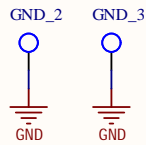
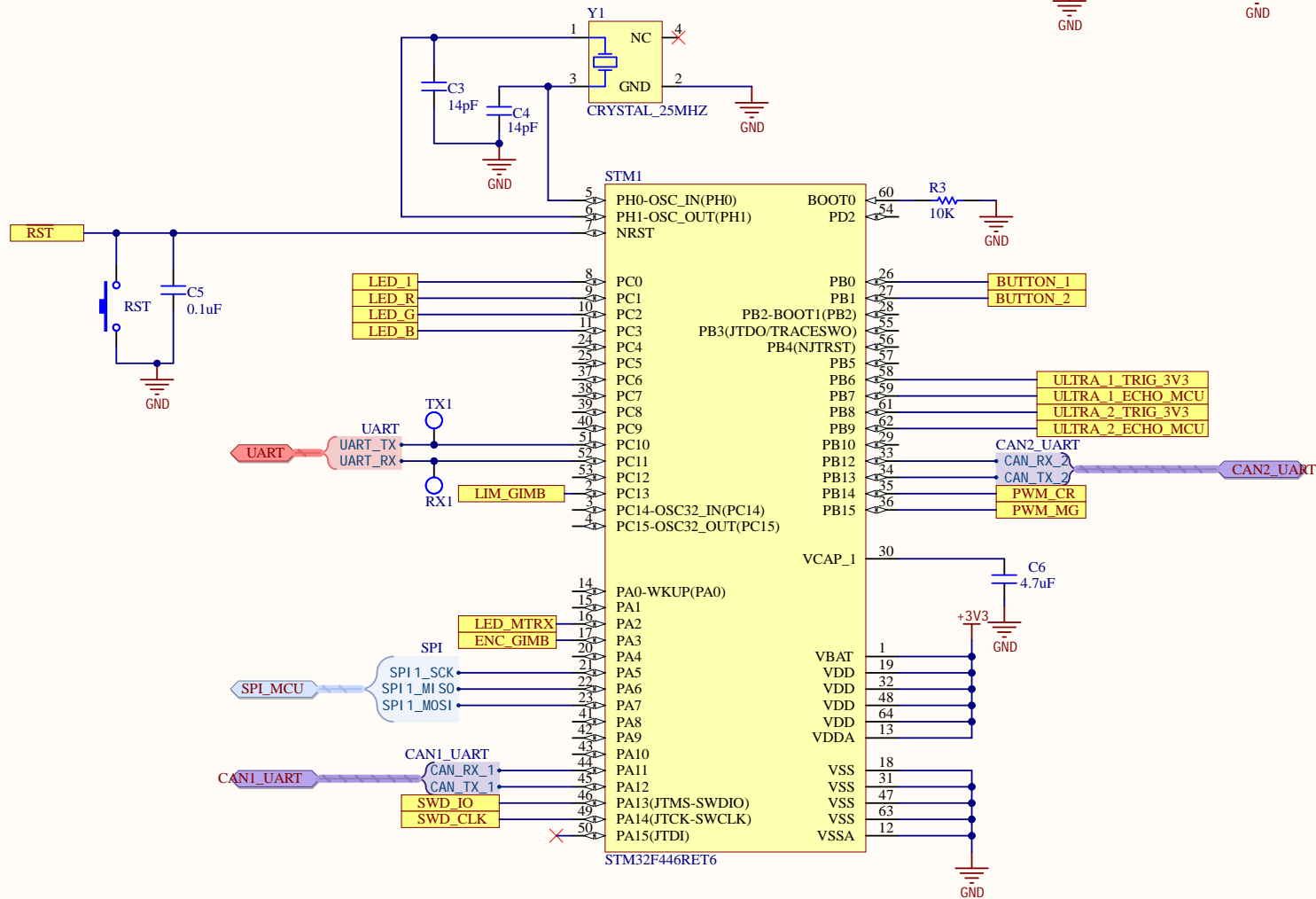


