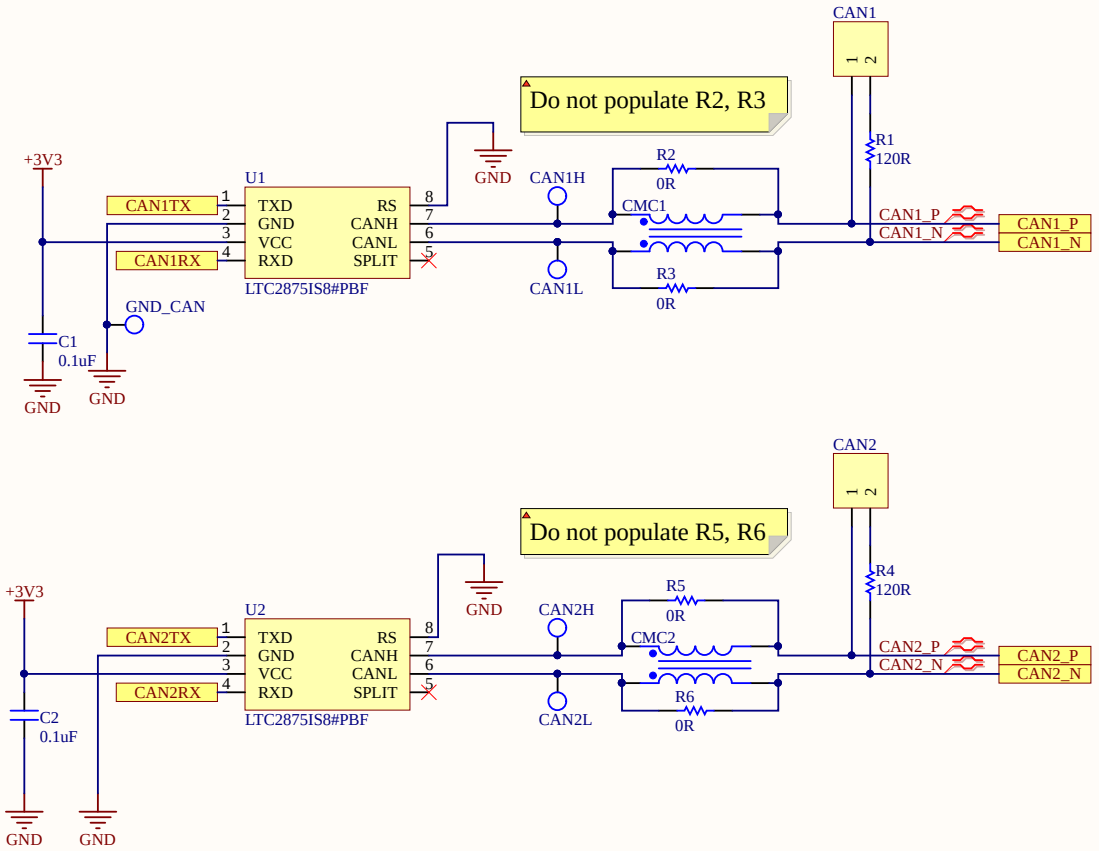
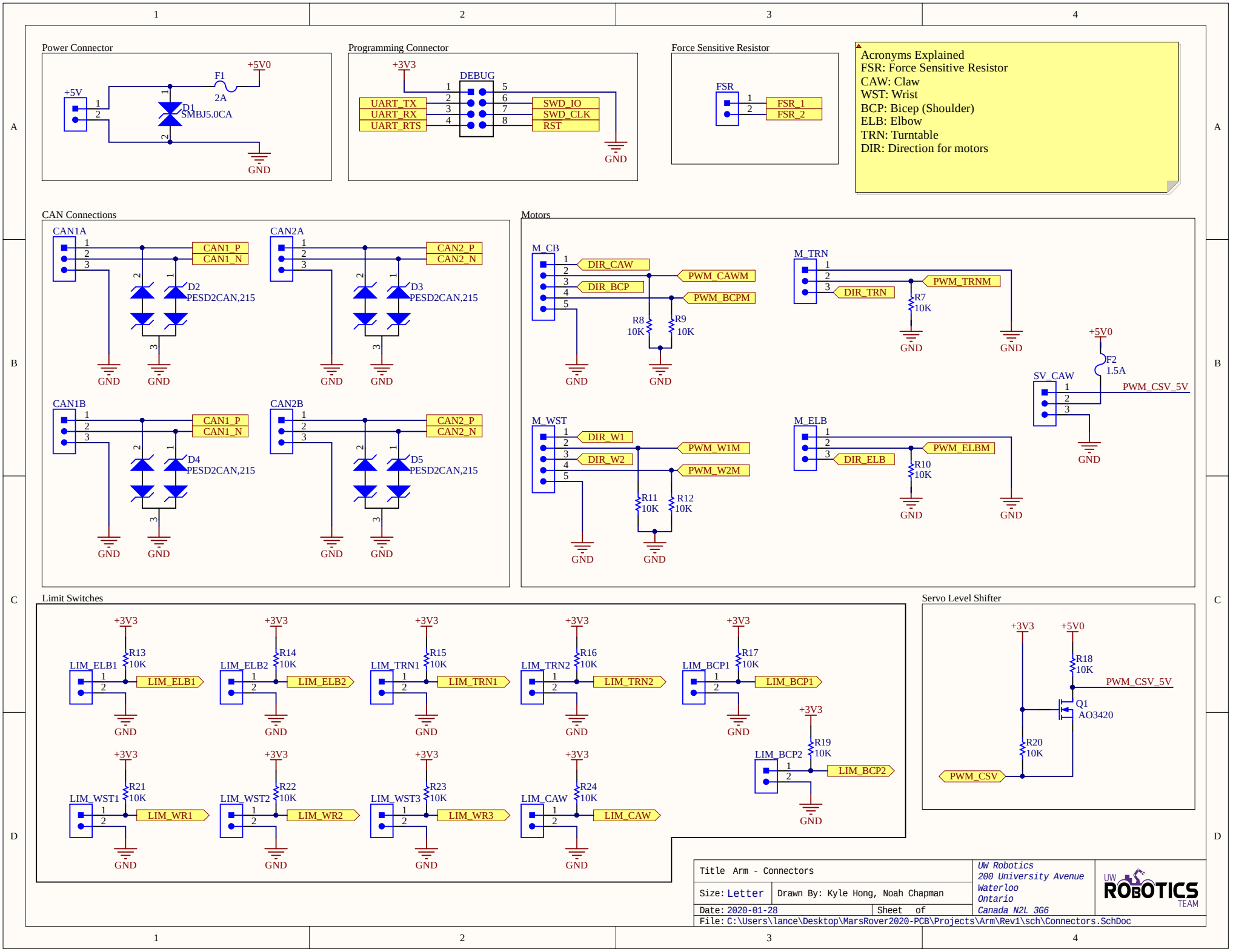
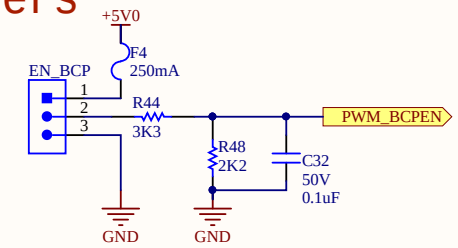
CAN Transceivers

