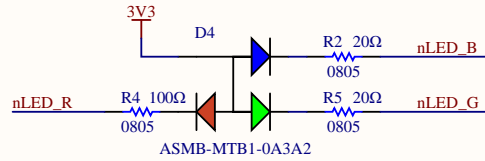


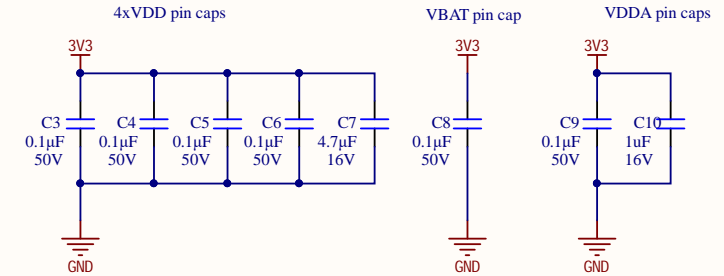
## Test LEDs



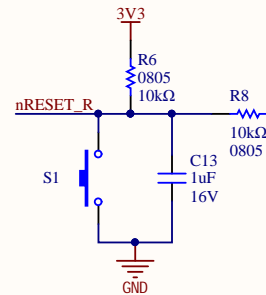
### Current Calculations

RGB LED voltage drops:  
 - Red: 2.1V:  $I = (3.3 - 2.1V) / 100 = 12mA$   
 - Blue: 3.1V:  $I = (3.3 - 3.1V) / 20 = 10mA$   
 - Green: 3.1V:  $I = (3.3 - 3.1V) / 20 = 10mA$

