day	Mon 19-01-28	Mon 19-01-28		Mike Vellekoop
17			Angular Accuracy	2 days	Tue 19-01-29	Wed 19-01-30	16	Mike Vellekoop
18			GPS Smoothing & Extrapolation	2 days	Thu 19-01-31	Fri 19-02-01	17	Mike Vellekoop
19			**Camera Integration - Mike**	**5 days**	**Mon 19-02-04**	**Fri 19-02-08**		
20			Interface trigger signal to camera	1 day	Thu 19-02-07	Thu 19-02-07	10	Mike Vellekoop
21			Integrate Camera Focus from Pi to Prosilica	3 days	Mon 19-02-04	Wed 19-02-06	18	Mike Vellekoop
22			Testing of Camera Trigger & Focus on bench	1 day	Fri 19-02-08	Fri 19-02-08	20,21	Mike Vellekoop



6 Feb '19

- ☐ vimba focus
- ☐ pos mode
- ☐ non linear motor
- ☐ tuning vs roll + pitch
- ☐ step response
- ☒ non-console build

mik3Qtm

Tunings A3eon

yaw

35
.2
.4
5x20
160x10
250 uR.

~~pitch~~
~~90~~
~~.1~~
~~5x20~~

pitch

70
~~.6~~ .4
.5
5x20
141x10
240x10
200uRad!

insulator →

16.9	Y	21.8	1.5
0	P	3.8	21.7
2013	f	1919	1919

exp
24 msec
= not
too
fuzzy

11 msec
a bit
fuzzy.

3 Feb '19

- [ ] position mode
- [ ] VN imu mode
- [ ] vimba + qt build
- [ ] focus units?
- [x] stabilization
- ~~[ ] more gyros~~
- [x] taller stand.
- [x] VN rates
- [x] roll = 177. -182.7 angle ofs.
- [x] p 0, .1, -.1 30×20 166×16
- [ ] non linear motor out.
- [x] gyro ofs -.995, -2.01, 1.872

- [ ] hard stops
- [ ] antenna offset
- [x] boresight
- [ ] gps smoothing, extrap.

- [ ] trigger
- [ ] focus

- [ ] odin
- [ ] multi target

660 f
15 pan
-4 tilt.

662
winner
-4.8
14.2

763 focus crane

-2.01

10 - 20,000 exposure
500 u Rad jitter
blurry when shake.

winners
y 15.5
p 0
f 762

y 15.3
p -5

252 cogs / rotation
36 slots
42

-5.15

pit 0 =

52.5
-6.5
740

54.5 now pit
-7.5
740 foc

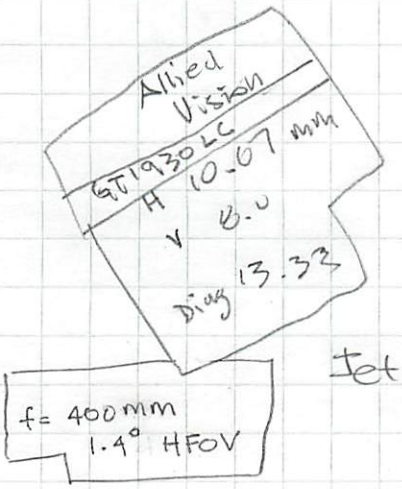
26 Jan '19

- [x] merge WeeCam/Ae3
- [x] start scope
- [x] better gyro mounting
- [x] blue lines
- [ ] port re-try
- [ ] SD files.

- [x] tabs!
- [ ] osc 2x. ?
- [x] grid, like Bode.
- [x] phase line
- [x] ref line
- [x] 2 charts
- [x] colors like Bode.

40, .05, .40
y 5, 20
p. 10, .5, .05
10, 30

22.1
3.7



- [ ] Pi - Odin
  - Vimba

Jetson TX-2

1	black	gnd
2	red	pwr (7-25V)
4	yellow	in1 3.3ttl
6	green	out1

APX-15
APX-20

axis	reads	
y	p	-ve.
p	y	-ve.
r	r	-ve.

raw.
215
-154
0
~~212~~
-155

motors off.
21.4
1.2
177

20.6 raw
1.11 pit
170 roll
~~695~~
660 for.

pitch
r : d
50 2 2
5x30 .5/1.

pitch
130 20 3
2x40

do nothing.

	P	I	D	LL	notch
y	30	.05	.4	5x20	-
p	8.08	.05		10x30	-
r	5	.05	.15	32x30	55x10
y	8	.1	.1	30x20	166x10

uwe quote
4 hr - $1600/hr
$500 Pilot Bracket
~~$500~~
1 hr min.

25 Jan '19

Asus tablet
'goober'

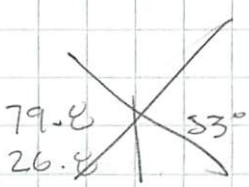
7

134
92

42

.6
19

42°



134 | 42° HFOV.
92

2 m | 1.5 VFOV
75 m | 2 HFOV.

4.8%

24 Jan 19

what sensors GPS/INS.
post proc

mech mfg:
xometry.
from CDS

- [ ] stops slew limited yaw
- [ ] smooth GPS
- [ ] tune
- [ ] 3 vs 2 axis
- [ ] Uwe flight test
- [ ] focus vimba. fire. cam
- [ ]

20 Jan '19

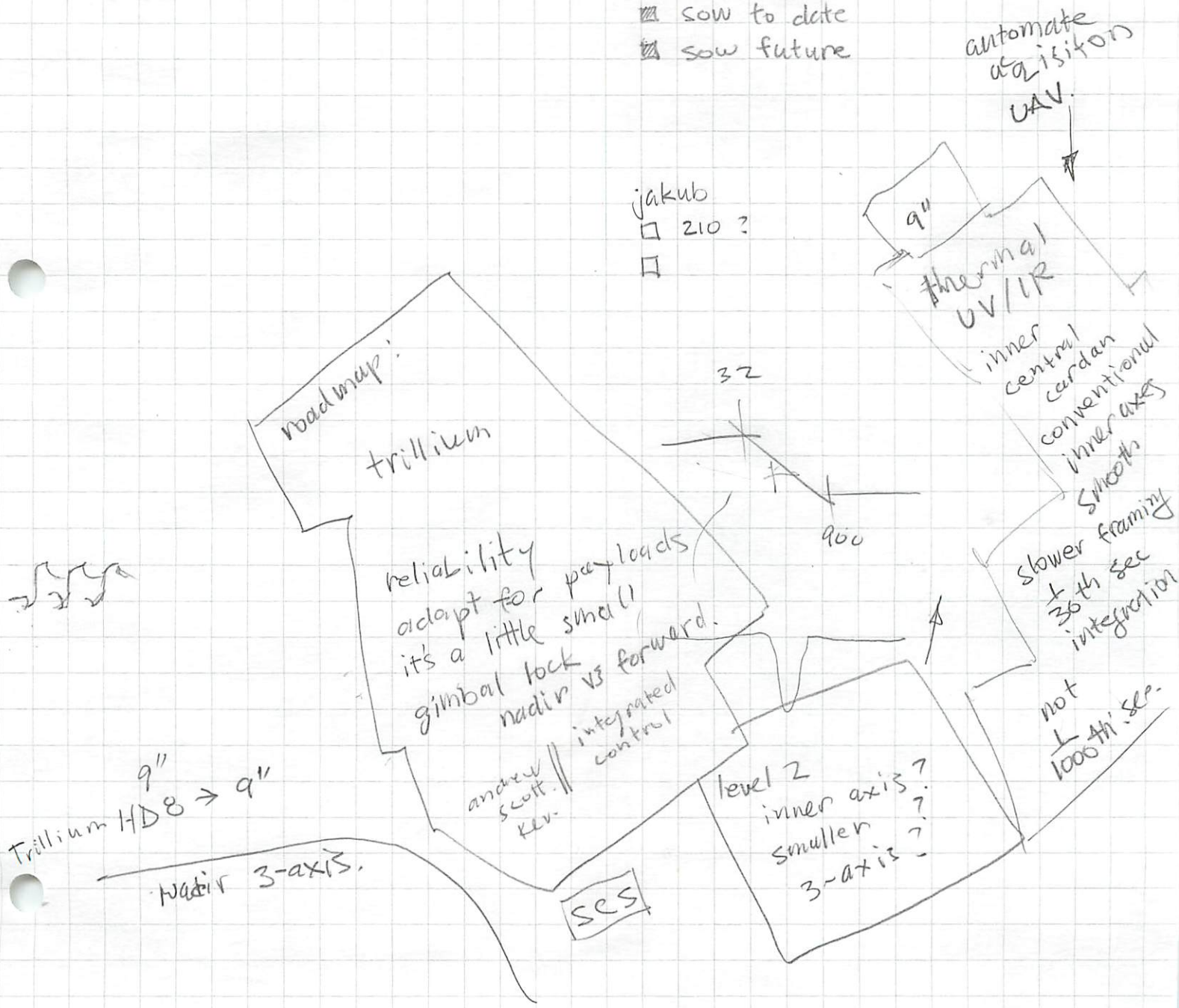
- [x] geo nod
- [x] merge fix
- [x] pitch sin bd overwritten
- [x] rEr offset UI
- [x] load first target
- [x] scale down jitter graph.
- [ ] tune for 12V
- [ ] blue lines
- [ ] inhibit fast sample
- [x] remove custom ... menu
- [ ] cross hair

Pid.

