

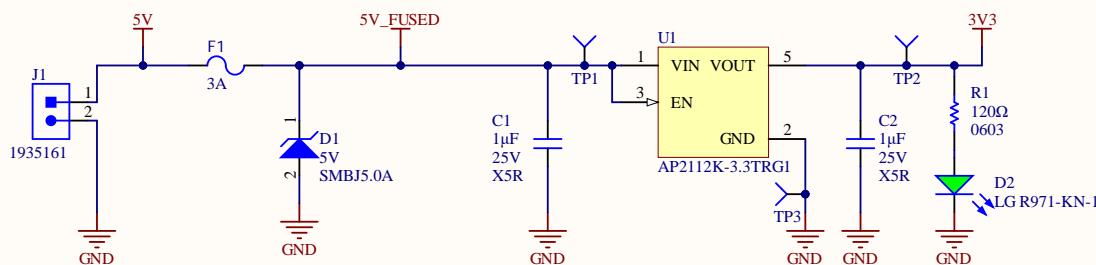
Mounting Holes

H¹ H²
H³ H⁴

Need to make new mounting hole part depending on Andrew's fastener choice

Add eFuse for Rev 3

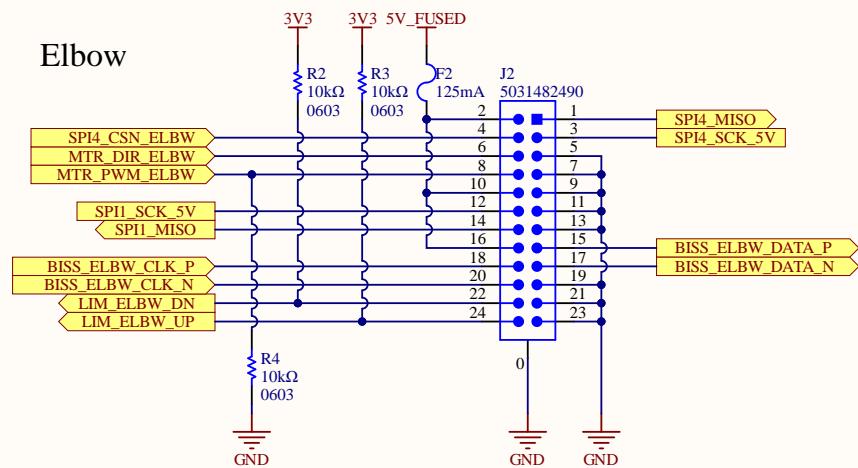
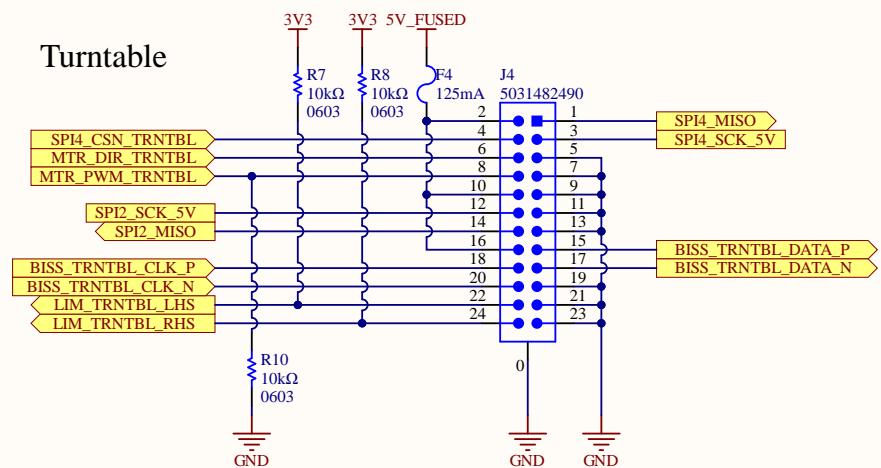
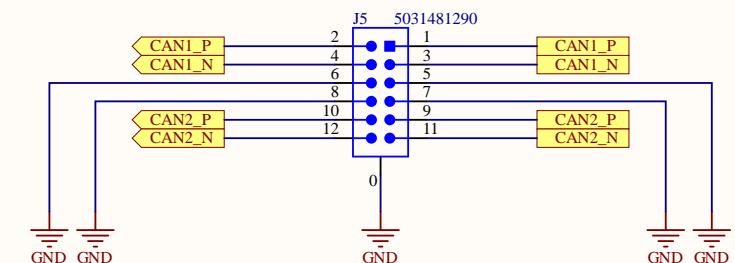
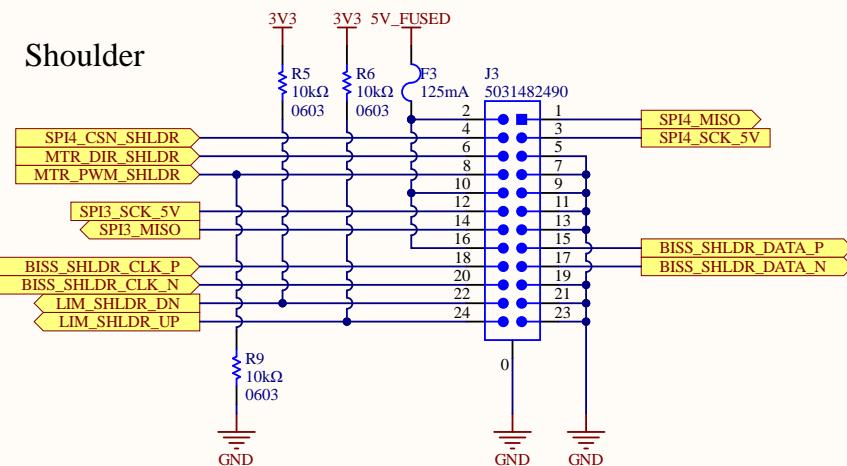
5V to 3.3V LDO (Max 600mA)