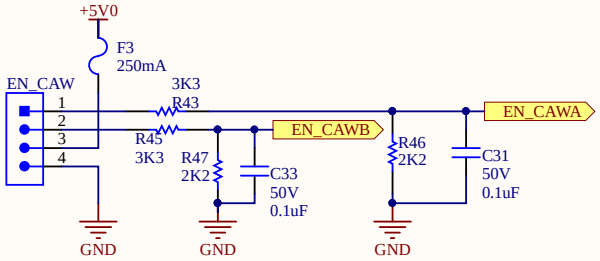


Title Arm - CAN Transcievers		UW Robotics 200 University Avenue Waterloo Ontario Canada N2L 3G6
Size: Letter	Drawn By: Princely Onaifo	
Date: 2020-01-28	Sheet of	
File: C:\Users\lance\Desktop\MarsRover2020-PCB\Projects\Arm\Rev1\sch\CAN.SchDoc		


Power Connector
+5V
+5V0
F1
2A
D1
SMBJ5.0CA
GND
Programming Connector
+3V3
DEBUG
UART_TX
UART_RX
UART_RTS
SWD_IO
SWD_CLK
RST
GND
Force Sensitive Resistor
FSR
FSR_1
FSR_2
Acronyms Explained
FSR: Force Sensitive Resistor
CAW: Claw
WST: Wrist
BCP: Bicep (Shoulder)
ELB: Elbow
TRN: Turntable
DIR: Direction for motors
CAN Connections
CAN1A
CAN2A
CAN1B
CAN2B
CAN1_P
CAN1_N
CAN2_P
CAN2_N
D2
D3
D4
D5
PESD2CAN,215
Motors
M_CB
DIR_CAW
DIR_BCP
PWM_CAWM
PWM_BCPM
R8
R9
10K
M_TRN
DIR_TRN
PWM_TRNM
R7
M_WST
DIR_W1
DIR_W2
PWM_W1M
PWM_W2M
R11
R12
M_ELB
DIR_ELB
PWM_ELBM
R10
SV_CAW
F2
1.5A
PWM_CSV_5V
Limit Switches
LIM_ELB1
LIM_ELB2
LIM_TRN1
LIM_TRN2
LIM_BCP1
LIM_BCP2
LIM_WST1
LIM_WST2
LIM_WST3
LIM_CAW
R13
R14
R15
R16
R17
R19
R21
R22
R23
R24
LIM_WR1
LIM_WR2
LIM_WR3
Servo Level Shifter
R18
R20
Q1
AO3420
PWM_CSV
Title Arm - Connectors
Size: Letter
Drawn By: Kyle Hong, Noah Chapman
Date: 2020-01-28
Sheet of
File: C:\Users\lance\Desktop\MarsRover2020-PCB\Projects\Arm\Rev1\sch\Connectors.SchDoc
UW Robotics
200 University Avenue
Waterloo
Ontario
Canada N2L 3G6
UW ROBOTICS TEAM

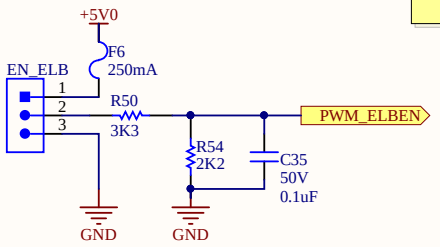
PWM Encoders

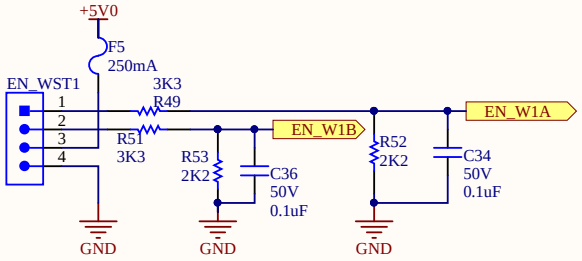


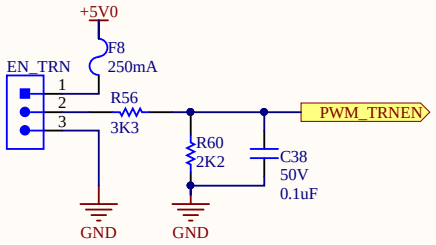


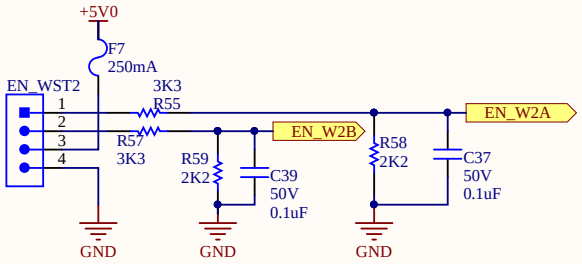
Low pass filter cut-off frequency:
fc = 1/(2*PI*3.3k*0.1u) = 482.29 Hz