Y	16	.6	.2
P	12	1.	.5

alastair
- [x] inv.
- [x] sow to date
- [x] sow future

jakub
- [ ] 210 ?
- [ ]



17 Jan '19

- [x] NovaTel
- [x] backup
- [ ] Jacobian
- [ ] roll level
- [x] camera viewer
- [ ] road test box
- [ ] console wired ? LAN
- [ ] zmult off
- [ ] no GRB gui
- [x] paste resolver

16 Jan '19

☐ gyro senses.
niaxes = 3.

y +p.
p +y.
r

☐ Jitter
☐ Drift.

☐ Freq
☐ Amp
☐ Enable
☐ Remote

2.45
1.45
1.2

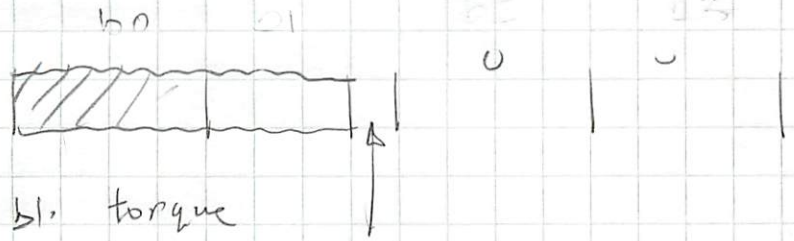
2.46
1.24
1.09

R 184
Y 216
P 148

1 Y
3 P
2 R

14 Jan '19

1mb 2flo 2kHz.



b1. torque

b0	coast
b1	brake
b2	X
b3	X

: 12
: 1
: 1
: 1
: 1
: 16

speed 0
spare 0
coast 1
break 1

1st

high.

1100 A

1mbaud
1byte = 10bits × 10^{-6} sec
10^{-5}

2047

0x7FF

Judy 796 0040 7467

3rd floor N
306 North
-private-
2640.78
2100.

Fri 10
10:AM

5

Erica Alexander
GM.
x5274
3330

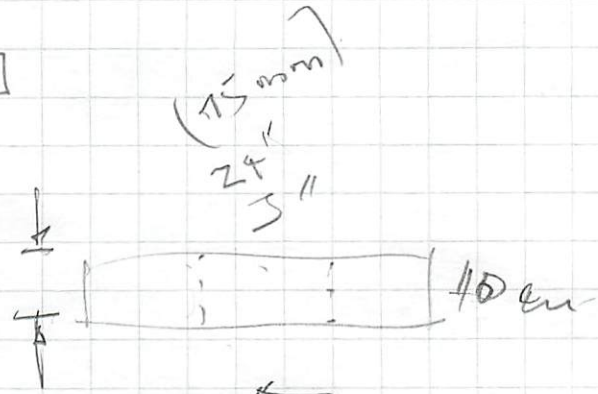
11 Jan '19

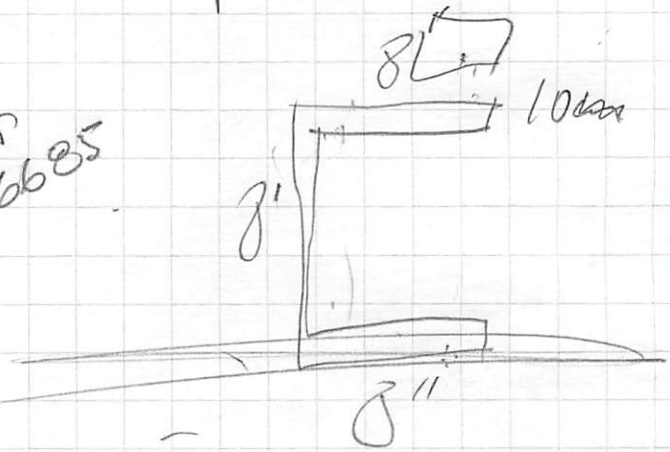
- [ ] strip charts
- [ ] jacobian
- [ ] VN300
- [ ] Adam vs handover
- [ ] alternate gps
- [x] alternate gyro
- [ ] schem for pro mini mods
- [ ] collect pro mini / gyro
- [x] try other VN200

- [x] prudence 5379
- [x] answer GSP

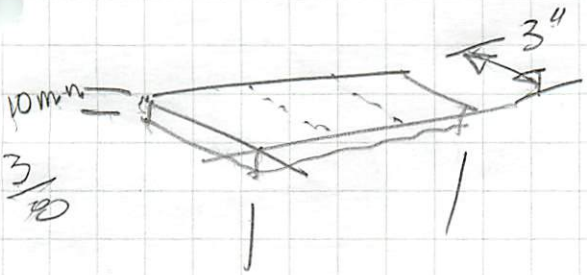
8 Jan '19

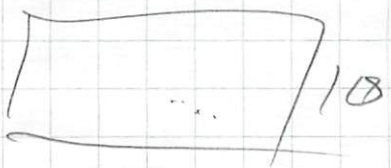
- [ ] target entry on the road
- [ ] NovAtel modes [ ] step, [ ] none, [x] smooth 1, [ ] smooth 2
- [ ] steering freq
- [x] remove misc ø
- [x] multi array of targets [5 set][13 targ]





c.dn bronze 2120 spear 905 827 6685





VN
divisor
= 16
50 Hz

3"

consent form
pers assistance device
Prudence
905 463 7002 5379

Julie
nurse prac
wounds buttock

6 Jan '19

- [x] NovAtel to console
- [x] restore Monkey (pw) Asus-i7
- [x] " iPhone
- [ ] how to correct VectorNav.
- [ ] plot errors.
- [ ] target list
- [x] lens jumbled
- [x] novatel thread in cons ϕ1
- [x] balance wtk reminder
- [x] which cons ϕ1
- [x] drill camera mount
- [x] balance WeeCam
- [x] blocking Qt read: waitForReadyRead(t)
- [ ] timeout = 200 all reads: customize for NovAtel?
- [ ] NovAtel to gimbal
- [ ] latency?

mon
10:30
14:30

timeout = 200

mon
20:00
~~25:45~~
26:00

w/p power

usb

scope.

8 m/s.
30 k/hr 100 Hz 10 msec

100 bytes · 10 bits / byte · 1 / (4 × 115.2k) = 2.2 msec

8 m/s × 12 ms = 0.1 m.

WFS210 WLAN osc

5 Jan '19

Aethon ports

m1	T1	
m2	T2	
m3	T3	
Gyro	T5	
Util /Cons /Pi	T4	
Odin	TUSB	Pi
Vector Nav	T3	
Novatel		Pi

Wee Cam ports

Gyro	T5
Util /Cons	T4
Vector Nav.	T3
Novatel.	

Aethon

- [ ] math 3D
- [ ] 3 axes
- [ ] -AETHON
- [ ] Novatel to Pi
- [ ]

pi ch3rrY
2
3

31 Dec '18

- [x] FTDI = 3v? - yes
- Try FTDI on serial 4
- [ ]

RTK
PPP
SBAS

< meter realtime.

pt grey
m - U -
zurd

A aethonMik3

460 800

Vn-300	
dev	5 k
rugg	4500
chip	3k

2m -

heading	antenna spacing
.30	1 m
.15	2 m
.60	$\frac{1}{2}$ m

~ Dec '18

atan 2 (y, x) $\tan^{-1} \frac{y}{x}$

- ☐ elevaton / pitch geo
- ▨ lens comp GRB

range 79.8 - 77.9 ell readings on roof VN200

109.3

72.5

expected 73.5

MSL = meters above sea level

ELL =

Prudence ext 5349

30 Dec '18

- [ ] Aethon Jacobians YRP
- [ ] Altitude issue YN200
- [ ] Logger
- [ ] record video
- [ ] math 3b
- [ ] OpenGl
- [ ]

Alt on G37 roof
54.5 55m 56m 58.5 62.2

28 Dec '18

- [ ] Qt file read/write
- [x] Green lights for Geo
- [ ] buttons for target
- [ ] save and name targets
- [ ] IIa data type
- [ ]

- [ ] DBIC new boards
- [ ] RF link GPS target
- [ ] Drafting table new surface
- [ ] Book club Jan 27 Half Blood Blues
- [ ] Braun blades
- [x] Vacuum
- [ ] Calendar
- [ ] Google Earth
- [ ] Scaler

- [ ] Aethon road test
  - [ ] target list playback
  - [x] list from Google Earth
  - [x] earth on Asus (in Chrome)
  - [x] compute range
  - [x] display list

26 Dec '18

- [x] Geo page
- [ ] compute passive
- [ ] compute L1/L2 target
- [x] target to teensy
- [ ] buttons
- [x] ~~uncertainty~~. VN state
- [ ] state readout
- [ ]

7 8
/ 1 1 1 / 1 0 0 0

1 / 0 0 0 0 / 1 1 1 0 / 1 0 1 0

23 Dec '18

Road Test

- [x] base for weecam
- [x] inverter
- [x] console self start (~~or use NUC~~)
- [x] console gui on Ada monitor
- [x] test inverter
- [ ] nav status on screen
- [ ] 2 point target code
- [ ] nav status from VN
- [x] 'rugged' VN connector
- [x] rugged RMP connector /no pigtail
- [ ] multi target
- [x] hones tech
- [ ] type target into util
- [ ] factory reset /other vn200

Christmas

- [x] LCBO certs
- [x] smoking loon x 2
- [x] 8 x 10c
- [x] 11 x choco
- [x] 11 x cards
- [x] wrap supplies · collect
- [x] food bank
- [x] ~~shelter~~ Covenant House
- [x] ~~scrounge book mo~~
- [x] ~~limericks.~~

24th

- [x] answer Jo & Kat
- [x] answer GSP
- [x] milestone cleanup
- [x] read burl post (+ discard!)
- [x] charity 1
- [x] charity 2
- [x] $600
- [x] print mode
- [x] print inventory
- [x] pay bill + file
- [x] ~~hot wheels~~
- [x] by-the-lake.
- [x] wrap.
- [x] zoombrowser
- [x] epson
- [x] clean up.

