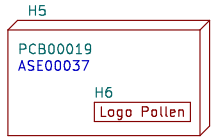
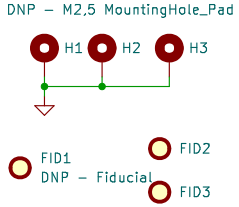
Release	Date	Designer	Check	Comments
A1	06/01/2023	EB	SN	Initial drawing
B1	22/03/2023	EB	SN	[added] Link Vbus and 5V with a 0R (DNP) [changed] Boot switch -> press-button [changed] 0R configuration points on SimpleFOC operation (EXTI) [changed] Test points got drilled (0,4 mm)
C1	14/04/2023	EB	SN	[fixed] SW1 was not operating (stucked in boot mode) [fixed] remove 0R between V_bus & 5V (useless)

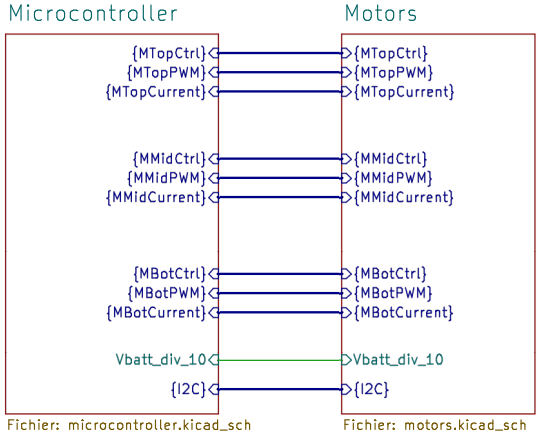
- [not fixed] freezing bug à l'init. UART ? EXTI ?
- [???] changer connecteur flex 10 cts pour un sliding
- [???] changer connecteur flex 40 cts pour un sliding
- [later] UART connector -> Dynamixel (https://emanual.robotis.com/docs/en/dxl/mx/mx-28/#connector-information)

Houston board is basically a STM32G4 microcontroller that focuses on driving 3 BLDC motors. It gets 3 Hall effects or encoders on motors and absolute positions behind reduction through SPI encoders.





EXTI use:
- 0: botHallC PC0_15 (PE4_3 on rev. A1)
- 1
- 2: botHallA PE2
- 3: midMotnFlt PC3_18
- 4: midHallB PD4_86
- 5:
- 6: botHallB PE6_5 (PE3_2 on rev. A1)
- 7: midHallC PD7
- 8: topHallA PA8
- 9: topHallB PA9
- 10: topHallC PA10
- 11: topMotnFlt PD11
- 12: botMotnFlt PE12
- 13
- 14
- 15: midHallA PA15