## Decoupling Caps



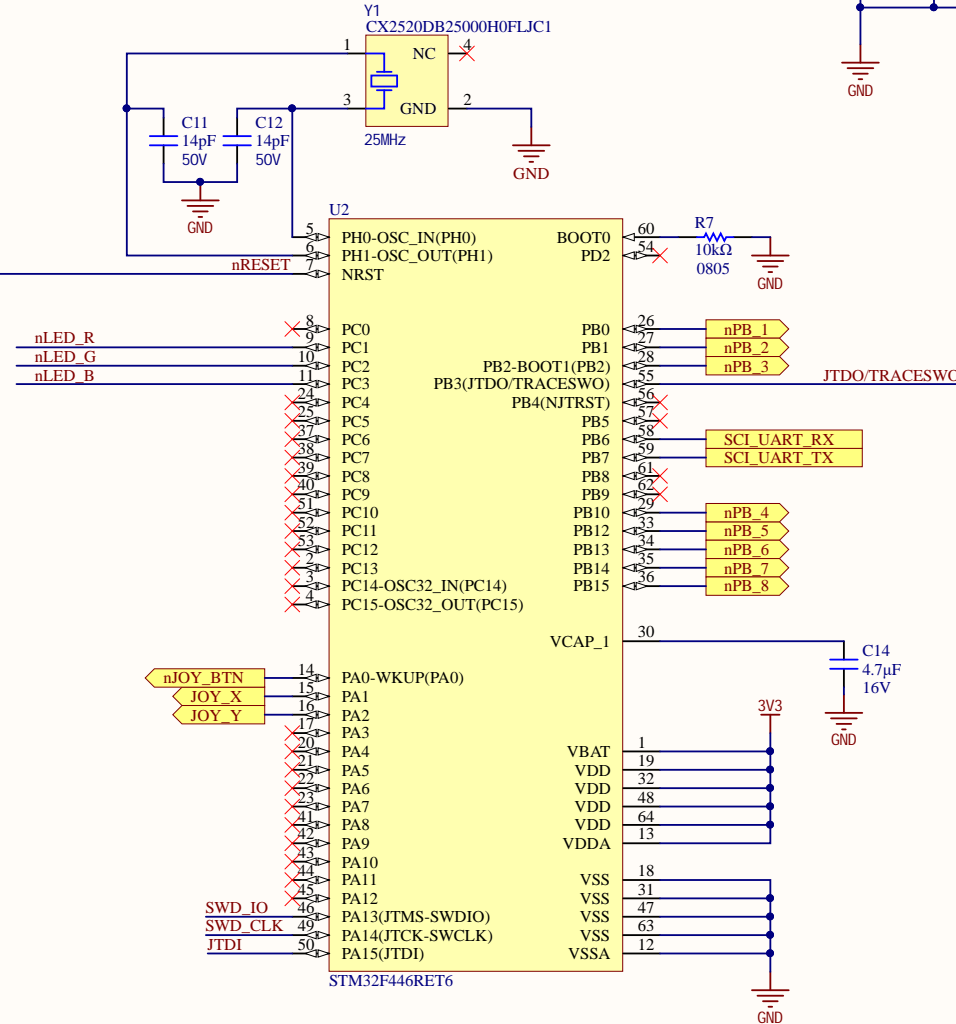
## Reset Button



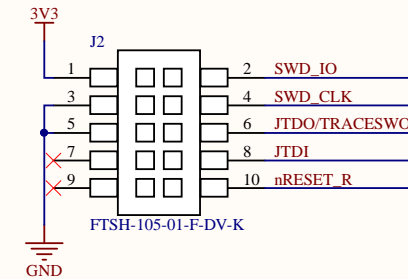
### For Debounce Circuit:

$T = RC \rightarrow C = T/R$   
 $C = 10ms / 10k\Omega = 1\mu F$

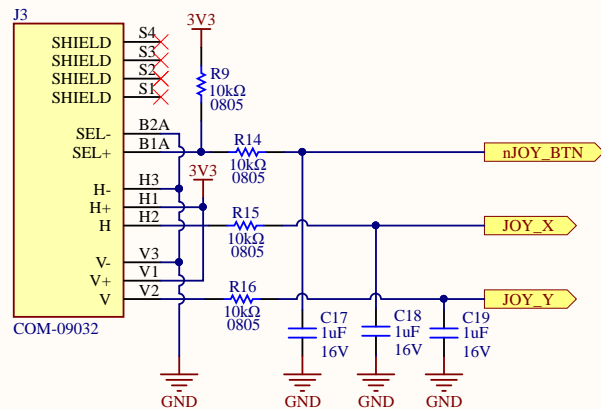
## STM32F446RET6



## Debug/Programming



## 2-Axis Joysticks



### Controls

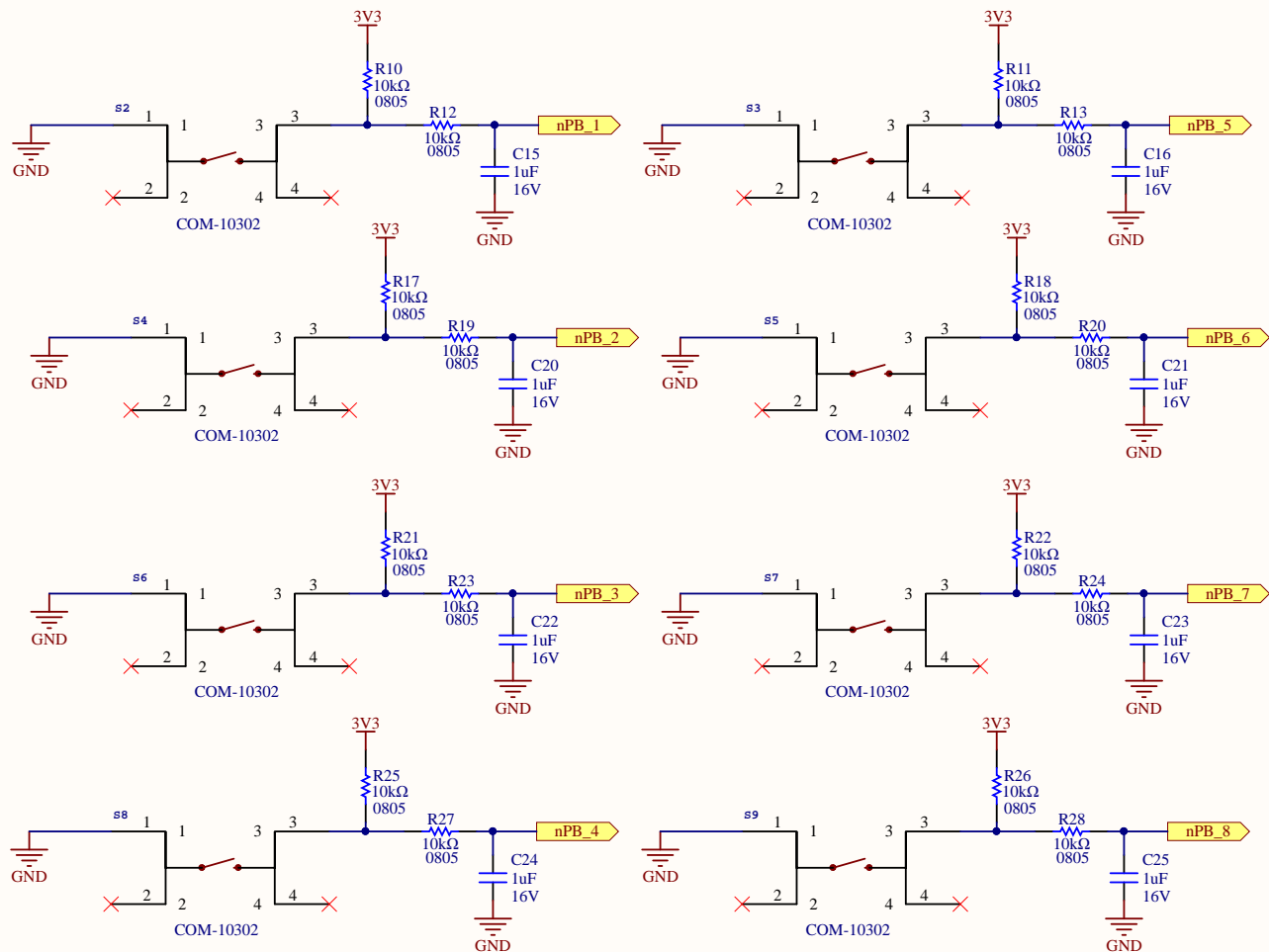
#### Joystick:

- Up/Down is for elevator, Left/Right is for opening/closing shovel
- Button should be used to choose between L/R and U/D, since the science mechanism may be damaged if too many things are moving at once

#### Buttons:

- 1/2: Move left/right 1 index
- 3/4: Move to leftmost/rightmost index
- 5/6: Open/close lid
- 7: Pre-programmed mixing sequence
- 8: Extra, in case additional functionality is requested later

## Pushbuttons



### For Debounce Circuits:

$$T=RC \rightarrow C= T/R$$

$$C= 10ms/10kOhms= 1\mu F$$

Title SH2-CONTROLS

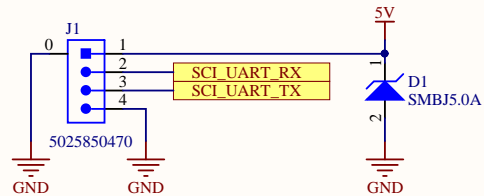
Size: Letter Drawn By: Oinyang Bao

Date: 2020-11-10

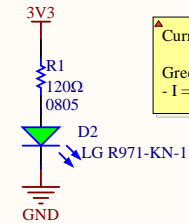
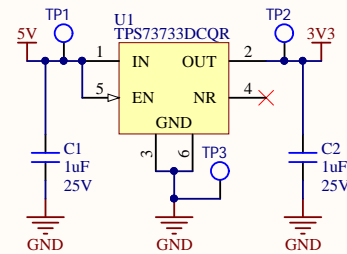
Sheet2 of 4

File: C:\Users\pkmn\Desktop\Document Archi ve\Other\Electrical Git Repo\MarsRover2020-PCB\Projects\Robot Controler\

## Power In



## 5V to 3V3 LDO



**Current Calculations**  
 Green LED voltage drop: 2.2V  
 -  $I = (3.3 - 2.2V) / 120 = 9mA$