Test Points

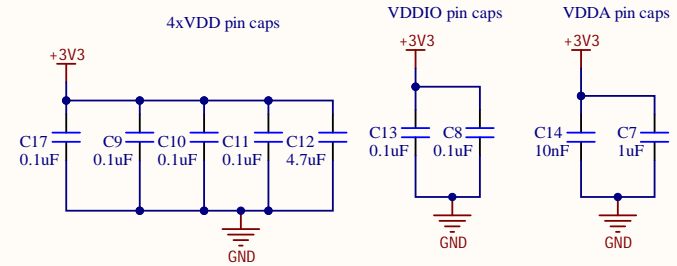
Extra Ground Testpoints

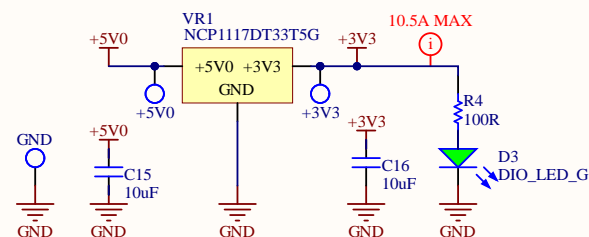


STM32F446RET6

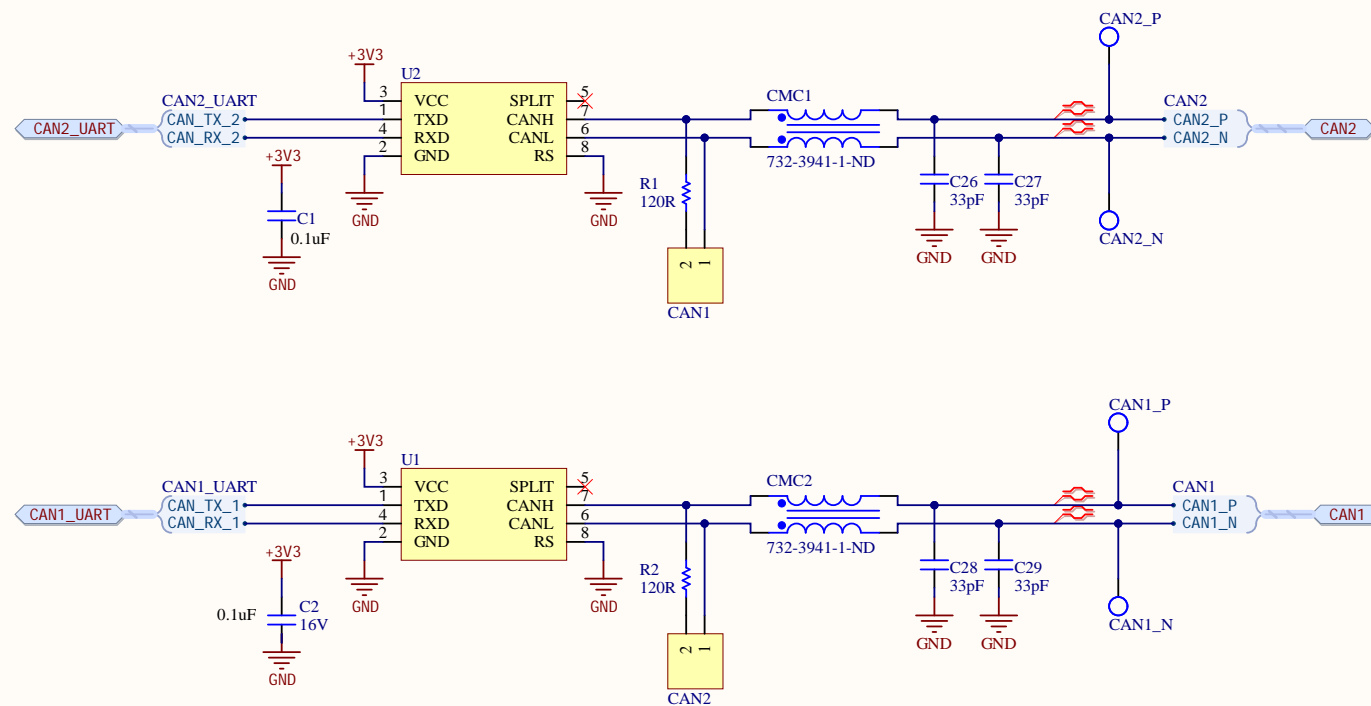



Decoupling Caps





CAN Transceivers



Title Gimbal CAN Schematic			
Size: Letter	Drawn By: Jing Hao Yao & Aidan Gratton	UW Robotics 200 University Avenue Waterloo Ontario Canada N2L 3G6	
Date: 2020-04-21	Sheet 2 of 5	File: C:\Users\gratt\Documents\University\Design Teams\UW Mars Rover\2020 Electrical Repo\MarsRover2020-PCB\	


