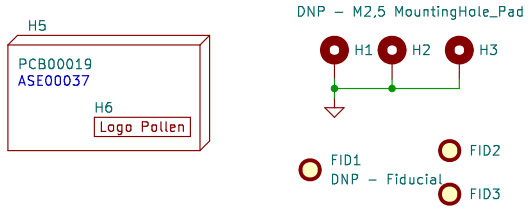
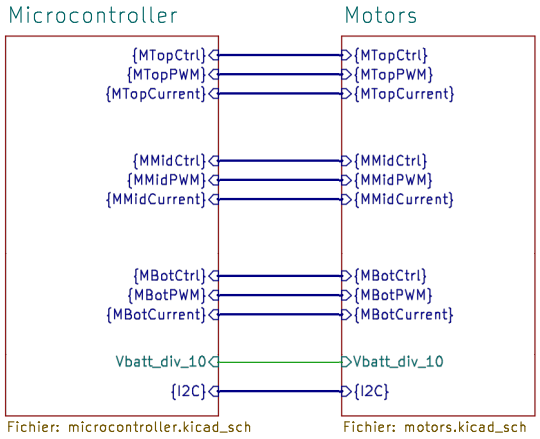
Release	Date	Designer	Check	Comments
A1	06/01/2023	EB	SN	Initial drawing
B1	22/03/2023	EB	SN	[added] Link Vbus and 5V with a 0R (DNP) [changed] Boot switch -> press-button [changed] 0R configuration points on SimpleFOC operation (EXTI) [changed] Test points got drilled (0,4 mm)
				- [not fixed] freezing 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

