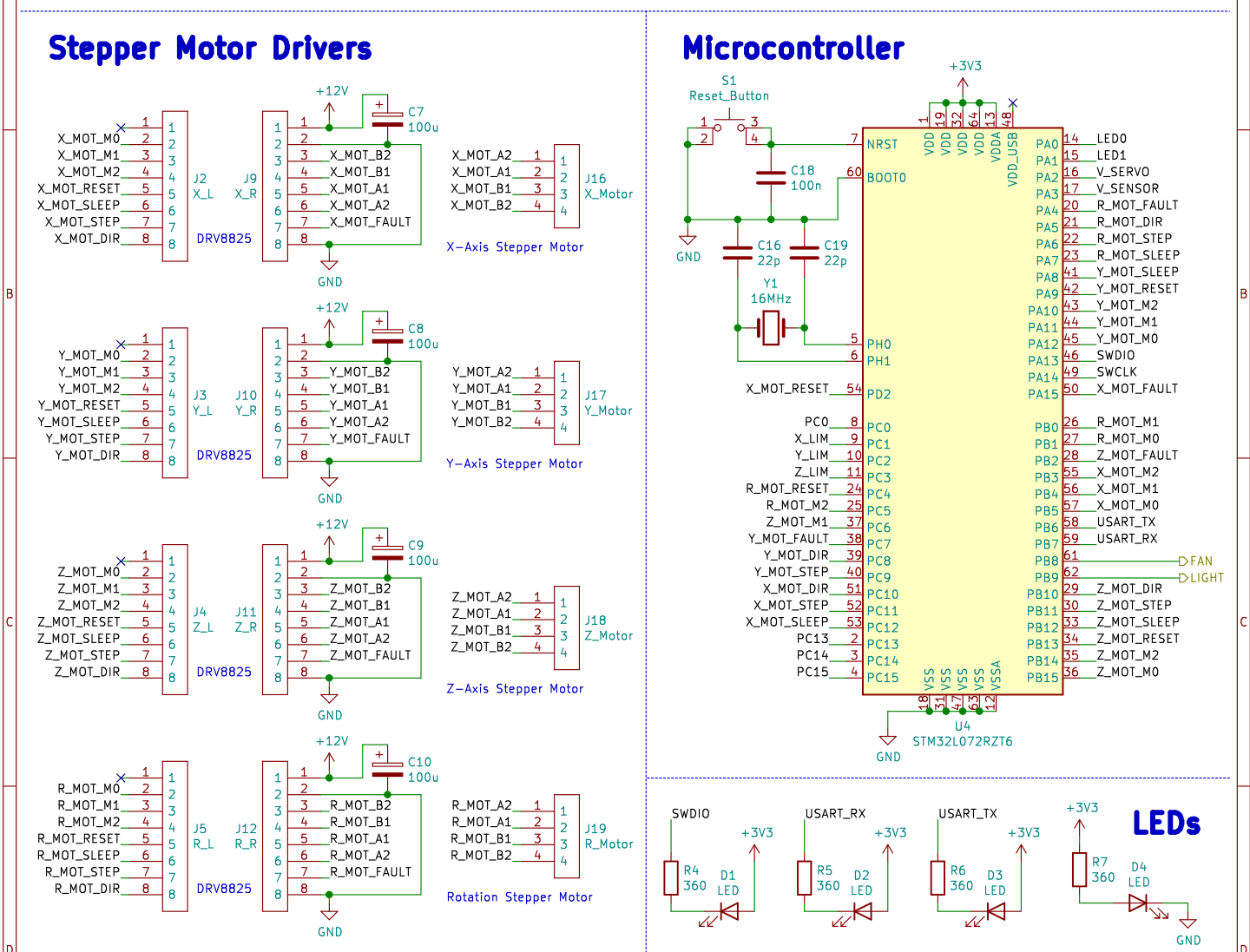


Power Lines

The diagram illustrates the power distribution for three microcontroller units (U1, U2, U3) connected to a common power supply (J1). The power supply provides +12V and GND. The regulators are configured as follows:

- U1 (NCP1117DTS3G):** A 3.3V voltage regulator. Its input (IN) is connected to +12V, and its output (OUT) provides +3V3. It includes an adjustment pin (ADJ/GND) connected to GND and an output capacitor (C4, 10uF).
- U2 (NCP1117DTS0G):** A 5V voltage regulator. Its input (IN) is connected to +12V, and its output (OUT) provides +5V. It includes an adjustment pin (ADJ/GND) connected to GND and an output capacitor (C14, 10uF).
- U3 (NCP1117DTS0G):** A 5V voltage regulator. Its input (IN) is connected to +12V, and its output (OUT) provides +5V. It includes an adjustment pin (ADJ/GND) connected to GND and an output capacitor (C22, 10uF).

All regulators are connected to a common ground (GND). The output capacitors (C4, C12, C14, C20, C22, C24) are connected to the output of each regulator and to a common ground.



Microcontroller

Microcontroller

STM32L072RZT6

Pin List:

- 14 LED0
- 15 LED1
- 16 V_SERVO
- 17 V_SENSOR
- 20 R_MOT_FAULT
- 21 R_MOT_DIR
- 22 R_MOT_STEP
- 23 R_MOT_SLEEP
- 41 Y_MOT_SLEEP
- 42 Y_MOT_RESET
- 43 Y_MOT_M2
- 44 Y_MOT_M1
- 45 Y_MOT_M0
- 46 SWDIO
- 49 SWCLK
- 50 X_MOT_FAULT
- 26 R_MOT_M1
- 27 R_MOT_M0
- 28 Z_MOT_FAULT
- 55 X_MOT_M2
- 56 X_MOT_M1
- 57 X_MOT_M0
- 58 USART_TX
- 59 USART_RX
- 29 Z_MOT_DIR
- 30 Z_MOT_STEP
- 33 Z_MOT_SLEEP
- 34 Z_MOT_RESET
- 35 Z_MOT_M2
- 36 Z_MOT_M0

Components:

- S1: Reset_Button
- C18: 100nF
- C16: 22pF
- C19: 22pF
- Y1: 16MHz
- U4: STM32L072RZT6

Connections:

- NRST (7) to S1 through C18 to GND
- PH0 (5) and PH1 (6) to Y1 through C16 and C19 to GND
- VDD (19) and VSS (18) to +3V3
- VDD_USB (13) and VSSA (12) to +3V3
- LED0 (14) and LED1 (15) to +3V3
- V_SERVO (16) and V_SENSOR (17) to +3V3
- R_MOT_FAULT (20) to +3V3
- R_MOT_DIR (21) to +3V3
- R_MOT_STEP (22) to +3V3
- R_MOT_SLEEP (23) to +3V3
- Y_MOT_SLEEP (41) to +3V3
- Y_MOT_RESET (42) to +3V3
- Y_MOT_M2 (43) to +3V3
- Y_MOT_M1 (44) to +3V3
- Y_MOT_M0 (45) to +3V3
- SWDIO (46) to +3V3
- SWCLK (49) to +3V3
- X_MOT_FAULT (50) to +3V3
- R_MOT_M1 (26) to +3V3
- R_MOT_M0 (27) to +3V3
- Z_MOT_FAULT (28) to +3V3
- X_MOT_M2 (55) to +3V3
- X_MOT_M1 (56) to +3V3
- X_MOT_M0 (57) to +3V3
- USART_TX (58) to +3V3
- USART_RX (59) to +3V3
- Z_MOT_DIR (29) to +3V3
- Z_MOT_STEP (30) to +3V3
- Z_MOT_SLEEP (33) to +3V3
- Z_MOT_RESET (34) to +3V3
- Z_MOT_M2 (35) to +3V3
- Z_MOT_M0 (36) to +3V3