Voltage divider:









Title Arm - PWM Encoders		UW Robotics 200 University Avenue Waterloo Ontario Canada N2L 3G6	UW ROBOTICS TEAM
Size: Letter	Drawn By: Kyle Hong		
Date: 2020-01-28	Sheet* of *		
File: C:\Users\lance\Desktop\MarsRover2020-PCB\Projects\Arm\Rev1\sch\Encoders.SchDoc			

Force Sensitive Resistor

Differential amplifier gain:

Low pass filter cutoff frequency:

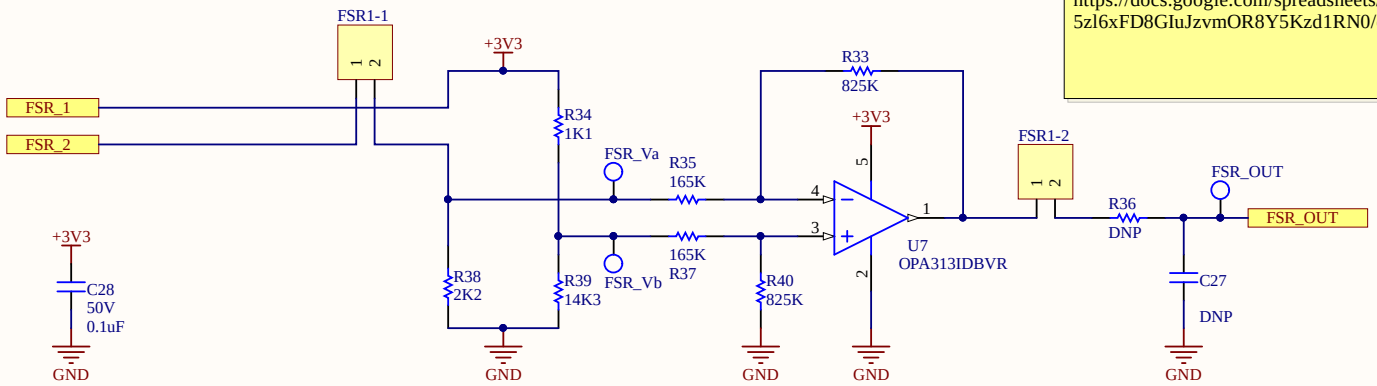
Links to calculations and documentation

https://docs.google.com/document/d/1rw19DyF2suYmOmllnorCrfqnUpDln50-sqe5KjQKnCs/edit

https://docs.google.com/spreadsheets/d/1JzRwpCH-aMdlyAMp5zl6xFD8GIuJzvmOR8Y5Kzd1RN0/edit#gid=0