.

SPI AS5047 CONNECTOR to nucleo #C7 ON encoder # and color#TOP in-line resistors .

	FUNCTION	CHIP PIN	c7					
comp	MOSI	4	3	pc12	3	yellow	-	47
enc	MISO	3	2	PC11	4.	pink	47	-
comp	CS	1	17	PA15	1	red	-	47
comp	CLK	2	1	PC10	2	black	-	47
	GND	13	8	gnd	6	white		
	+3.3	11	12	3,3v	5	gray		

Joystick Hall Chip
363ABB

21 Dec 18

19 Dec '12

- [x] windows update
- [x] ftp
- [ ] heading offset
- [x] gyro offset
- [x] initialize lens controls = 0.5
- [x] glitch on 'geo button'
- [ ] passive range
- [ ] target el, terrain el
- [ ] remove 'indoor mode'.

gyro oks.
--113
1.5e4

console Pi on
"Power Bank"
7:19 4/5 bars
8:29 3/5 bars.

18 Dec '18

- [x] what port is lens serial 1 RX1/TX1
- [x] rx from lens
- [ ] backups of 181218
- [x] tx to lens
- [ ] update Asus i7
- [ ] get lens code
- [ ] ftp.
- [ ] geo targets
- [ ] heading zero button

the Horn Netflix
gstreamer. free desktop.

16 Dec '18

- [x] code merge
- [x] VN200 comm
- [x] burn from HPi7 no 5V.
- [x] fixup LOS error
- [x] geo to Teensy
- [x] geo mode engage
- [x] geo gain + limit
- [x] fewer doubles in geo.
- [ ] geo target mgmt.

- [x] backup gimT.
- [x] backup Pi mTune
- [x] update console mTune
- [x] newest gimT
  - [x] no usbser
  - [x] new tuning.
  - [x] load.
- [x] merge lens mods mTune
- [x] no longer invert com

- [ ] raw console sws to gimbal
- [ ] passive target
- [x] why raw plot glitch on geo button
- [ ] VN200 heading.

24:30
mon 17 Dec 13:30 - ~~XXX/XX~~
(-3)

- [ ] geo from here blue button
  1km range.

- [ ] note: ugly drift = gains too low.
- [ ] spikes on gyro / popcorn sound / logic filter
- [x] note: raw check over written on gui.

43.3735961911
-79.7456
59

169.254.76.133

Y	P
130	70
1.2	.1
2	0

ch3rry3
pi

SN 01000 38476
VN-200T-CR

15 Dec '18

- [x] tangent plane error
- [x] console thru db9 / slipring
- [ ] fujinon cover screws
- [x] report lens fell out of bayonet
- [x] shim Weecam pitch bracket
- [x] attach VN-200
- [x] connect VN-200
- [x] debug iris and zoom drive
- [ ] 422 to lens
- [x] quiet tuning
- [x] check lens wiring
- [x] finish geo pos error ~~loop~~
- [ ] start geo rate loop
- [x] ftdi lens
- [x] verify bad zoom servo amp
- [x] report GRB's weights kit
- [x] iris pos loop.
- [ ] autonull improvement
- [x] versions & ports

30 .5 .1
22 .6 0

Z 10 f 3
f 3 i 11
i 11 e 9
e 9

3
f 11
i 10
e 9

Z 10 0 2B.
F 3 1 1A
I 11 2 1B.
9 2A

wired from (J305.1)

VN200 pins.

P308		VN200	
1	TX	3	RX1
2	RX	2	TX1
3	RET	5	GND.
4	5V	1	3.3 to 17V

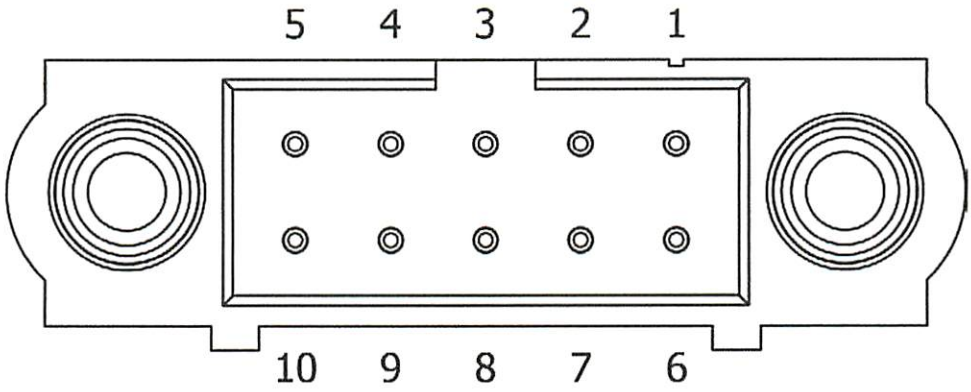
15 Dec 12

2.2 VN-200 Rugged Electrical

VN-200 Rugged Pin Assignments

Pin	Pin Name	Description
1	VCC	+3.3V to +17V
2	TX1	RS-232 voltage levels data output from the sensor. (Serial UART #1)
3	RX1	RS-232 voltage levels data input to the sensor. (Serial UART #1)
4	SYNC_OUT	Output signal used for synchronization purposes. Software configurable to pulse when ADC, IMU, or attitude measurements are available.
5	GND	Ground
6	RESTORE	If high at reset, the device will restore to factory default state. Internally held low with 10k resistor.
7	SYNC_IN	Input signal for synchronization purposes. Software configurable to either synchronize the measurements or the output with an external device.
8	TX2_TTL	Serial UART #2 data output from the device at TTL voltage level (3V).
9	RX2_TTL	Serial UART #2 data into the device at TTL voltage level (3V).
10	GPS_PPS	GPS pulse per second output. This pin is a TTL voltage level (3V) output directly connected to the PPS (pulse per second) pin on GPS receiver A.

VN-200 Rugged External Connector



Friday 14 Dec '12

- [x] write up HCH
- [x] pay bills
- [x] milestone cleanup
- [x] collect mTune edits from Aethon
- [x] set up geo on HP win10
- [x] more GUI vars
- [x] check 3x3 vs SU-Code

- [ ] aethon Teensy + gyro
- [ ] aethon VN200
- [ ]

J306	dongle	DB9	dongle	old cable	J306	serial cable
TD−	RXD+	6	Y	R	1	bu
RD−	TX D+	8	O	W	3	gy
RD+	TXD−	9	R	G	4	bk
ret	gnd	5	Bk	sh	5	gn
TD+	RXD−	7	W	Bk	2	v

console serial cable

J306	DB9	
5	5	sh
1	6	data
2	7	data
3	8	data
4	9	data

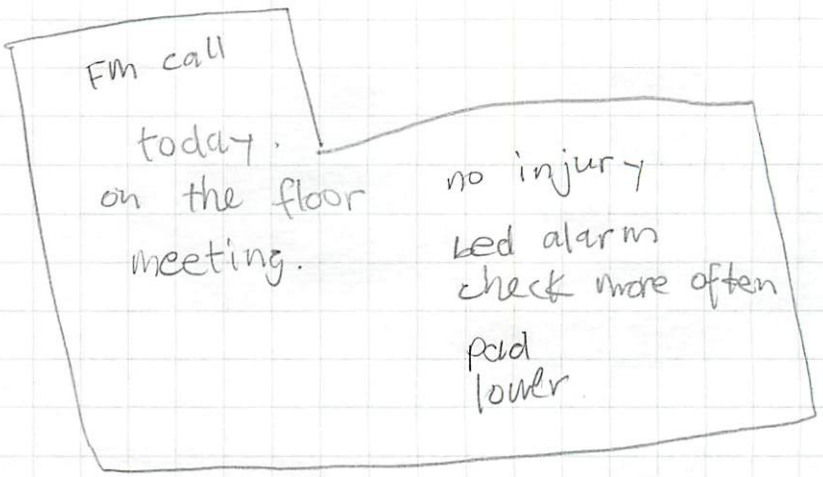
dongle — serial cable (color code) — J306 — DB9

	b (1) 0		
R ——	bk(2) 1	4	9
	r (3) 2		
	o (4) 3		
	y (5) 4		
Bk ——	gn(6) 5	5	5
Y ——	bu(7) 6	1	6
W ——	v (8) 7	2	7
O ——	gy(9) 8	3	8
	w (10)		

Aethon 12:30 met: 14 Dec '18
17:30

☐ nav.