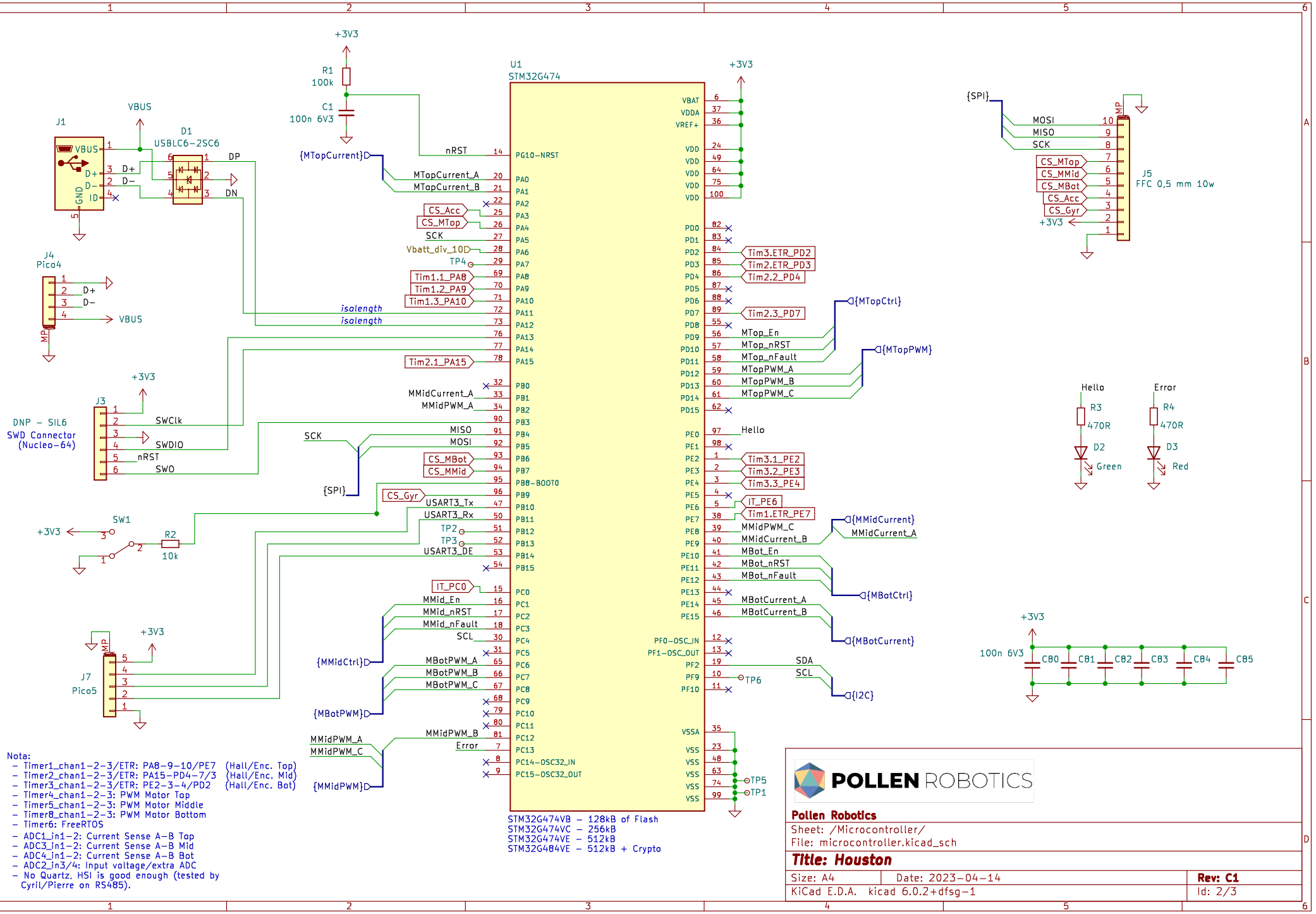
POLLEN ROBOTICS

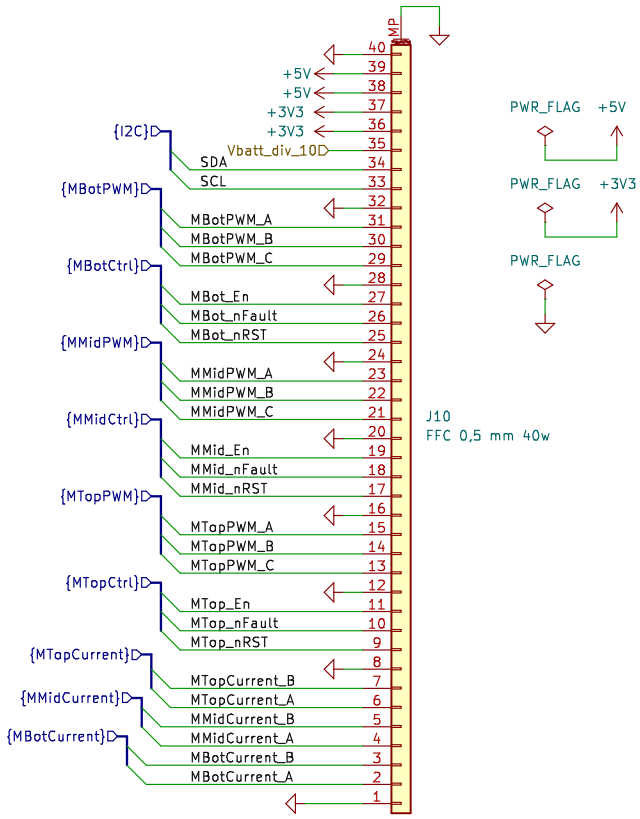
Pollen Robotics

Sheet: /
File: carte_Houston.kicad_sch

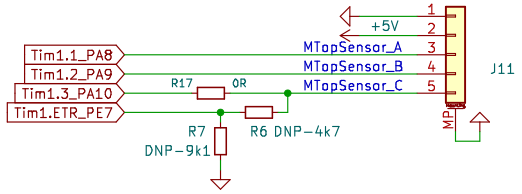
Title: Houston

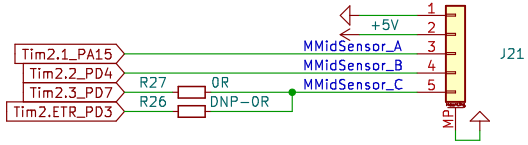
Size: A4	Date: 2023-04-14	**Rev: C1**
KiCad E.D.A. kicad 6.0.2+dfsg-1		Id: 1/3