Wheatstone Bridge

Differential Amplifier



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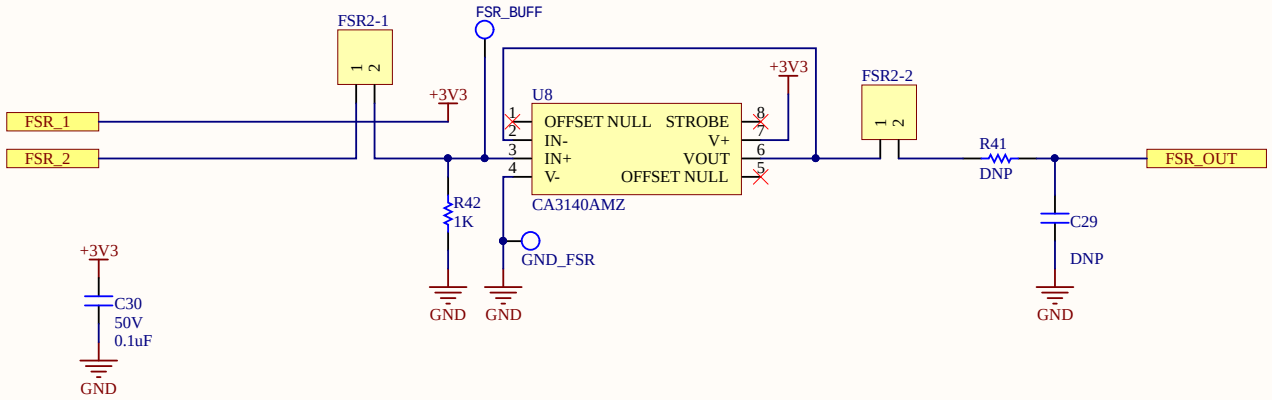
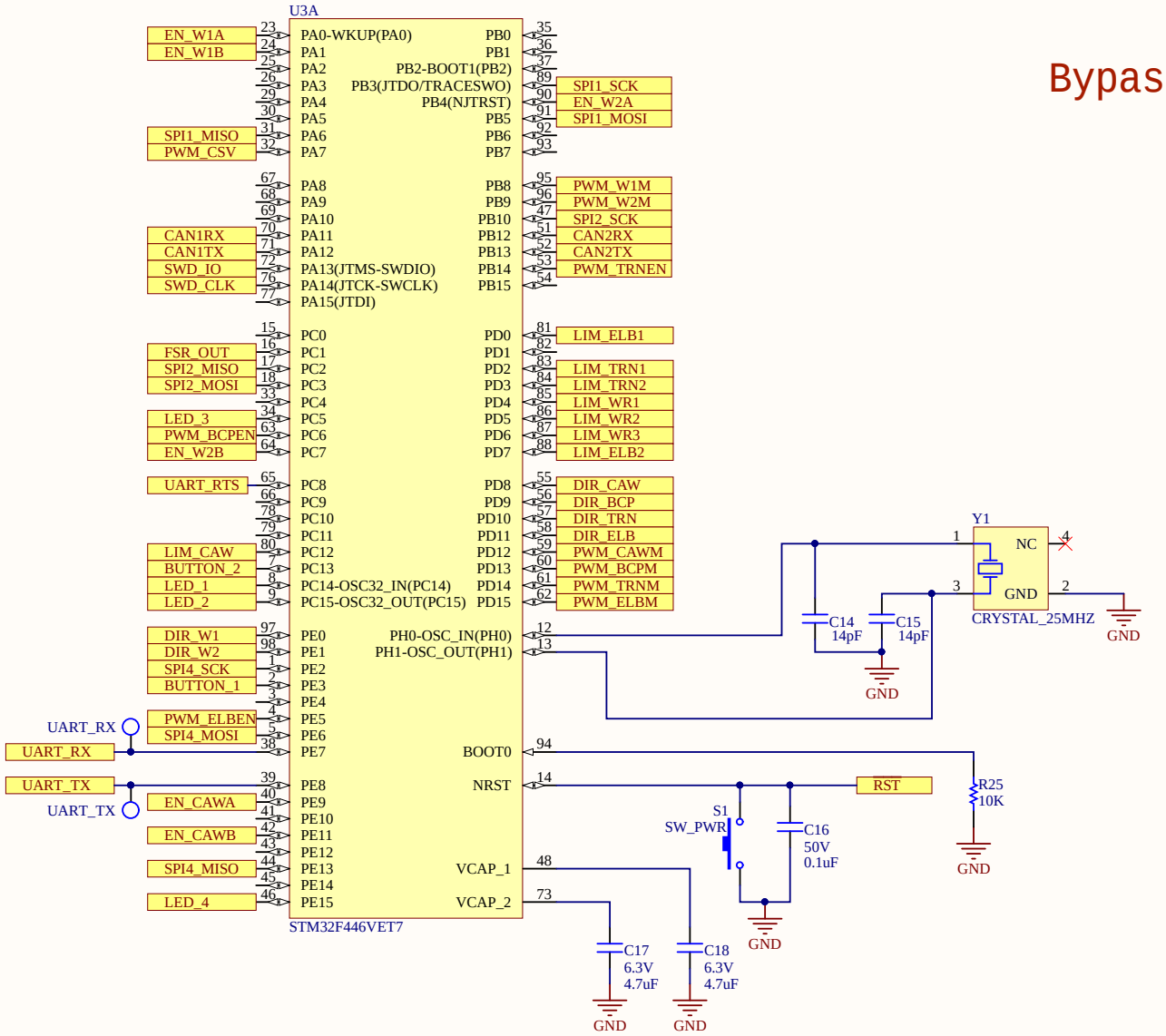
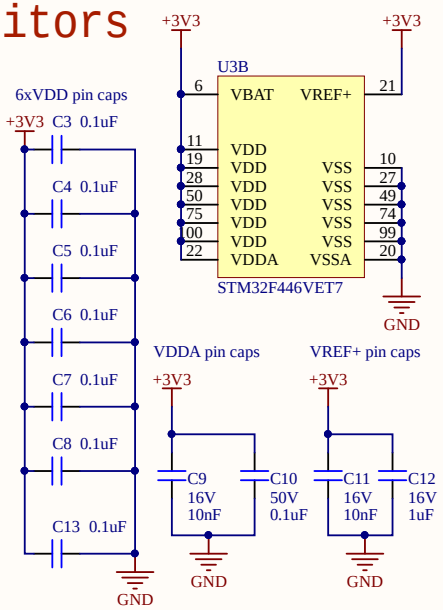