The diagram illustrates the connection of the UART and SWD modules to the STM32F103C8T6 microcontroller. The UART module is connected to the UART_TX and UART_RX pins of the DEBUG header. The SWD module is connected to the SWD_IO, SWD_CLK, and RST pins of the DEBUG header. The RST pin is connected to the +3V3 supply. The SWD_CLK pin is connected to the GND.

The diagram shows a 24-pin connector J4 with the following connections:

- Power and Ground:**
 - +3V3 to pin 2
 - +5V0 to pin 4
 - +5V0+5V0 to pin 6
 - +5V0+5V0 to pin 8
 - GND to pin 24
 - GND to pin 0
- Resistors:**
 - R7 (10K) between +3V3 and LIM_GIMB
 - R5 (470R) between LED_MTRX_CON and pin 20
- Fuses:**
 - F4 (250mA) between +5V0+5V0 and pin 3
 - F5 (250mA) between +5V0+5V0 and pin 5
- Sensor Signals:**
 - ULTRA_1_ECHO_CON to pin 3
 - ULTRA_1_TRIG_5V to pin 5
 - ULTRA_2_ECHO_CON to pin 7
 - ULTRA_2_TRIG_5V to pin 9
 - SPI_CON to pin 11
 - SPI1_MISO to pin 13
 - SPI1_MOSI_CON to pin 15
 - SPI1_SCK_CON to pin 17
 - ENC_GIMB_CON to pin 19
 - Pin 21 is connected to the SPI bus
 - Pin 23 is connected to the SPI bus
 - Pin 24 is connected to the SPI bus

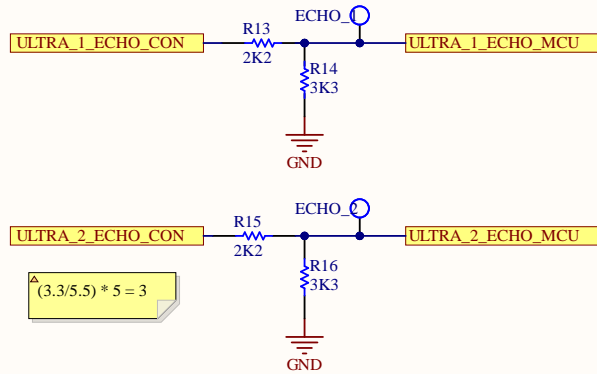
Servos

The diagram shows two 5V servos connected to a 5V pin header (J3). The brown wire of each servo is connected to GND. The red wire of each servo is connected to a +5V supply. The yellow wire of each servo is connected to a PWM signal. The PWM signals are generated by a microcontroller (represented by a yellow box) and connected to the PWM_MG and PWM_CR pins of the servo. The microcontroller is also connected to the GND pin of the servo.

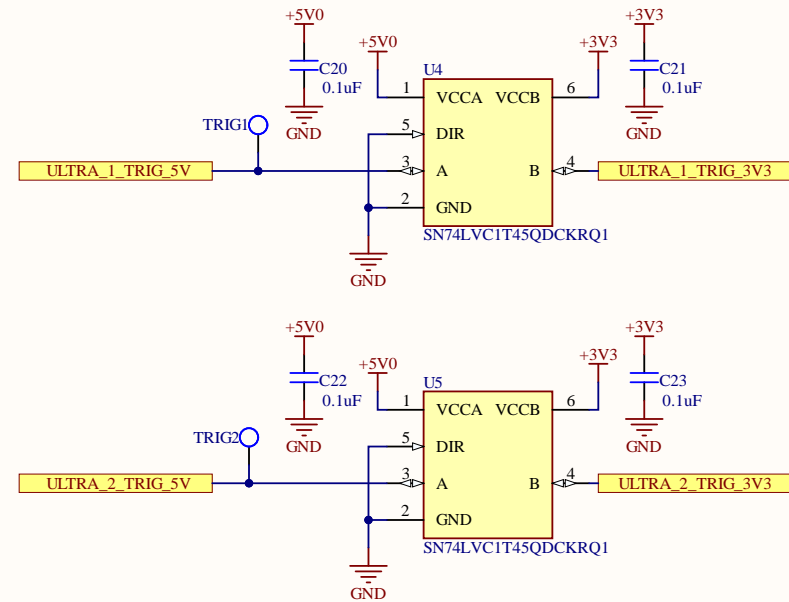
Title Gimbal - Connectors		
Size: Letter	Drawn By: Aidan Gratton	
Date: 2020-04-21	Sheet 8 of 5	