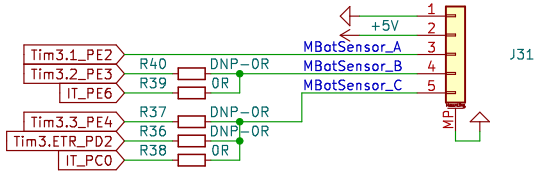

U1
STM32G474
+3V3
R1
100k
C1
100n 6V3
{MTopCurrent}
nRST
MTopCurrent_A
MTopCurrent_B
CS_Acc
CS_MTop
SCK
Vbatt_div_10
TP4
Tim1.1_PA8
Tim1.2_PA9
Tim1.3_PA10
isolength
isolength
Tim2.1_PA15
MMidCurrent_A
MMidPWM_A
MISO
MOSI
CS_MBot
CS_MMid
{SPI}
CS_Gyr
USART3_Tx
USART3_Rx
TP2
TP3
USART3_DE
IT_PC0
MMid_En
MMid_nRST
MMid_nFault
SCL
{MMidCtrl}
MBotPWM_A
MBotPWM_B
MBotPWM_C
{MBotPWM}
MMidPWM_A
MMidPWM_C
{MMidPWM}
MMidPWM_B
Error
PG10-NRST
PA0
PA1
PA2
PA3
PA4
PA5
PA6
PA7
PA8
PA9
PA10
PA11
PA12
PA13
PA14
PA15
PB0
PB1
PB2
PB3
PB4
PB5
PB6
PB7
PB8-BOOT0
PB9
PB10
PB11
PB12
PB13
PB14
PB15
PC0
PC1
PC2
PC3
PC4
PC5
PC6
PC7
PC8
PC9
PC10
PC11
PC12
PC13
PC14-OSC32_IN
PC15-OSC32_OUT
VBAT
VDDA
VREF+
VDD
PD0
PD1
PD2
PD3
PD4
PD5
PD6
PD7
PD8
PD9
PD10
PD11
PD12
PD13
PD14
PD15
PE0
PE1
PE2
PE3
PE4
PE5
PE6
PE7
PE8
PE9
PE10
PE11
PE12
PE13
PE14
PE15
PF0-OSC_IN
PF1-OSC_OUT
PF2
PF9
PF10
VSSA
VSS
Tim3.ETR_PD2
Tim2.ETR_PD3
Tim2.2_PD4
Tim2.3_PD7
MTop_En
MTop_nRST
MTop_nFault
MTopPWM_A
MTopPWM_B
MTopPWM_C
{MTopCtrl}
{MTopPWM}
Hello
Tim3.1_PE2
Tim3.2_PE3
Tim3.3_PE4
IT_PE6
Tim1.ETR_PE7
MMidPWM_C
MMidCurrent_B
{MMidCurrent}
MMidCurrent_A
MBot_En
MBot_nRST
MBot_nFault
{MBotCtrl}
MBotCurrent_A
MBotCurrent_B
{MBotCurrent}
SDA
SCL
{I2C}
TP6
TP5
TP1
STM32G474VB – 128kB of Flash
STM32G474VC – 256kB
STM32G474VE – 512kB
STM32G4B4VE – 512kB + Crypto
J1
VBUS
D+
D–
GND
ID
D1
USBLC6-2SC6
DP
DN
J4
Pico4
MP
J3
DNP – SIL6
SWD Connector
(Nucleo-64)
SWClk
SWDIO
nRST
SWO
SW1
R2
10k
J7
Pico5
{SPI}
MOSI
MISO
SCK
CS_MTop
CS_MMid
CS_MBot
CS_Acc
CS_Gyr
+3V3
J5
FFC 0,5 mm 10w
Hello
Error
R3
470R
D2
Green
R4
470R
D3
Red
100n 6V3
C80
C81
C82
C83
C84
C85
Nota:
– Timer1_chan1–2–3/ETR: PA8–9–10/PE7 (Hall/Enc. Top)
– Timer2_chan1–2–3/ETR: PA15–PD4–7/3 (Hall/Enc. Mid)
– Timer3_chan1–2–3/ETR: PE2–3–4/PD2 (Hall/Enc. Bot)
– Timer4_chan1–2–3: PWM Motor Top
– Timer5_chan1–2–3: PWM Motor Middle
– Timer8_chan1–2–3: PWM Motor Bottom
– Timer6: FreeRTOS
– ADC1_in1–2: Current Sense A–B Top
– ADC3_in1–2: Current Sense A–B Mid
– ADC4_in1–2: Current Sense A–B Bot
– ADC2_in3/4: Input voltage/extra ADC
– No Quartz, HSI is good enough (tested by Cyril/Pierre on RS485).
POLLEN ROBOTICS
Pollen Robotics
Sheet: /Microcontroller/
File: microcontroller.kicad_sch
Title: Houston
Size: A4
Date: 2023–04–14
Rev: C1
KiCad E.D.A. kicad 6.0.2+dfsg–1
Id: 2/3



Nota: /!\ J1 is inverted in regards to the facing connector (J10 on Major Tom).







Pico5 53261-0571

Mating:
- 51021-0500 (Fem. housing)
- 50079-8000 (Contacts)
- 92001-1198 (300 mm cable)

5 Volts-tolerant inputs
(5V->3V3 conversion for PE7)

POLLEN ROBOTICS

Pollen Robotics

Sheet: /Motors/
File: motors.kicad_sch

Title: Houston

Size: A4	Date: 2023-04-14	**Rev: C1**
KiCad E.D.A. kicad 6.0.2+dfsg-1		Id: 3/3