Current Calculations

Green LED voltage drop: 2.2V
 $- I = (3.3 - 2.2V)/120 = 9.17mA$

| | | | |
|------------------------------------------------------------------------------------|---------------------|-------------------------------------------------------------------------------|---------------------|
| Title Arm - Power | | UW Robotics 200 University Avenue Waterloo Ontario Canada N2L 3G6 | UW ROBOTICS TEAM |
| Size: Letter | Drawn By: Kyle Hong | | |
| Date: 2020-11-20 | | Sheet 1 of 8 | |
| File: C:\Users\lance\GitHub\MarsRover2020-PCB\Projects\Arm\Rev2\SH1 - POWER.SchDoc | | | |

Elbow**Turtable****CAN Connections****Shoulder****Acronyms**

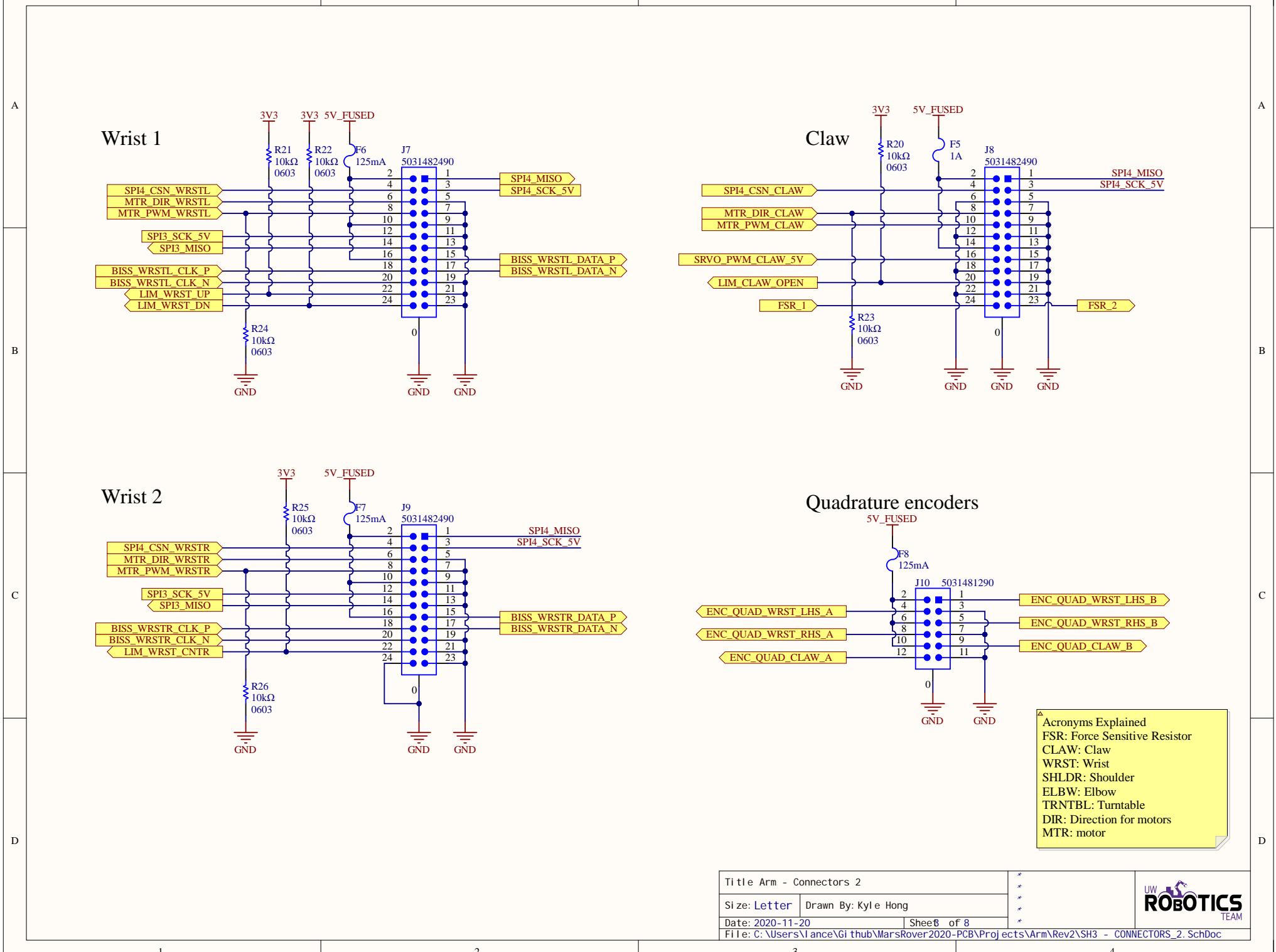
CSN: Current Sensor
MTR: Motor
ELBW: Elbow
LIM: Limit Switch
CLK: Clock
DN: Down
FSR: Force Sensitive Resistor
CLAW: Claw
WRST: Wrist
SHLDR: Shoulder
TRNTBL: Turntable
DIR: Direction for motors