File: C:\Users\gratt\Documents\University\Design Teams\UW Mars Rover\2020 Electrical Repo\MarsRover2020-PCB\

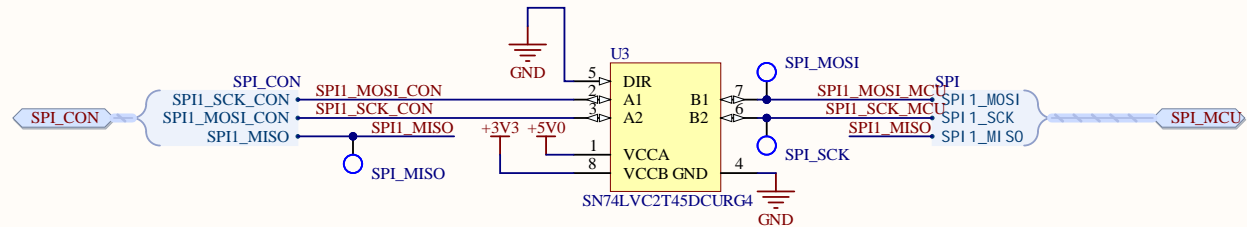
Ultrasonic Voltage Dividers



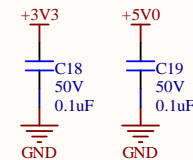
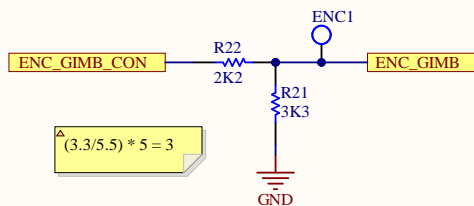
Ultrasonic Level Shifters



SPI Encoder Level Shifter



PWM Encoder

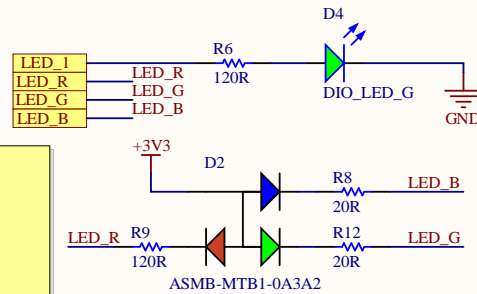


Test LEDs

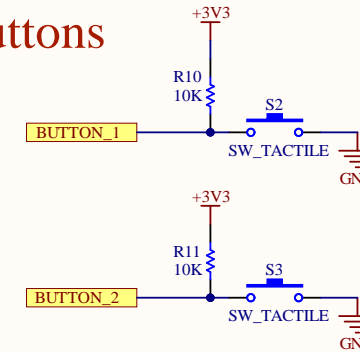
Current Calculations

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

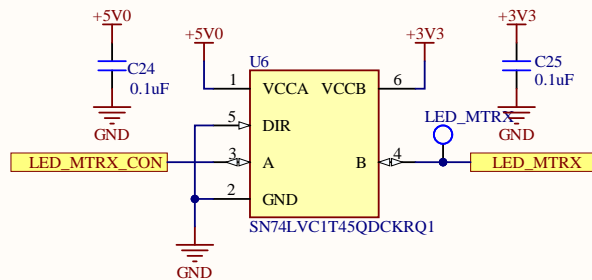
RGB LED voltage drops:
 - Red: 2.1V: $I = (3.3 - 2.1V) / 120 = 10mA$
 - Blue: 3.1V: $I = (3.3 - 3.1V) / 20 = 10mA$
 - Green: 3.1V: $I = (3.3 - 3.1V) / 20 = 10mA$



Test Buttons



LED Matrix Level Shifter



MOUNTING_HOLES