AJ1
AJ2
SP
AW



12 Dec '18

- [x] backup
- [x] Aethon demo
- [x] Milestone cleanup
- [x] graph VN200
- [x] 50 Hz VN200 $\frac{800}{16} = 50$

- [ ] Open GL
- [ ] check Wescam math
- [ ] video overlay
- [ ] Jacobians

gim

[ ]

NEU (geodetic) to ECEF

Gui:

dem
LLE gimbal
LLE target
velocity
target sim velocity
target sample / offset.

Qt: z@hm cut3Y zard
ST " bullsh4rT

VN-200

11 Dec '18

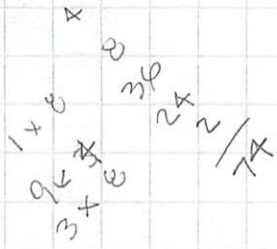
10 × 74

276 46.
294 49.

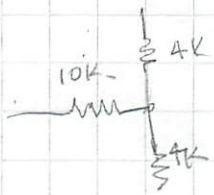
fields.

8	12	1	vel
7	24	1	posn
6	12	1	angular
5		0	
4	12	1	ypr
3		0	
2	8	1	
1		0	t

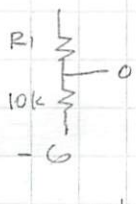
68
4
2
74



Time GPS
ypr
Angular Rate.
Pos
Vel



3.3

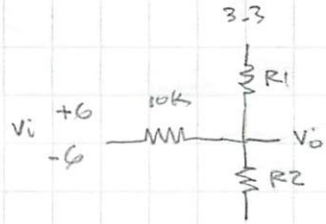


$R_1 = \frac{10k \times 3.3}{6.} = 5.5k.$

2-2
3-3
5-5

R_2

$\pm 6V. \rightarrow \begin{matrix} 3 \\ 0 \end{matrix}$



$V_i = 6 \quad -6$
$V_o = 3 \quad 0$

$\frac{V_o - V_i}{10K} = \frac{V_o}{R_2} + \frac{3.3 - V_o}{R_1}$

$\frac{\quad}{10k} = \frac{3}{R_2} + \frac{0.3}{R_1}$

$\frac{-6}{10K} = \frac{0}{R_2} + \frac{3.3}{R_1}$

$R_1 =$

8 Dec '10

Lens

- FIZ vs ZFI in mTune
- AIP cross talk
- cal

880	33	f
1023	0	i
39	976	z

7 Dec '18

Lens

- [ ] cal feedback
- [ ] wiring vs code
- [ ] lens workflow

		is		was		should be
F		D2	DIR-1	1.IN2	D4 ✓	Z
F	✓	D3	PWM-1	1.IN1	D3 ✓	Z D3
I		D4	DIR-2	1.IN4	D5 ✓	F
I	×	D5	PWM-2	1.IN3	D9 ✓	F D11
Z		D6	DIR-3	2.IN2	D6 ✓	I
Z	×	D7	PWM-3	2.IN	D10 ✓	I D10
E		D8	DIR-4	2.IN4	D7 ✓	E
E	✓	D9	PWM-4	2.IN3	D11 ✓	E D9
		D10	J603.1			
		D11	NC			

D3	1.IN1	1.IN1	focus
D9	2.IN3	2.IN3	spare
D10	2.IN1	J603.1	zoom
D11	1.IN3	nc	iris

measured!

pwm		cut	
D2	1.IN2		
D3	1.IN1		
D4	1.IN4		
D5	1.IN3	✓	
D6	2.IN1	✓	
D7	2.IN2		
D8	2.IN4		
D9	2.IN3		
D10	J603.1	✓	
D11	NC		

mods

cut
- D10 - J603.1
- D5 - 1.IN3
- D6 - 2.IN1

add
- D10 - 2.IN1
- D11 - 1.IN3
- D5 - J603.1

final

				AIP READINGS ccw	
f	1.IN1	PWM	D3	f 541-543	899-900
f	1.IN2	DIR	D2	i 541-543	1023
i	1.IN3	PWM	D11	z 987	596-597
i	1.IN4	DIR	D4		
z	2.IN1	PWM	D10		
z	2.IN2	DIR	D7		
e	2.IN3	PWM	D9		
e	2.IN4	DIR	D8		

error list on 18NOV18

Lens Wiring
wee cam to new Lens board

6 Dec '12

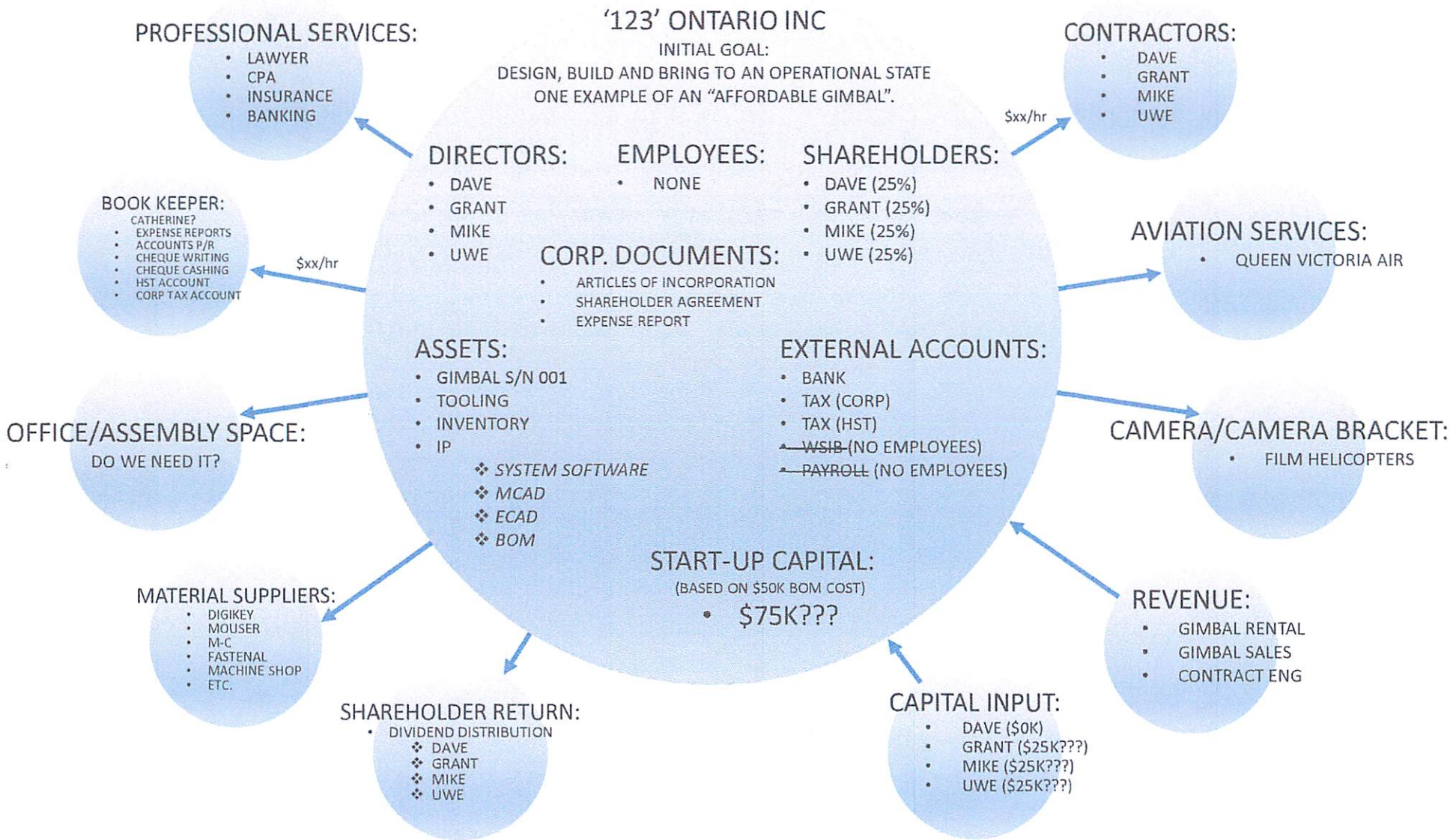
115	3	1	y	32 × 30	No notch
22	.6	0	p	32 × 30	No notch

1. vector in world space. - subtract gimbal xyz from target.
2. vector in gimbal space.
   mult by dcm