Title: Arm - Connectors

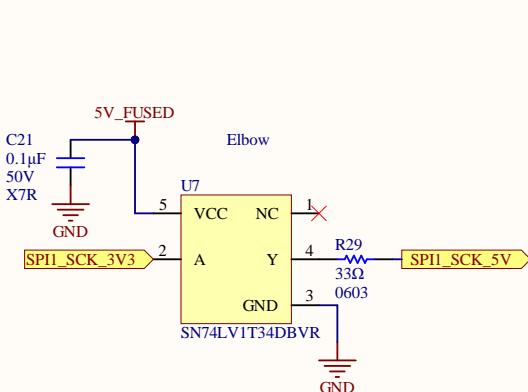
Size: Letter Drawn By: Kyle Hong

Date: 2020-11-20

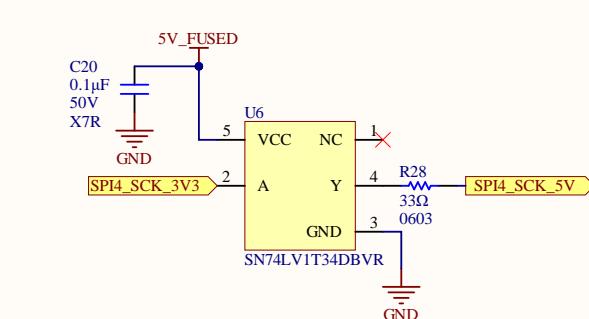
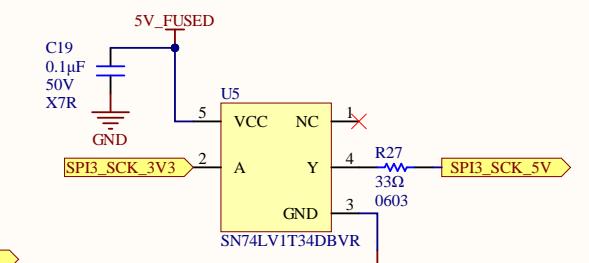
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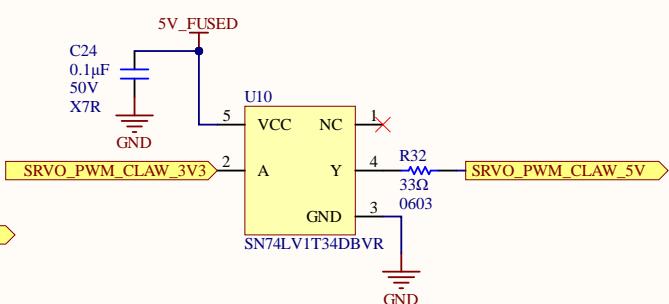
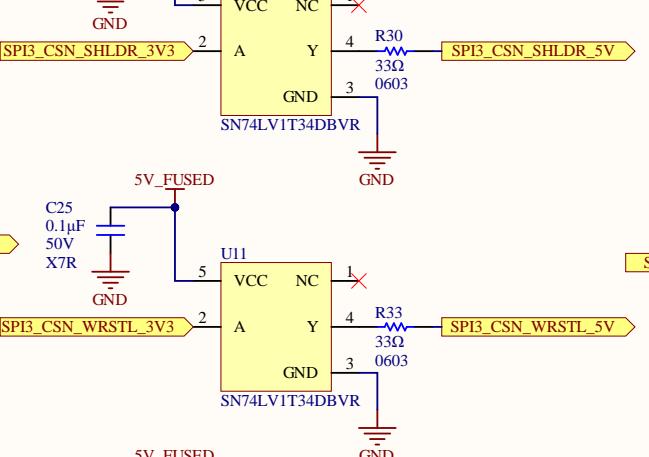
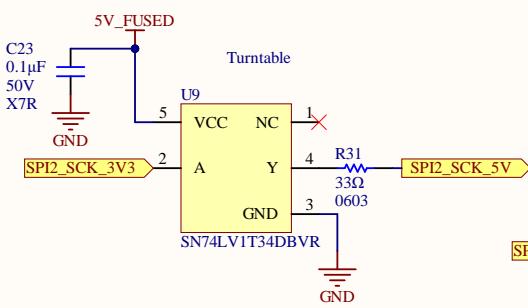
Encoder Level Shifter