SWDIO

+3V3

R4 360

D1 LED

USART_RX

+3V3

R5 360

D2 LED

USART_TX

+3V3

R6 360

D3 LED

+3V3

R7 360

D4 LED

GND

LEDs

Limit Switches

The image shows three identical circuit diagrams for limit switches, labeled X_LIM, Y_LIM, and Z_LIM. Each circuit consists of a 4.7k resistor (R1, R2, R3) connected to a +3V3 supply, a 100nF capacitor (C1, C2, C3) connected to ground, and a switch (J6, J7, J8) connected to the other end of the resistor. The switch has two terminals, 1 and 2. Terminal 1 is connected to the resistor, and terminal 2 is connected to ground. The switch is labeled X_Limit, Y_Limit, and Z_Limit respectively.

Decoupling Capacitors

The diagram illustrates a parallel arrangement of five decoupling capacitors. A horizontal line at the top represents the +3V3 supply, and a horizontal line at the bottom represents the GND. Five capacitors, labeled C6, C11, C13, C15, and C17, are connected in parallel between these two lines. Each capacitor is represented by two parallel vertical lines, with its label and value (100n) placed to its right. The capacitors are connected to the supply and ground lines at regular intervals along the horizontal span.

Miscellaneous Connectors

J15 Servo_Motor

Pin 1: +5V
Pin 2: V_SERVO
Pin 3: GND

J20 Status

Pin 1: LED0
Pin 2: LED1

J21 GPIO

Pin 1: +3V3
Pin 2: PC0
Pin 3: PC13
Pin 4: PC14
Pin 5: PC15
Pin 6: GND

Author: Christopher Conroy	
Student No: 18072918	
Component: Robotic Control	
Description: Circuit to provide control	
University of Pretoria	
Sheet: /Robotic_Component/ File: Robotic_Component.sch	
Title: Robotic Subsystem C	
Size: A4	Date: 2021-09-
KiCad E.D.A. kicad (5.1.10)-1	

USB to Serial Converter

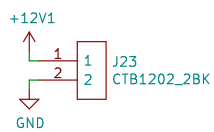
Author: Christopher Conroy
 Student No: 18072918
 Component: Robotic Control
 Description: Circuit to provide control and provide an interface to the robotic subsystem
University of Pretoria

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 File: Robotic_Component.sch

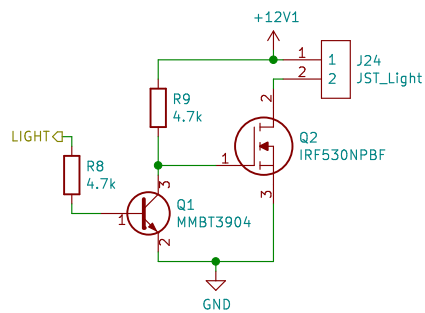
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Size: A4	Date: 2021-09-19	Rev: v01
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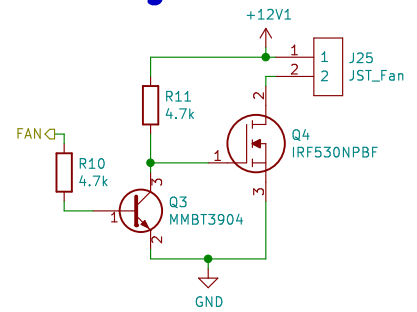
Power Supply Connection



LED Strip Driver



Cooling Fan Driver



Author: Christopher Conroy
 Student No: 18072918
 Component: Supplementary
 Description: Circuit to drive fan and LED strip
University of Pretoria

Sheet: /Supplementary_Component/
 File: Supplementary_Component.sch

Title: Robotic Subsystem Controller

Size: A4
 Date: 2021-09-19
 KiCad E.D.A. kicad (5.1.10)-1

Rev: v01
 Id: 3/3