			OLD		GLD Z,F,I		pin	new F,I,Z
	1	PRO	GND	3 x brown	LENS_0V		2	
	2	PRO	VCC	3 x orng	LENS_5V		1	
I	3	PRO	A2	red	CH3A	iris blu	13	
F	4	PRO	A1	red	CH2B	iris wht	12	
Z	5	PRO	A0	red	CH2A	zm wht	14	
I	6	SA2	OUT2	blk	S2 OUT2	ir b	22	S1.4
I	7	SA2	OUT1	red	S2 OUT1	ir r	21	S1.3
F	8	SA1	OUT3	blk	S1 OUT4	f b	20	S1.2
F	9	SA1	OUT4	red	S1 OUT3	f r	19	S1.1
Z	10	SA1	OUT2	blk	S1 OUT2		24	S2.2
Z	11	SA1	OUT1	red	S1 OUT1		23	S2.1

pots

F	A0
I	A1
Z	A2
X	A4


'123' ONTARIO INC
INITIAL GOAL:
DESIGN, BUILD AND BRING TO AN OPERATIONAL STATE
ONE EXAMPLE OF AN "AFFORDABLE GIMBAL".
PROFESSIONAL SERVICES:
• LAWYER
• CPA
• INSURANCE
• BANKING
CONTRACTORS:
• DAVE
• GRANT
• MIKE
• UWE
$xx/hr
DIRECTORS:
• DAVE
• GRANT
• MIKE
• UWE
EMPLOYEES:
• NONE
SHAREHOLDERS:
• DAVE (25%)
• GRANT (25%)
• MIKE (25%)
• UWE (25%)
BOOK KEEPER:
CATHERINE?
• EXPENSE REPORTS
• ACCOUNTS P/R
• CHEQUE WRITING
• CHEQUE CASHING
• HST ACCOUNT
• CORP TAX ACCOUNT
$xx/hr
CORP. DOCUMENTS:
• ARTICLES OF INCORPORATION
• SHAREHOLDER AGREEMENT
• EXPENSE REPORT
AVIATION SERVICES:
• QUEEN VICTORIA AIR
ASSETS:
• GIMBAL S/N 001
• TOOLING
• INVENTORY
• IP
❖ SYSTEM SOFTWARE
❖ MCAD
❖ ECAD
❖ BOM
EXTERNAL ACCOUNTS:
• BANK
• TAX (CORP)
• TAX (HST)
• ~~WSIB~~ (NO EMPLOYEES)
• ~~PAYROLL~~ (NO EMPLOYEES)
OFFICE/ASSEMBLY SPACE:
DO WE NEED IT?
CAMERA/CAMERA BRACKET:
• FILM HELICOPTERS
START-UP CAPITAL:
(BASED ON $50K BOM COST)
• $75K???
MATERIAL SUPPLIERS:
• DIGIKEY
• MOUSER
• M-C
• FASTENAL
• MACHINE SHOP
• ETC.
REVENUE:
• GIMBAL RENTAL
• GIMBAL SALES
• CONTRACT ENG
SHAREHOLDER RETURN:
• DIVIDEND DISTRIBUTION
❖ DAVE
❖ GRANT
❖ MIKE
❖ UWE
CAPITAL INPUT:
• DAVE ($0K)
• GRANT ($25K???)
• MIKE ($25K???)
• UWE ($25K???)

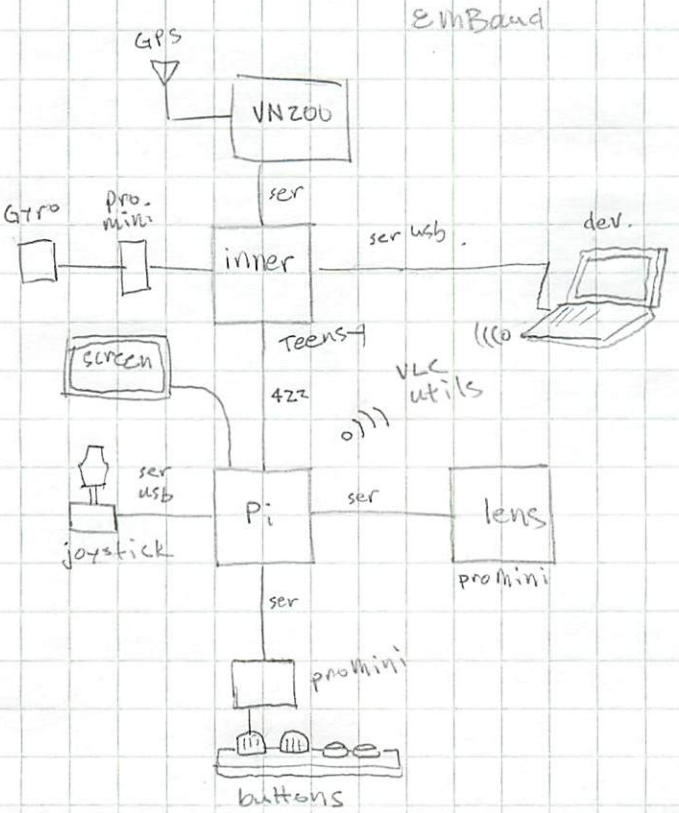
4 Dec 18

WeeCam

- [x] Flexi gyro wire
- [ ] Filter graph
- [x] FFT Graph glitchy
- [x] com4 no-wait
- [x] console choose TTY
- [ ] VN200
- [ ] Filter doesn't work
- [ ] Lens drive
- [ ] geo math.

Aethon

- [ ] VN200
- [ ] geo math
- [ ] comms



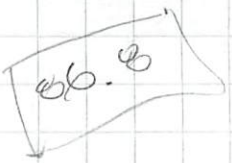
Serial USB

Serial 1, 2 64byte fifo HW

Serial 4-6 HW-

cons 4

gyro 5



121200

110200

10/sec

2 Dec '12

Aethon

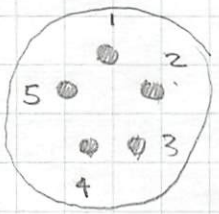
- [ ] VN200
- [ ] geo
- [ ] wiring
- [ ]

Monkey SCS

- [ ] VN200 log setup.
- [x] PWM
- [x] +ve gyro
- [ ] com4 non block
- [ ] geo xforms
- [x] close inner loop.
- [x] serial USB, burn from console

Pwm pins

	IN1	IN2	PWM
Y	12	24	20
P	25	26	21
R	27	28	22

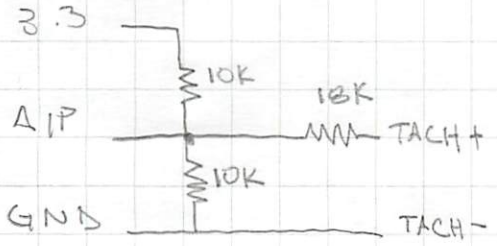


1 M+
2 3V
3 pot
4 0V
5 M-

Weecam pins.

1	tach +
2	m+
3	m-
4	tach -

tach scaling



p i d

Y 50 1 .1

P 50 .5 .2

- [x] gains save:
- [x] commit
- [ ] backup
- [x] document EE

outer dome

0-3	.015
-.035	-.035
-.01	-.010

(1)877 499 9555 275516

claire. ManuLife.

pots

AI20 Yaw [x]
" 21 pit [x]
" 22 roll

- [x] read pots
- [x] dome tach
- [ ] notch filter fix
- [x] roll amp fix
- [x] dome axis

27 NOV '18

- [ ] +ve gyro
- [ ] 10kHz interrupt
- [ ] pwm out.
- [ ] ribbon to gyro
- [ ] no-wait com4 writes

.2 µs.

180 MHz.

36 clocks. / 2 writes.

.5 × .1 = .05 µs.

$\frac{1}{180\,MHz} = \frac{1}{180}$ µs

.05 9 clocks / 2 writes.

Aethon (11AM-6PM) 29 NOV '18

CONNECT2aethon!

mike be mike @ methodical ...

~~mike st1~~ mike st1

openstm32.org

STS Workbench For

(11AM -) 30 NOV '18

- [x] VN200 - demo
- [ ] VN200 - config bin from Teensy
- [ ] - read bin.
- [x] Pi2 - VNC
- [x] - FTP
- [ ] mu-co debugger

lat, lon, elev.
y, p, r
$\dot{y}$, $\dot{p}$, $\dot{r}$

$\circ T(3)$
$\dot{T}(3)$

$\circ V(3)$
$\dot{V}(3)$

$TV(3)$
$\dot{TV}(3)$

20 NOV '18

Aethon

prep Asus i7

- [ ] sync Code dir
- [ ] sync monkey dir
- [x] burn from Asus i7
- [x] util on Asus i7
- [x] gyro to teensy
- [ ] re-distribute Qt exe
- [x] work space
- [x] old gyro
- [x] gyro cable
- [ ] branch for Aethon
- [x] commit Teensy
- [ ] sync util vs console Pi
- [x] 3V or 5V for Pro Mini → 5V ✓
- [ ] install.txt – Asus i7

Monkey: nav test.