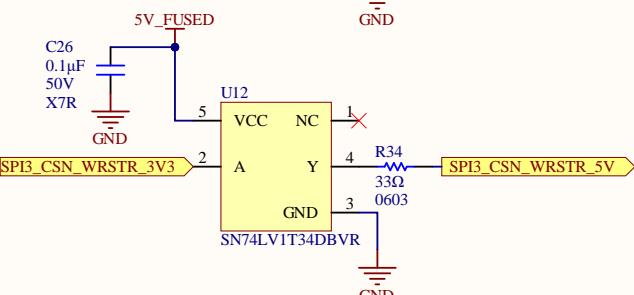
Current Sensor Level Shifter



Servo Level Shifter

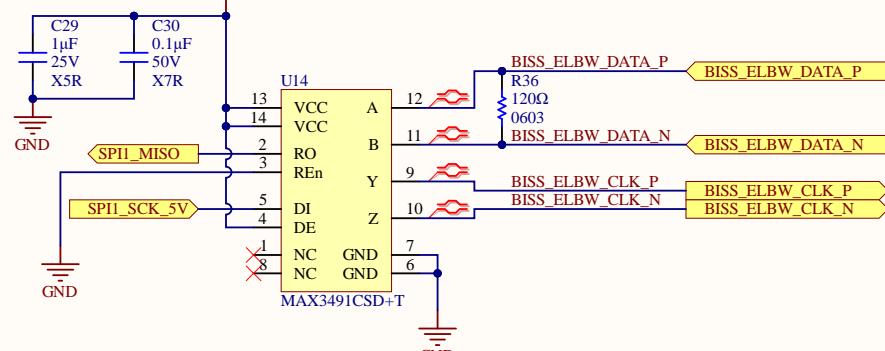


^A Encoder manufacturer: Broadcom
Encoder part number: AEAT-6012-A06
Did not level shift MISO signals since the STM32 SPI peripheral is 5V tolerant

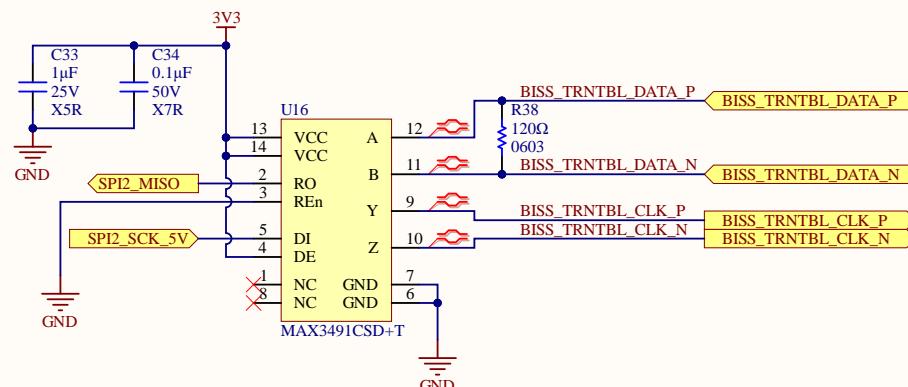


A

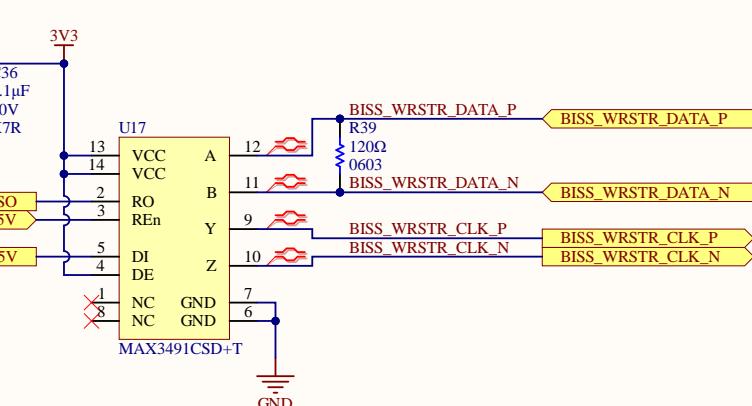
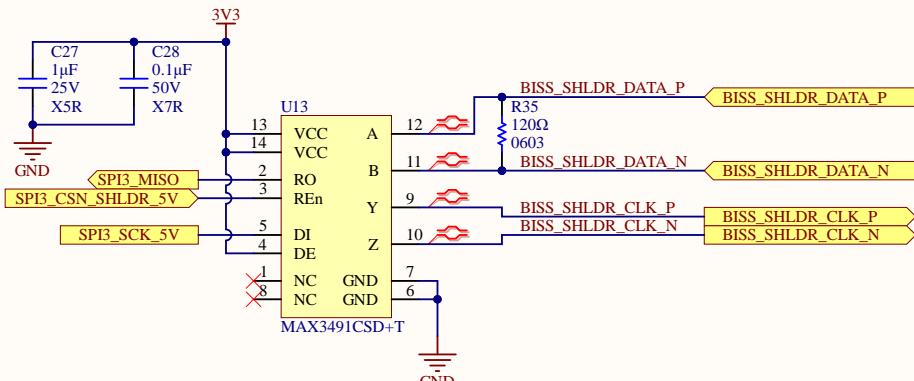
Netzer Encoders