Title Arm - Claw Sensor		UW Robotics 200 University Avenue Waterloo Ontario Canada N2L 3G6	UW ROBOTICS TEAM
Size: Letter	Drawn By: K. Hong, N. Chapman, A. Ebrahim		
Date: 2020-01-28	Sheet* of *		
File: C:\Users\lance\Desktop\MarsRover2020-PCB\Projects\Arm\Rev1\sch\FSR.SchDoc			

STM32F446VET7

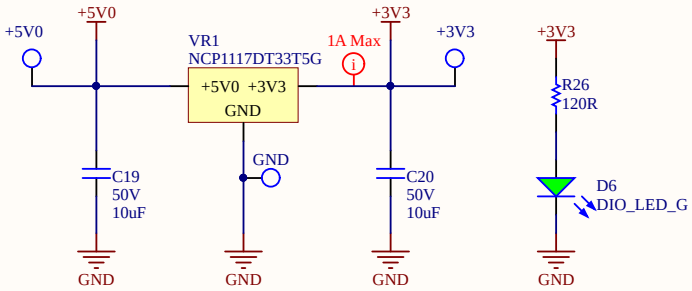


Bypass Capacitors



Title Arm - Microcontroller		UW Robotics 200 University Avenue Waterloo Ontario Canada N2L 3G6
Size: Letter	Drawn By: Princely Onaifo	
Date: 2020-01-28	Sheet of	
File: C:\Users\lance\Desktop\MarsRover2020-PCB\Projects\Arm\Rev1\sch\MCU.SchDoc		