- [x] Qt on HPi7
- [x] Teensy on HPi7
- [ ] glitchy sine wave
- [ ] non-blocking serial + write
- [ ] PWM
- [ ] timer

shopping list

- [ ] Dad's (Costco)
- [ ] Toblerones + cookies
- [ ] Pastilles

		Austin	T	C
$	☐	Emily	T	C
$	☐	Andrew	T	C
		Mehak	T	
		Kaley	T	
$	☐	Peter	T	C
Goal	△	Dave	L	C
"	△	Angela	L	C
"	△	Mo	L	C
	△	Gordon	T	C
	△	Ingrid	T	C
		Mom	T	C
		Rafael	T	
			13	10

Choc		Steve
Choc	Cup	Jo
Choc	Cup	Kat

T = Tob / Lett / Past

12 NOV '18

Calendar

- ☐ hoskin return 27th: 10 days
- ☐

Today

- ▨ clean up
- ~~☐ start GST~~
- ▨ walk (?)
- ☐ inner loop WeeCam
- ☐ Pwm Teensy
- ☐ Timer Teensy
- ▨ pay Hydro
- ▨ Katya
- ☐ clean up files Asus17 code monkey
- ☐ FTDI to Teensy / PC
- ☐ params mgmt
- ☐ baby PC
- ☐ geo xform
- ☐ openGL in Qt
- ☐ util in PC
- ☐ caves / leaves
- ☐ GSP TO GO

P306 inner

				FTDI		
swap ↕	blk	1	T-	8	R-	white
	red	2	T+	5	R+	yellow
swap ↕	grn	3	R-	3	T-	red
	wht	4	R+	4	T+	orange
	shld	5	0V	1	GND	black

EE fixes list

gyro swapped SDA/SCK

gyro 3.3V not 5.0V

outer MAX3491 pin 4 to DOP/pulldown

lens " " "

FTDI 422: cross +/-

servo amps - 3V - enable, m1 D1, m2 D1

- teensy PWM m1 D2, m2 D2

Lens D10 - 2 - IN1 D6 - NC / cut D5, D6, D10 /
D11 - 1 - IN3 D5 - J603.1

schem error: DIR-4 becomes PWM-4

40 + 36

43 + 36

3'7 + 2'7

52 Hz

.02

.0005

40+ sloper

17 Nov '18

- [x] card reader
- [ ] ~~wheezy~~ stretch console
- [ ] pwm WeeCam
- [ ] revive db16
- [ ] nav into console
- [x] start car up
- [x] shower first
- [x] try big monitor
- [ ] going mobile
  - [x] case for Asus i7
  - [x] camera dot Ai7

- [ ] fairport conv. ill keep it with mine

- [ ] edit vstudio
- [ ] burn Teensy ☐ win7 ☐ raspbian
- [ ] Qt ☐ win ☐ lin

- [ ] new drives
- [ ] HP-i5 200
- [x] XP AMD 160
- [x] Asus i7 500

14 Nov '18

1 ms. 5Hz.

VN200.

VN300 uart1 —○— uart1.

PPS —○— PPS.

uart2.
gyro.

uart1 firmware.

5 USB-RS422-WE-LLLL-CU

The USB-RS422-WE cable is un-terminated; it has bare and tinned wires.

The LLLL specifies the length of the cable in cm. The CU specifies the colour of the cable and the colour of the USB connector. The cable can be either Black or transparent. The USB connector comes with transparent plug because of the LED implemented inside but can be sold in black colour as well. For simplicity, the LLLL and CU have been dropped from the following descriptions.

5.1 USB-RS422-WE Connections and Mechanical Details

The following Figure 5.1 shows the cable signals and the wire colours for the signals on the USB-RS422-WE cable. The Figure 5.2 shows dimensions in millimetres.

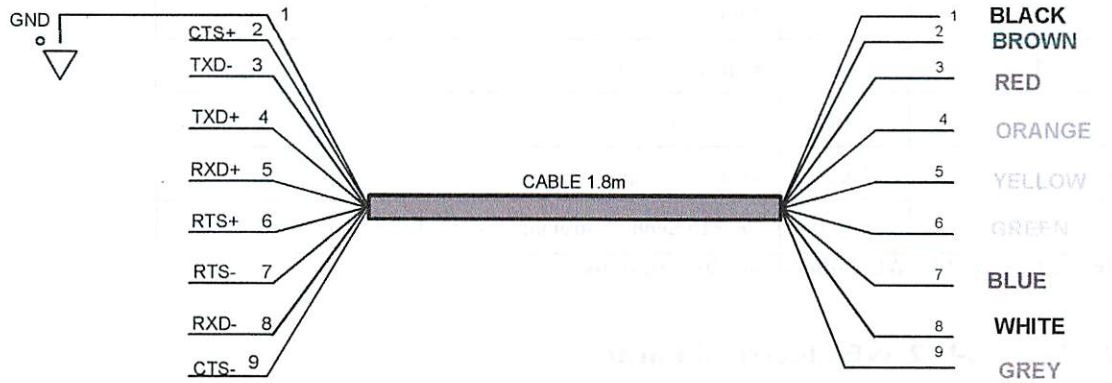


Figure 5.1 USB-RS422-WE Connections

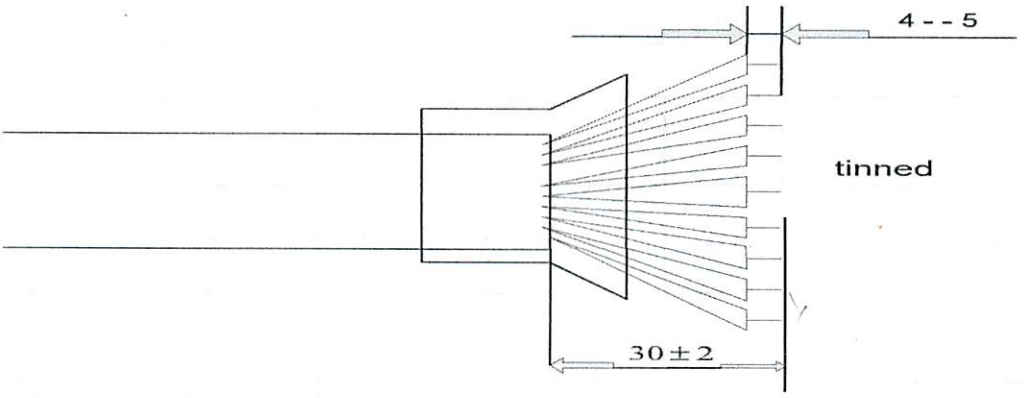


Figure 5.2 USB-RS422-WE Mechanical Details (dimensions in mm)

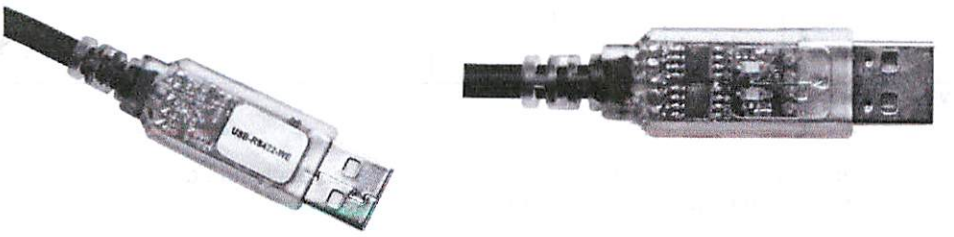


Figure 5.3 USB-RS422-WE Cable images

5.2 USB-RS422-WE Cable Signal Descriptions

Colour	Name	Type	Description
Black	GND	GND	Device ground supply pin.
Brown	CTS+	Input	Clear to Send Control + (B), Input
Red	TXD-	Output	Data – (A) Output
Orange	TXD+	Output	Data + (B) Output
Yellow	RXD+	Input	Data + (B) Input
Green	RTS+	Output	Request To Send Control + (B), Output
Blue	RTS-	Output	Request To Send Control – (A), Output
White	RXD-	Input	Data – (A) Input
Grey	CTS-	Input	Clear to Send Control input – (A), Input

Table 5.1 USB-RS422-WE Cable Signal Descriptions

5.3 USB-RS422-WE Electrical Parameters

Parameter	Description	Minimum	Typical	Maximum	Units	Conditions
Receiver Input						
VCM	Common-mode input voltage range	-7		+12	V	
IN	Input Current			1.0	mA	VIN = +12V
				-0.8		VIN = -7V
VTH	DIfferential Threshold Voltage,VTH	-0.2		+0.2	V	
VIHYST	Input Hysteresis		20		mV	
RIN	Input Resistance, RIN	12	15		kΩ	
Transmitter Output						
VOD	DIfferential Output Voltage, dVOD	1.5		5	V	With RL = 54Ω. CL = 50pF *

Table 5.2 USB-RS422-WE I/O Characteristics

* - The 54 ohms is the equivalent of two 120 ohm termination resistors placed on each side of the transmission line and the input impedance of 32 receivers on the line.

14 Nov '18

Connect 2 aethon!

dhcp.

CONNECT 2 aethon!