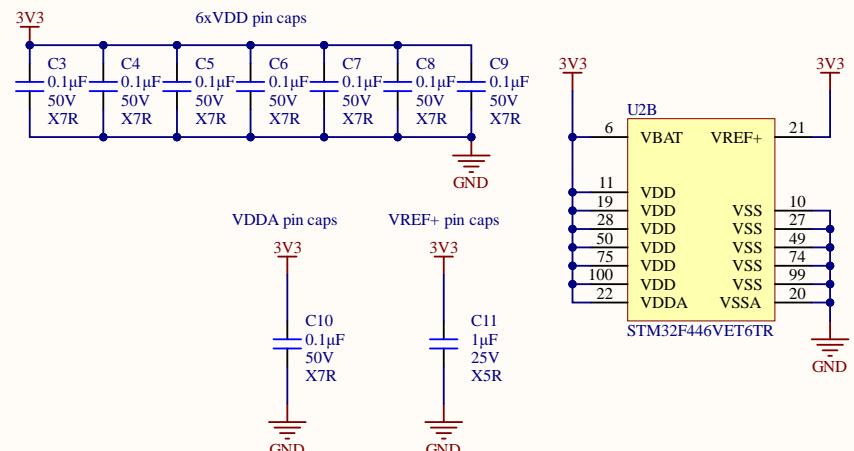
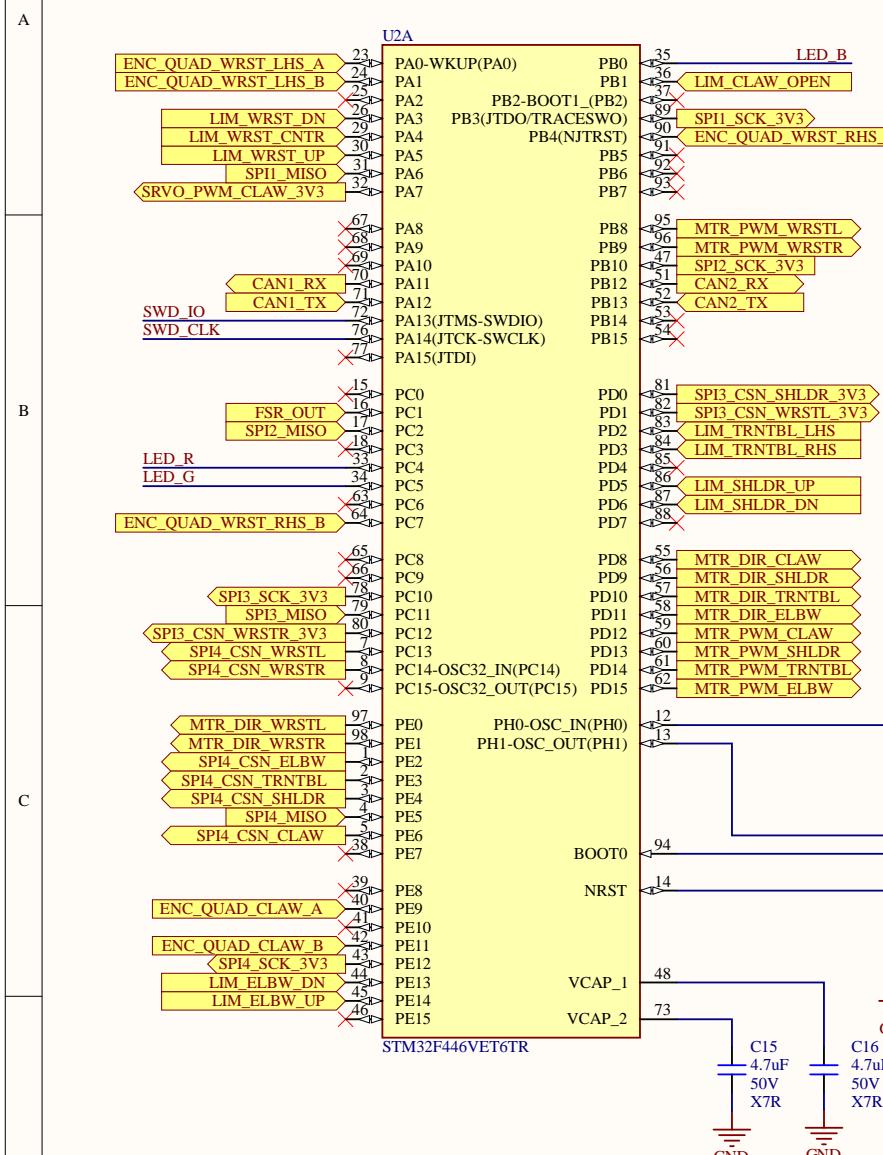
B



