Motor Controller

(100)

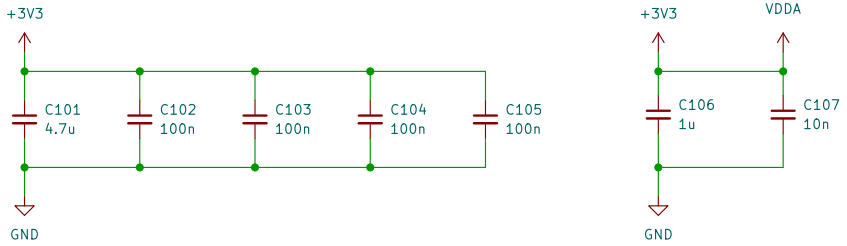
Requirements
File: requirements.kicad_sch

(2) Power Supply
File: power.kicad_sch

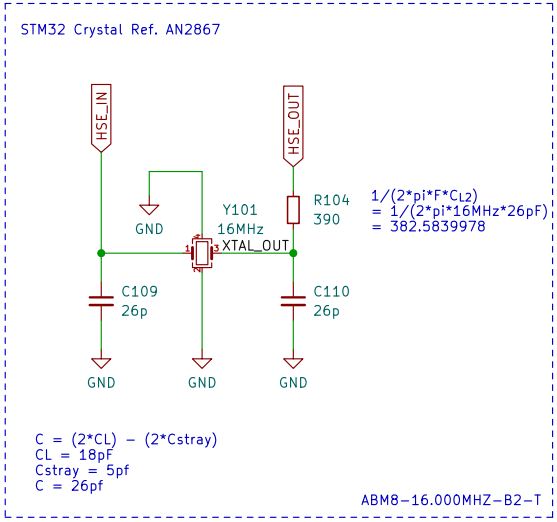
(3) Motor Driver
File: motor_driver.kicad_sch

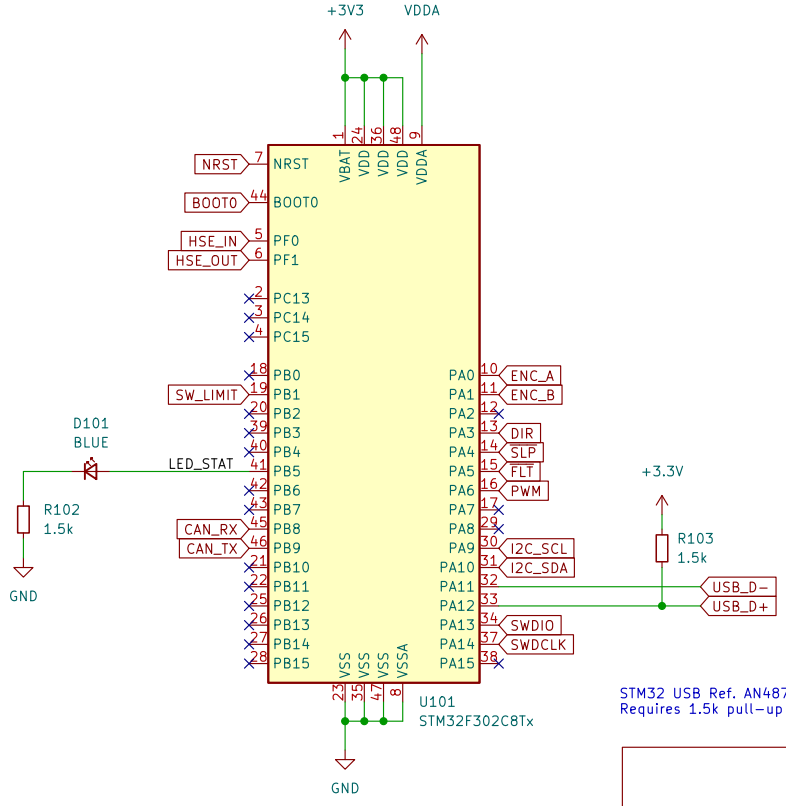
(4) Peripherals
File: peripherals.kicad_sch

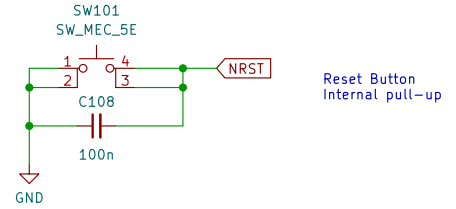
CPU Decoupling Capacitors

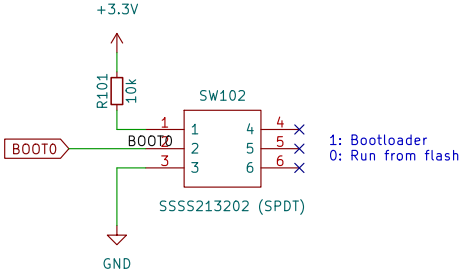


HSE Resonator









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Sheet: /
File: motor_controller.kicad_sch

Title: Motor Controller (Base)

Size: A4	Date: 2022-05-03	**Rev: 1.0**
KiCad E.D.A. kicad (6.0.5)		Id: 1/5

A motor position controller for audio-animatronics.