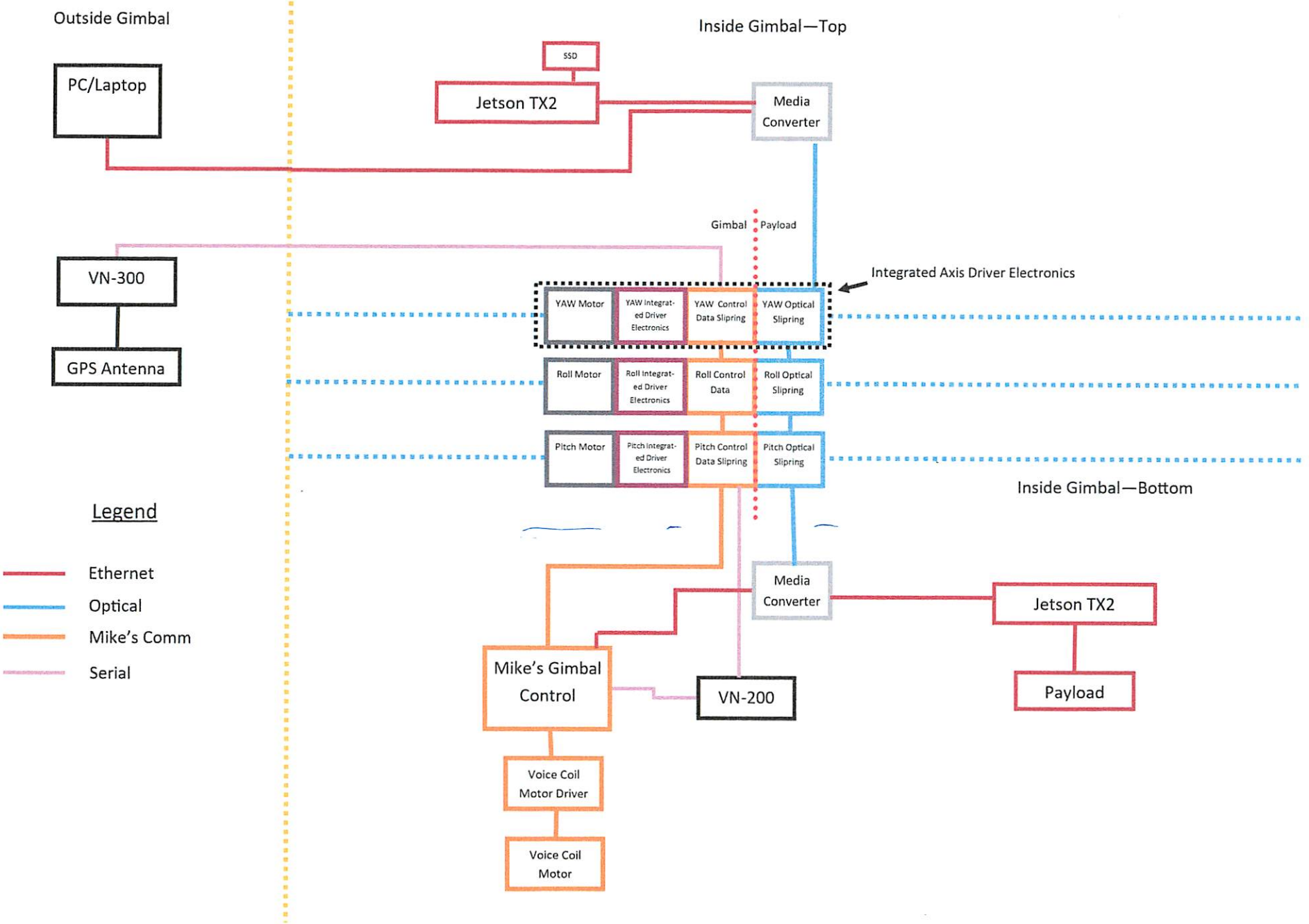
wifi guest

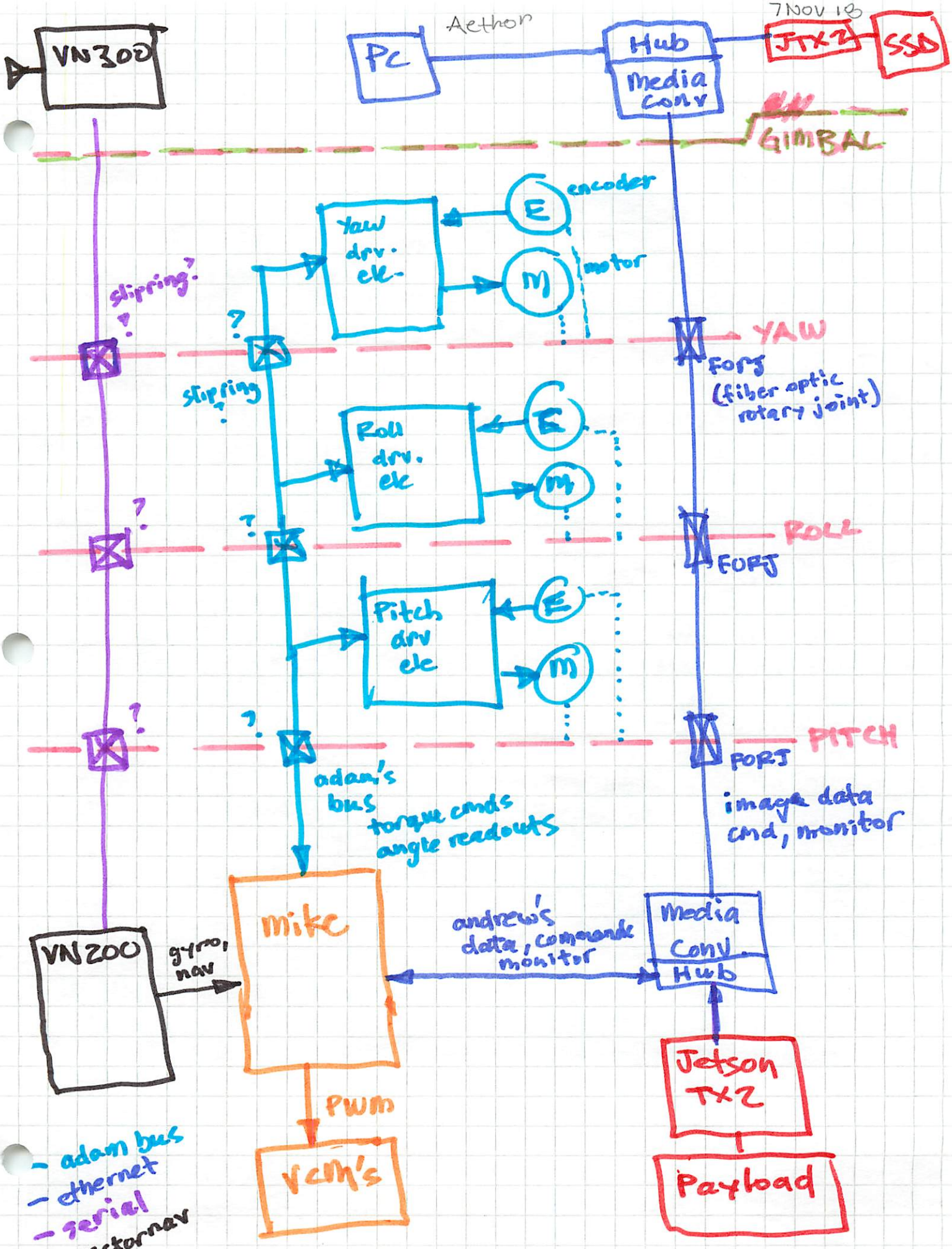
stm32

my TV.
55 LA 6205

14 NOV '18

Proposed Aethon Gimbal Signal Flow—Wired—20181107

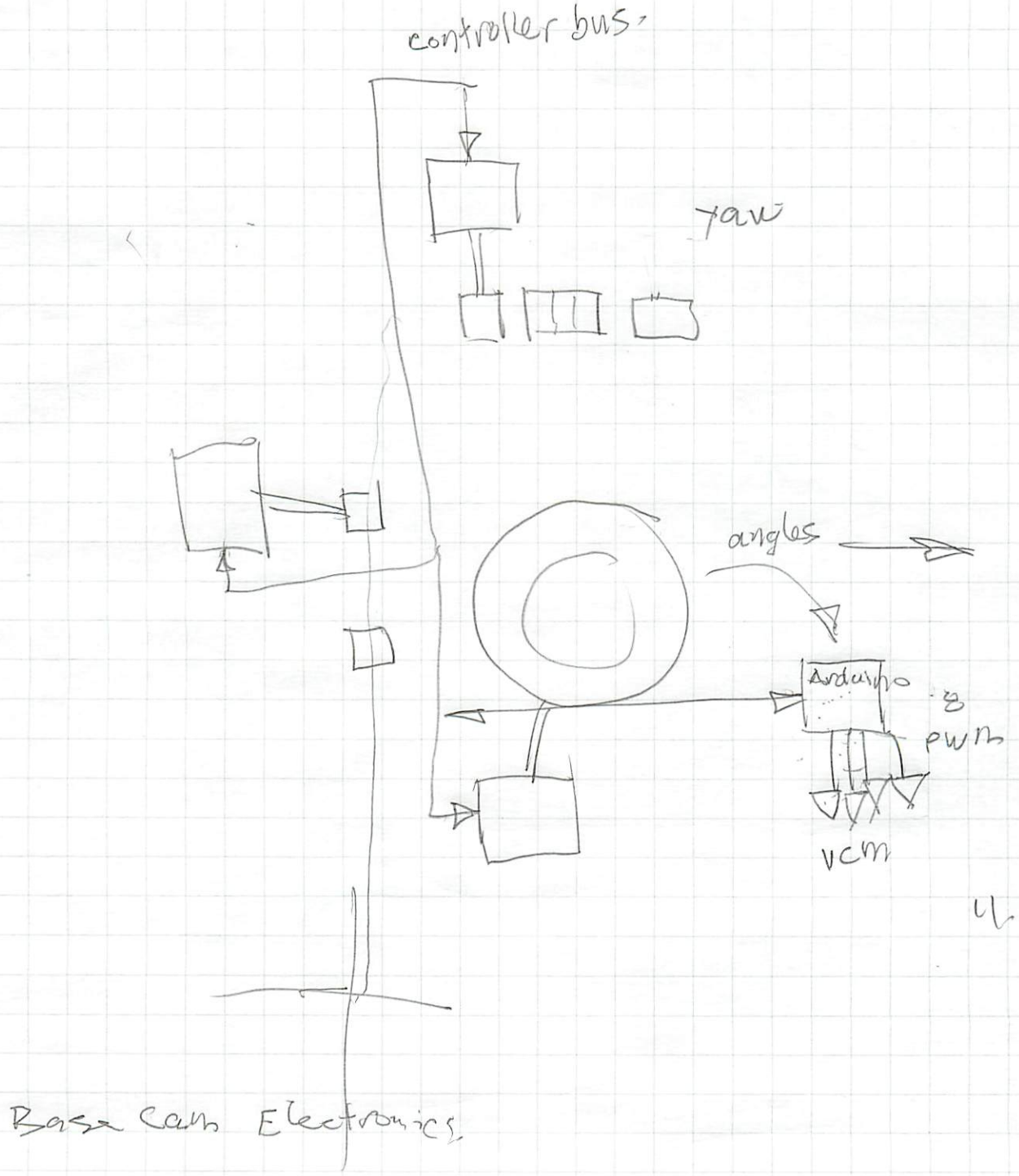



7NOV 18
Aethon
VN300
PC
Hub
Media Conv
JTX2
SSD
GIMBAL
encoder
Yaw drv. ele.
E
M
motor
slipring?
?
YAW
FORJ
(fiber optic rotary joint)
slipring
Roll drv. ele
ROLL
FORJ
Pitch drv ele
PITCH
FORJ
adam's bus
torque cmds
angle readouts
image data
cmd, monitor
mike
VN200
gyro, nav
andrew's data, commands monitor
Media Conv
Hub
Jetson TX2
Payload
PWM
vesc's
- adam bus
- ethernet
- serial
- vectornav