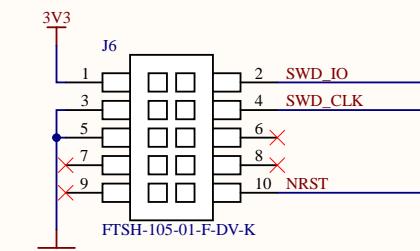
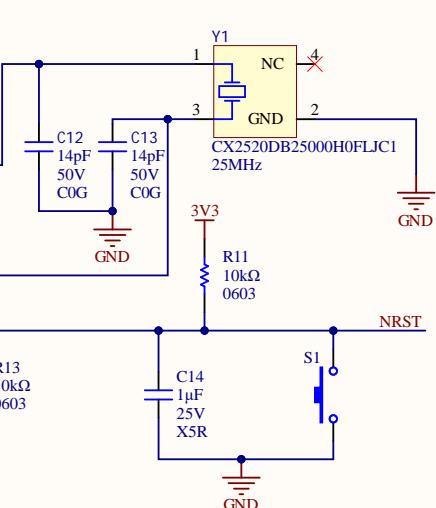
C



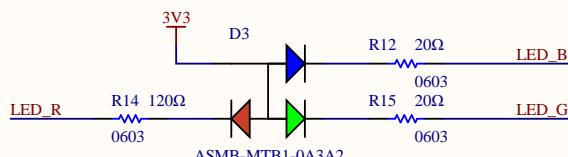
STM32F446VET7



Programming Header



Status LED



Current Calculations

RGB LED voltage drops:

- Red: 2.1V; $I = (3.3-2.1V)/120 = 10mA$
- Blue: 3.1V; $I = (3.3-3.1V)/120 = 1.67mA$
- Green: 3.1V; $I = (3.3-3.1V)/120 = 1.67mA$