1. Audio-Animatronics
    1.1. 30 FPS playback
    1.2. Homing - need to determine "zero" position for correct animation
    1.3. Need to recieve position commands from a "show" computer

2. Motor Controller
    2.1. Real-time compute
        2.1.1. Floating-Point Hardware
    2.2. Position Control
        2.2.1. Quadrature encoder feedback
        2.2.2. Homing
    2.3. Power supply demands
        2.3.1. Logic Power
        2.3.2. Actuator Power

3. Testing
    4.1. LED hooked up to CPU GPIO
        - Sanity to ensure CPU works and can control GPIO
    4.2. LED hooked up to USB 3V3 regulator
        - Sanity to ensure power & regulation are correct

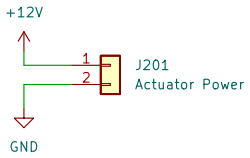
Sheet: /Requirements/		
File: requirements.kicad_sch		
Title: Requirements		
Size: A5	Date:	**Rev:**
KiCad E.D.A. kicad (6.0.5)		Id: 2/5

Power Supply

(200)

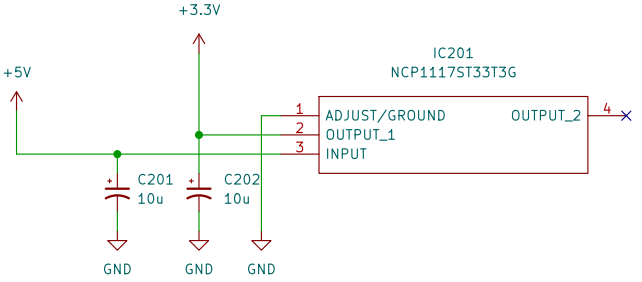
Actuator Power Regulation

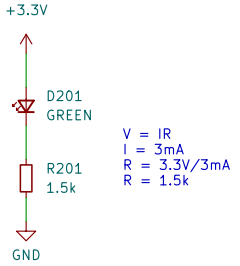
max 6A @ 12V
Assume pre-regulated for now



Logic Power Regulation

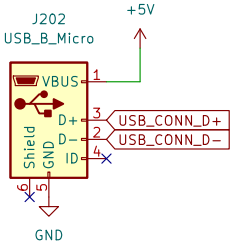
max 1A @ 3.3V



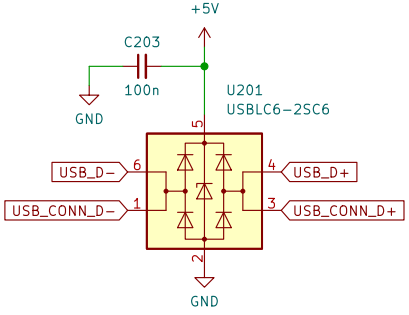


Note: add ferrite bead for low-pass filter for USB power

USB & Logic Power



USB – AN4879 Reference
Leave shield floating (unless suitable enclosure is available)



ESD Protection

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Sheet: /(2) Power Supply/
File: power.kicad_sch

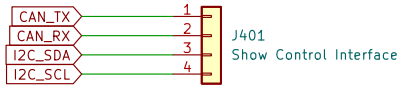
Title: Power Supply

Size: A4	Date: 2022-05-18	**Rev: 1.0**
KiCad E.D.A. kicad (6.0.5)		Id: 3/5

Peripheral Interfaces

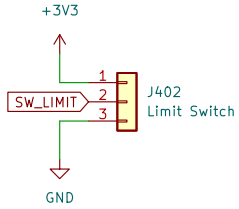
(400)

Show Control Interface



- Add I2C Interface and CAN bus interface
- These two interfaces are added so that we can experiment using the two protocols during testing.

Limit Switch



GPIO Interface to a limit switch
- +3.3V supplied from USB
- Digital Signal Input (SW_LIMIT)

Serial Wire Debug

SWD Ref. AN4206

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Sheet: /(4) Peripherals/
File: peripherals.kicad_sch

Title: Peripheral Interfaces

Size: A4	Date: 2022-05-18	**Rev: 1.0**
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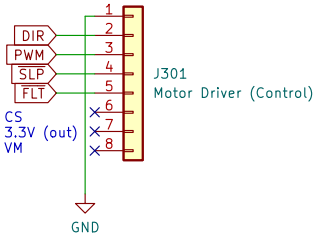
Motor Driver

(300)

G2 18v17 Motor Driver

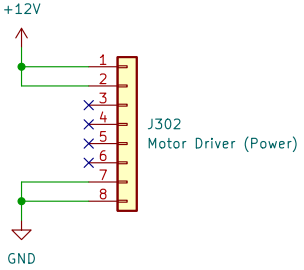
Motor Driver
Front-End
(Control)



!Be careful not to accidentally short the 3V3 pin to the neighboring VM pin while power is being supplied as doing so will instantly destroy the board!

CS (Current Sense) needs ADC, add in next iteration

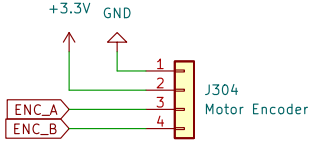
Motor Driver
Back-End
(Actuator Power)



Supplying motor power to G2 18v17 board

G2 18v17 Motor Driver Ref. https://www.pololu.com/product/2991

Motor Encoder



Need connector to interface with motor encoder

Motor Ref. https://www.pololu.com/product/4757

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Sheet: /(3) Motor Driver/		
File: motor_driver.kicad_sch		
Title: Motor Driver		
Size: A4	Date: 2022-05-18	**Rev: 1.0**
KiCad E.D.A. kicad (6.0.5)		Id: 5/5