Aethon

6 Nov '15

14th
1 pm



4.

6 Nov 18

Vector nav. call.

APX 15

.15 to .3 deg.

VN200 inside
VN300 airframe.

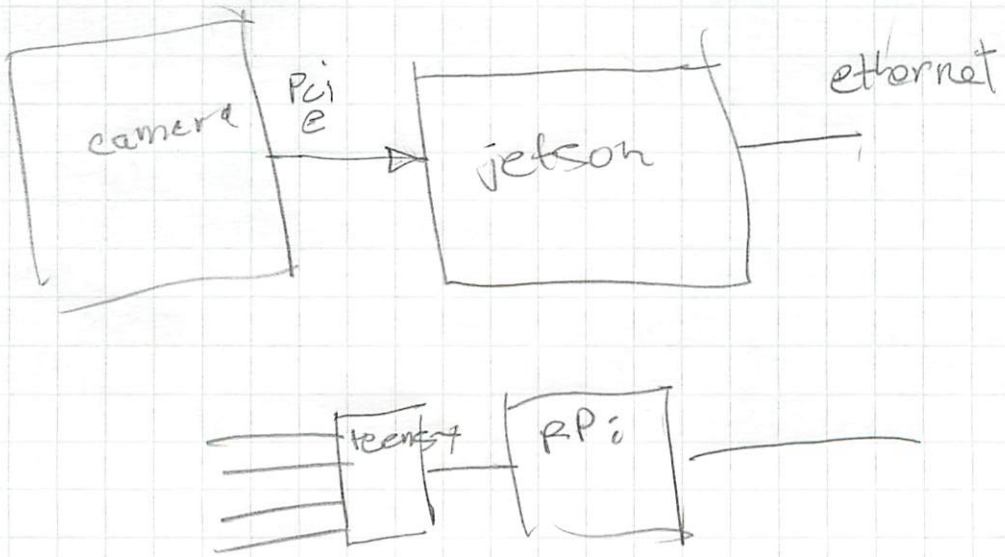
RTK

ajones @aethontech.com
ajenkins @aethonaerial.com

vectornav.
jakub +
lasse

Jetson TX2.
Linux.

AJenk
AJones
AWol.
Scott Peacock.



DB16 19 Feb '19

- [x] slave message
- [ ] read encoders
- [x] tach from pot
- [x] scsgim → aethon 3D
- [x] range in meters vimba.

$$F = \frac{M}{range} + B$$

$$(F - B) \cdot range = M$$

$$range = M / (F - B)$$

- [x] geo target list
- [x] range to focus
- [ ] settling time
- [ ] metadata
- [x] save frames
- [x] integrate uBlox
- [x] fake heading
- [x] init lens on startup

-68.6

-68.6

1934 23m

212

winners

144.28 114.34

0 -.04

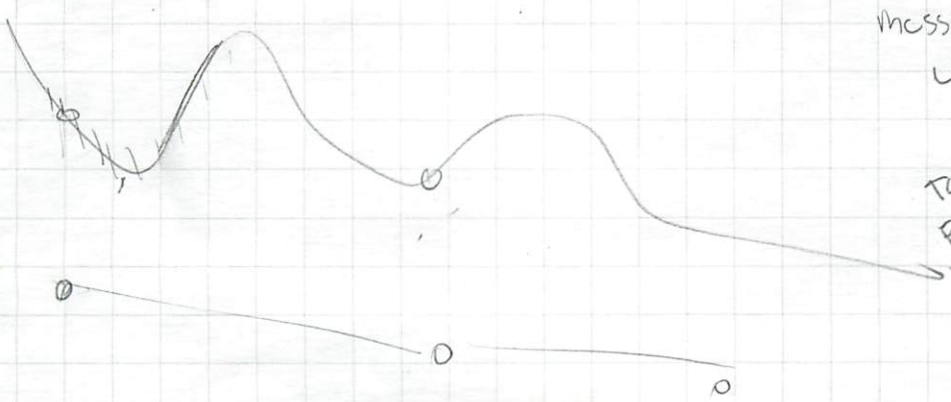
2010 2010

2 2010 building

45.2 2.47 1900 tower

13.73 0.2 2005 winn

12.5



Messages

UBX

CFG / ~~Ports~~ PRTS

Targ uart1

P-in 5-RTCM3

P-out none

Baud 19200

— × ~~7.385~~

0 6.0 × — ant.

1 2

POSLLH

SOL.

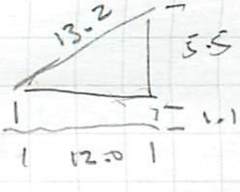
PVT

— × 1.8 + 6.0 - 1.4

1.8

6.4 m antenna to gnd

× 6.7 gim to gnd. ~~bottom conductor.~~ 6.6 m light standard



DB16 commission ~ 20 Feb '19

- ☐ P501.6 and 501.5 crimps failed, solder repair (gyro data) gyro cable
- ☐ J301.3 R28 was N/C, re-flowed solder - (pin goes thru Servo Amp) inner board

- ☐ outer timeout
- ▨ reduce VSW gain
- ▨ up outer freq
- ▨ debug dome drive
- ☐ heat sink
- ▨ encoders
- ▨ outer message, half duplex

y -r —
p -y
r -p. —

- ▨ check in. geoTune
- ☐ backup.

- ☐ message-bad counts
- ▨ connect console
- ▨ joystick ff tune.

200 Hz. $\frac{1}{200}$ s 5 ms.

25 1
50 bytes @ 1M = 0.5 ms.
$\frac{50 \times 10}{10^6}$

	encoders		reg.bit	
	dome	VSW.	dom	VSW.
A	D6	D9	D.4	C.3
B	D7	D10	D.2	C.4
X	D8	D11	D.3	C.6

c3
c2
a3
e3

assessment
cow
pureed
regular/thi
thickened.

lens
txen = pin6.
timer = 33 us 30kHz. 1M.
100kHz.

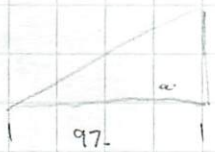
23 Feb '19

antenna	106.9
ground	100.5
arm	107.1
	110.9

Tower

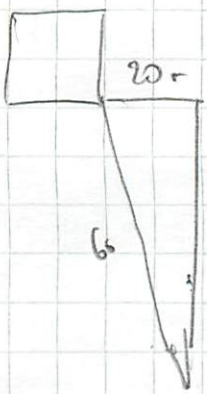
pitch		h.
6.3	top.	10.7
5.1	cen	9.2
4.5	bot. @	7.6
1.7	light.	2.9
-1.6	base.	-3.0
	road.	

- ☐ bracket frames by 2° (3)
- ☐ filenames
- ☐ map view
- ☐ target selection
- ☐ save frames
- ☐



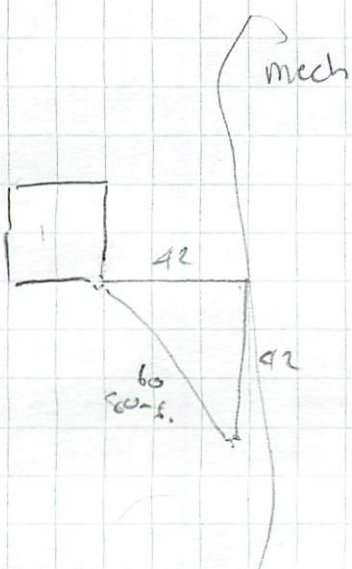
$\tan 6.3 = \frac{h}{97}$

road to light
6.6 m



		towers.
106.6	antenna.	110.9
-6.4	gnd.	10.7.
100.2	gnd.	

105 msl = gim.



280
5 micron
35 x 24 cameras
mm.
1mm.

3-5 or 7

27-35 knots.

60-80
15m wide.
20m.

20m

111.45
111+5 inches
166"

bed positioning
300 plus pillar
- thin drinks w/straw
- nectar thick liquids.
- tested

AVMIR
- swallowing assessment
- breakfast in bed
- cough during meal