5V-3.3V LDO

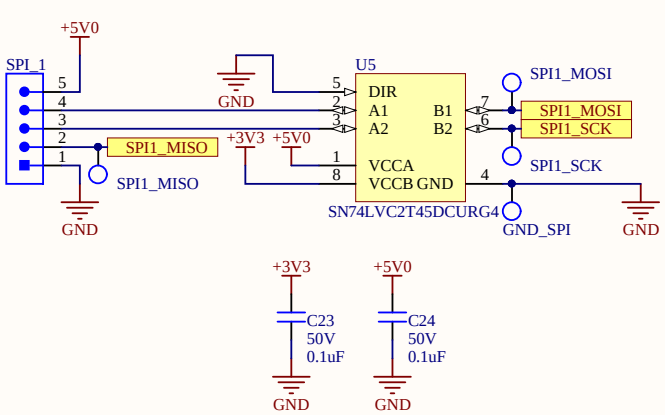


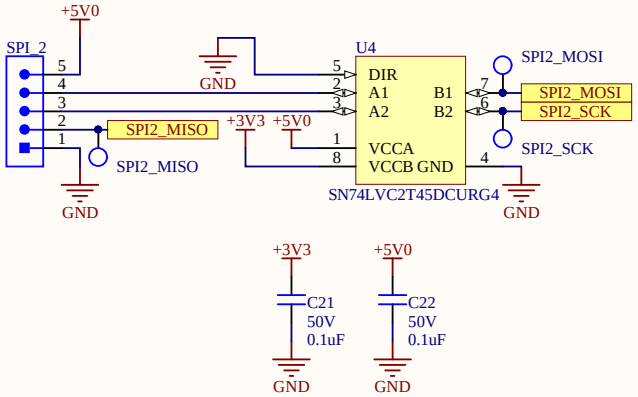
Current Calculations

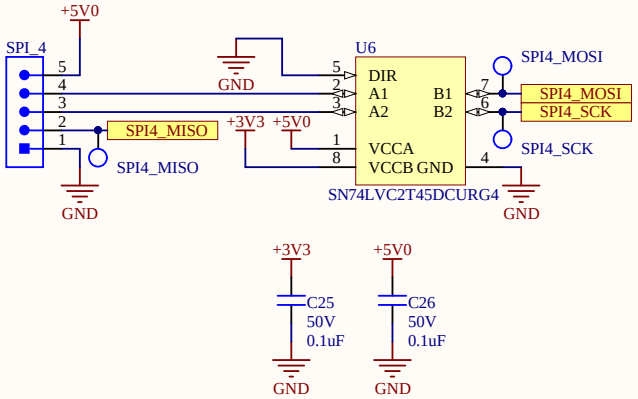
Green LED voltage drop: 2.2V
- I = (3.3-2.2V)/120 = 10.83mA

Title Arm - Power		UW Robotics 200 University Avenue Waterloo Ontario Canada N2L 3G6
Size: Letter	Drawn By: Kyle Hong	
Date: 2020-01-28	Sheet of	
File: C:\Users\lance\Desktop\MarsRover2020-PCB\Projects\Arm\Rev1\sch\POWER.SchDoc		

SPI Encoders







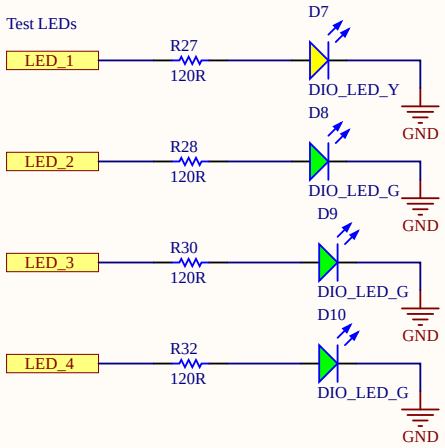
Encoder manufactuer:
Broadcom
Encoder part number:
AEAT-6012-A06

Did not level shift MISO

Title Arm - SPI Encoders		UW Robotics 200 University Avenue Waterloo Ontario Canada N2L 3G6
Size: Letter	Drawn By: Noah Chapman	
Date: 2020-01-28	Sheet* of *	
File: C:\Users\lance\Desktop\MarsRover2020-PCB\Projects\Arm\Rev1\sch\SPI Encoders.SchDoc		

H1 H2 H3 H4

Test LEDs

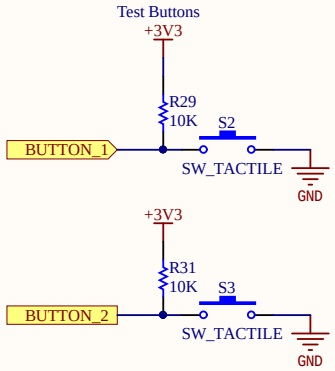


Current Calculations

Yellow LED voltage drop: 2.2V
- I = (3.3-2.2V)/120 = 10.83mA

Green LED voltage drop: 2.2V
- I = (3.3-2.2V)/120 = 10.83mA

Test Buttons



Title Arm - Support		UW Robotics 200 University Avenue Waterloo Ontario Canada N2L 3G6
Size: Letter	Drawn By: Noah Chapman	
Date: 2020-01-28	Sheet of	
File: C:\Users\lance\Desktop\MarsRover2020-PCB\Projects\Arm\Rev1\sch\Support.SchDoc