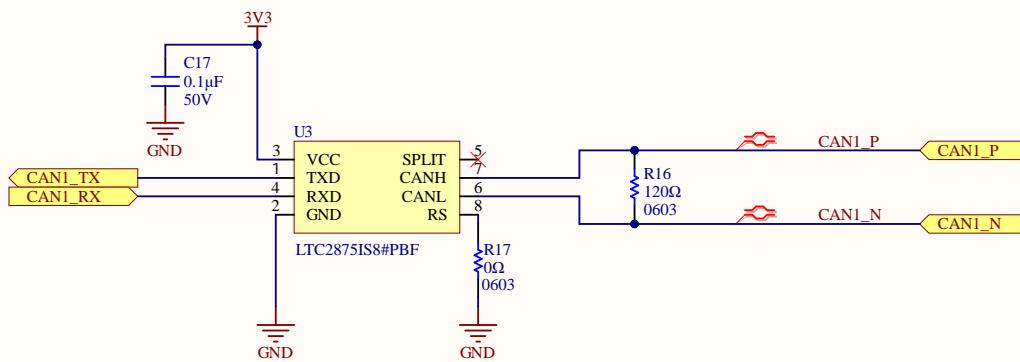
A

A

CAN Transceivers

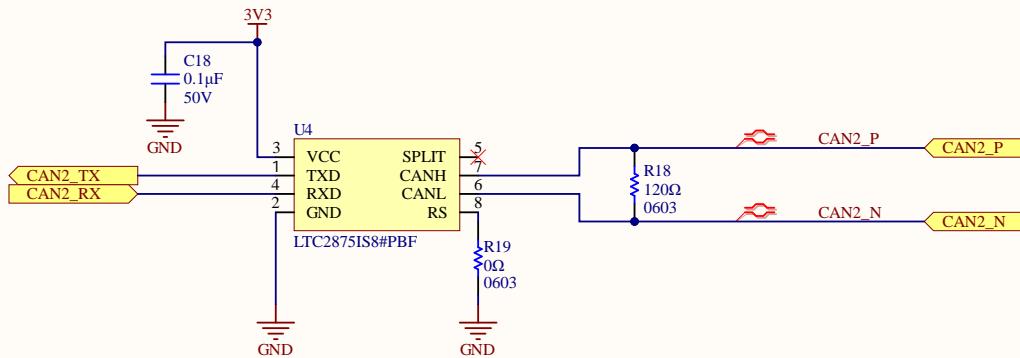
B

B



C

C



D

D

Title Arm - CAN Transceivers

Size: Letter Drawn By: Kyle Hong

Date: 2020-11-20 Sheet of 8

File: C:\Users\lance\GitHub\MarsRover2020-PCB\Projects\Arm\Rev2\SH7 - CAN.SchDoc

UW Robotics
200 University Avenue
Waterloo
Ontario
Canada N2L 3G6



Force Sensitive Resistor

A

Sensor:
 Manufacturer: Interlink Electronics
 Manufacturer Part Number: 30-81794
 Supplier: Digi-Key
 Supplier Part Number: 1027-1001-ND
<https://cdn.sparkfun.com/assets/8/a/1/2/0/2010-10-26-DataSheet-FSR402-Layout2.pdf>
 Resistance at 20N = 800 ohms
 Resistance at 100N = 250 ohms

Wheatstone bridge voltage output values:
 At 20N, Vout = 3.2V
 At 100N, Vout = 0.5V

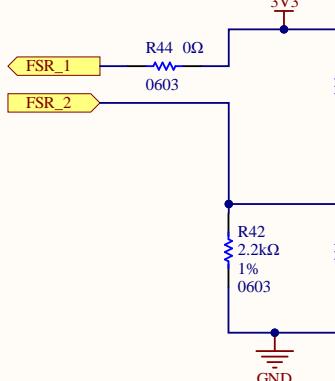
Low pass filter cutoff frequency:
 $f_c = 1/(2\pi R_1 C_1) = 111.30 \text{ Hz}$

Links to calculations and documentation

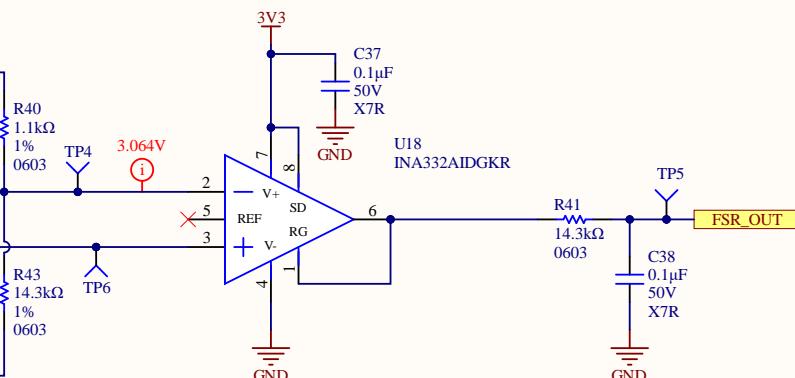
<https://docs.google.com/spreadsheets/d/1JzRwpCH-aMdlyAMP5zl6xFD8GluJzvmOR8Y5Kzd1RN0/edit#gid=0>

B

Wheatstone Bridge



Instrumentation Amplifier (Gain = 5)



C

D

A

B

C

D

Title: Arm - Force Sensitive Resistor

Size: Letter Drawn By: Kyle Hong

Date: 2020-11-20 Sheet 8 of 8

File: C:\Users\lance\GitHub\MarsRover2020-PCB\Projects\Arm\Rev2\SH8 - FORCE SENSITIVE RESISTOR.schdoc