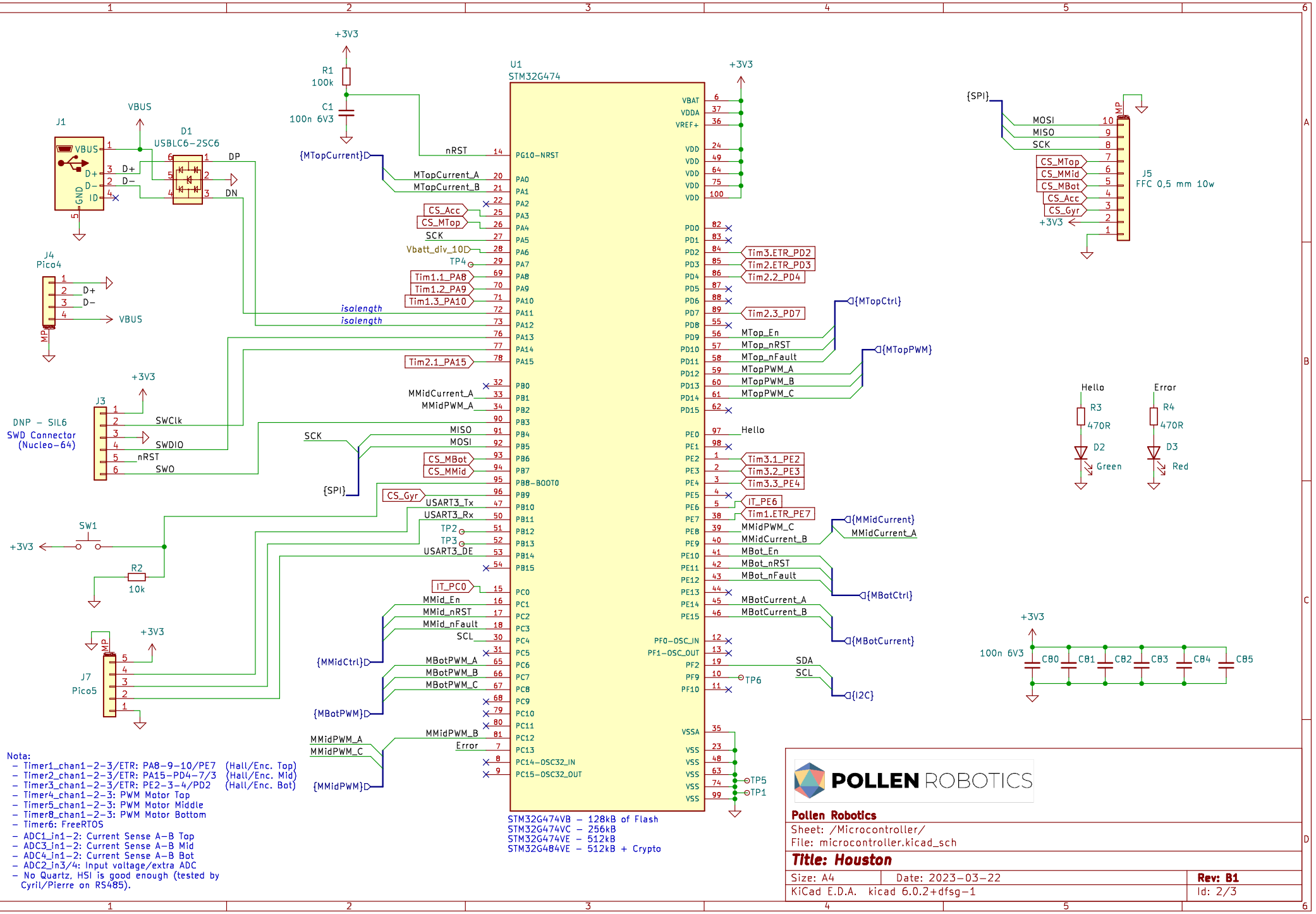
POLLEN ROBOTICS

Pollen Robotics

Sheet: /
File: carte_Houston.kicad_sch

Title: Houston

Size: A4	Date: 2023-03-22	**Rev: B1**
KiCad E.D.A. kicad 6.0.2+dfsg-1		Id: 1/3


U1
STM32G474
R1
100k
C1
100n 6V3
+3V3
VBUS
J1
D1
USBLC6-2SC6
DP
DN
D+
D−
J4
Pico4
J3
DNP – SIL6
SWD Connector
(Nucleo-64)
SWCLk
SWDIO
nRST
SWO
SW1
R2
10k
J7
Pico5
{MTopCurrent}
MTopCurrent_A
MTopCurrent_B
CS_Acc
CS_MTop
SCK
Vbatt_div_10
TP4
Tim1.1_PA8
Tim1.2_PA9
Tim1.3_PA10
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_B
Error
STM32G474VB – 128kB of Flash
STM32G474VC – 256kB
STM32G474VE – 512kB
STM32G4B4VE – 512kB + Crypto
Tim3.ETR_PD2
Tim2.ETR_PD3
Tim2.2_PD4
Tim2.3_PD7
{MTopCtrl}
MTop_En
MTop_nRST
MTop_nFault
MTopPWM_A
MTopPWM_B
MTopPWM_C
{MTopPWM}
Hello
Tim3.1_PE2
Tim3.2_PE3
Tim3.3_PE4
IT_PE6
Tim1.ETR_PE7
{MMidCurrent}
MMidPWM_C
MMidCurrent_B
MBot_En
MBot_nRST
MBot_nFault
{MBotCtrl}
MBotCurrent_A
MBotCurrent_B
{MBotCurrent}
SDA
SCL
{I2C}
TP6
TP5
TP1
{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
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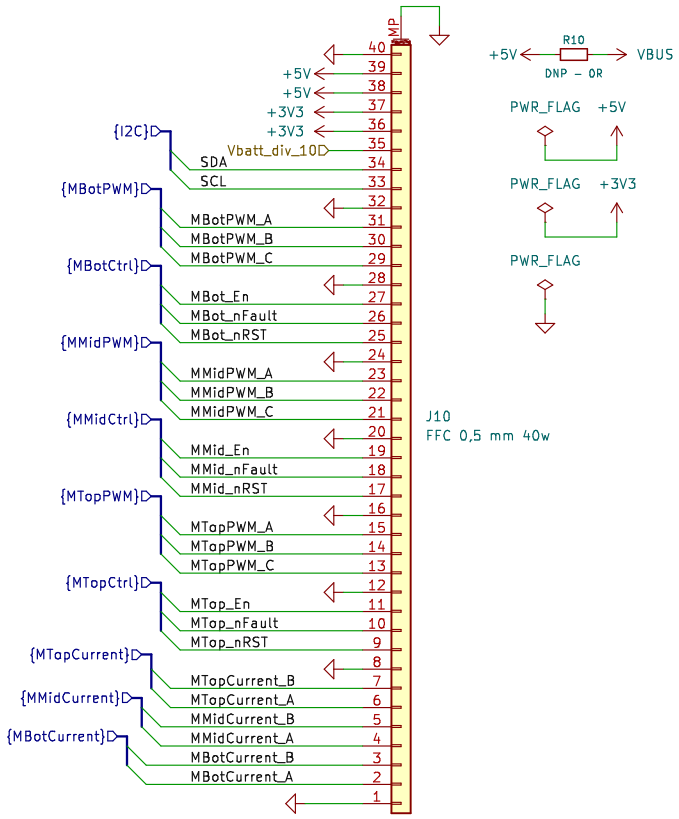
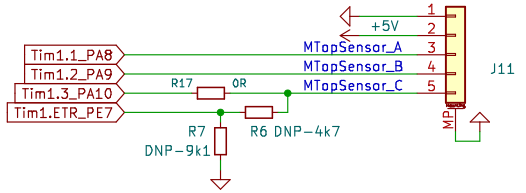
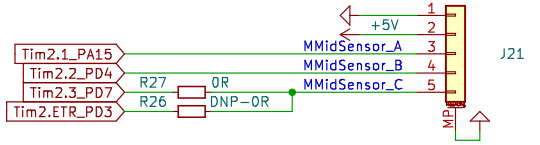
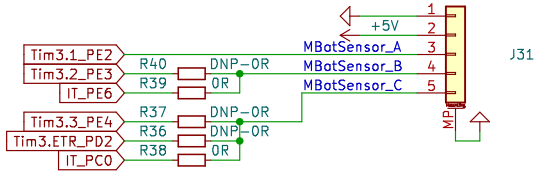
Sheet: /Microcontroller/
File: microcontroller.kicad_sch
Title: Houston
Size: A4
Date: 2023–03–22
Rev: B1
KiCad E.D.A. kicad 6.0.2+dfsg–1
Id: 2/3









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)

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

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Sheet: /Motors/
File: motors.kicad_sch

Title: Houston

Size: A4	Date: 2023-03-22	**Rev: B1**
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