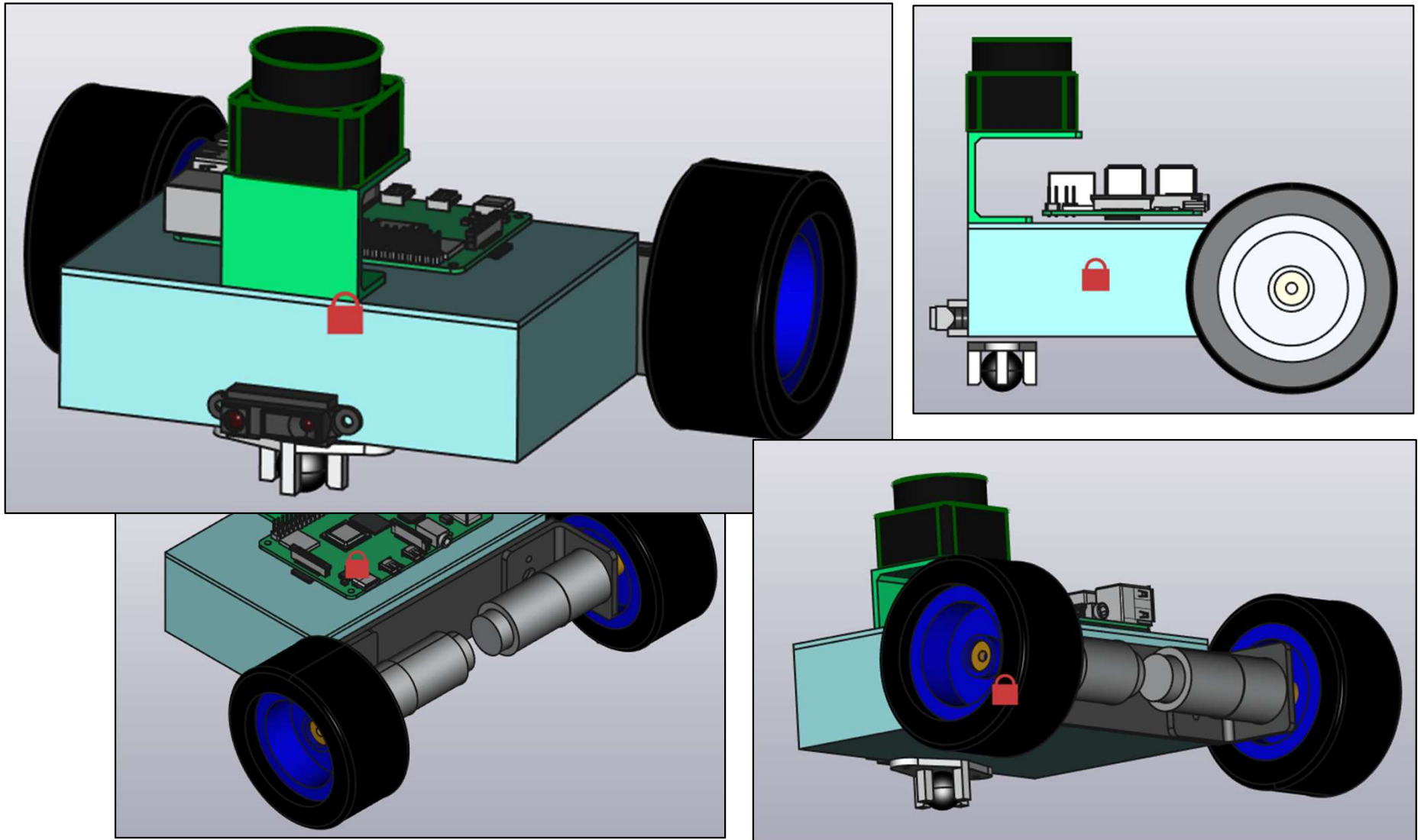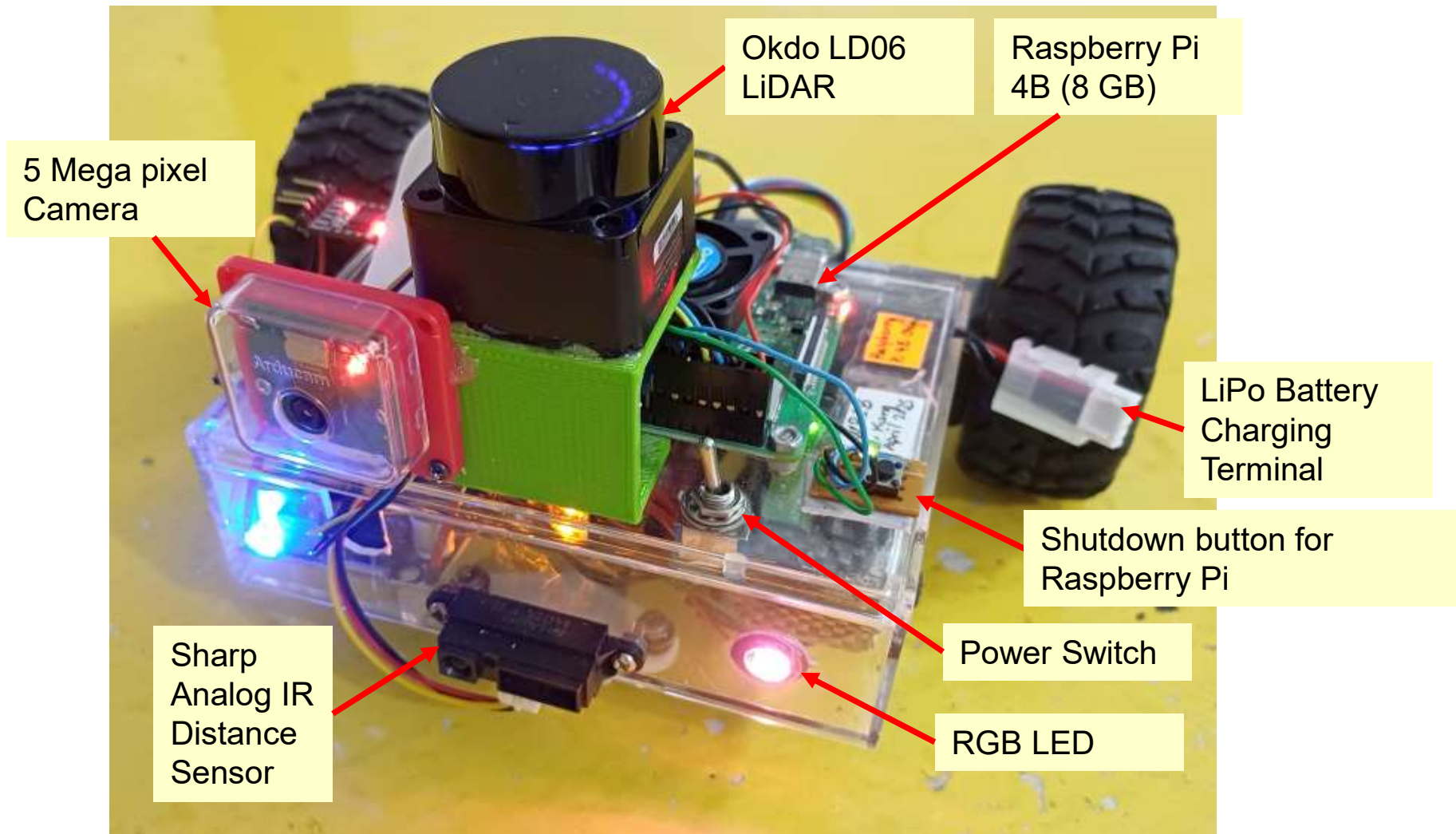# CAD Design Using FreeCAD V1.0.0

Wheel Robot Platform – WR1B

Okdo LD06 LiDAR

Raspberry Pi 4B (8 GB)

5 Mega pixel Camera

LiPo Battery Charging Terminal

Shutdown button for Raspberry Pi

Power Switch

Sharp Analog IR Distance Sensor

RGB LED
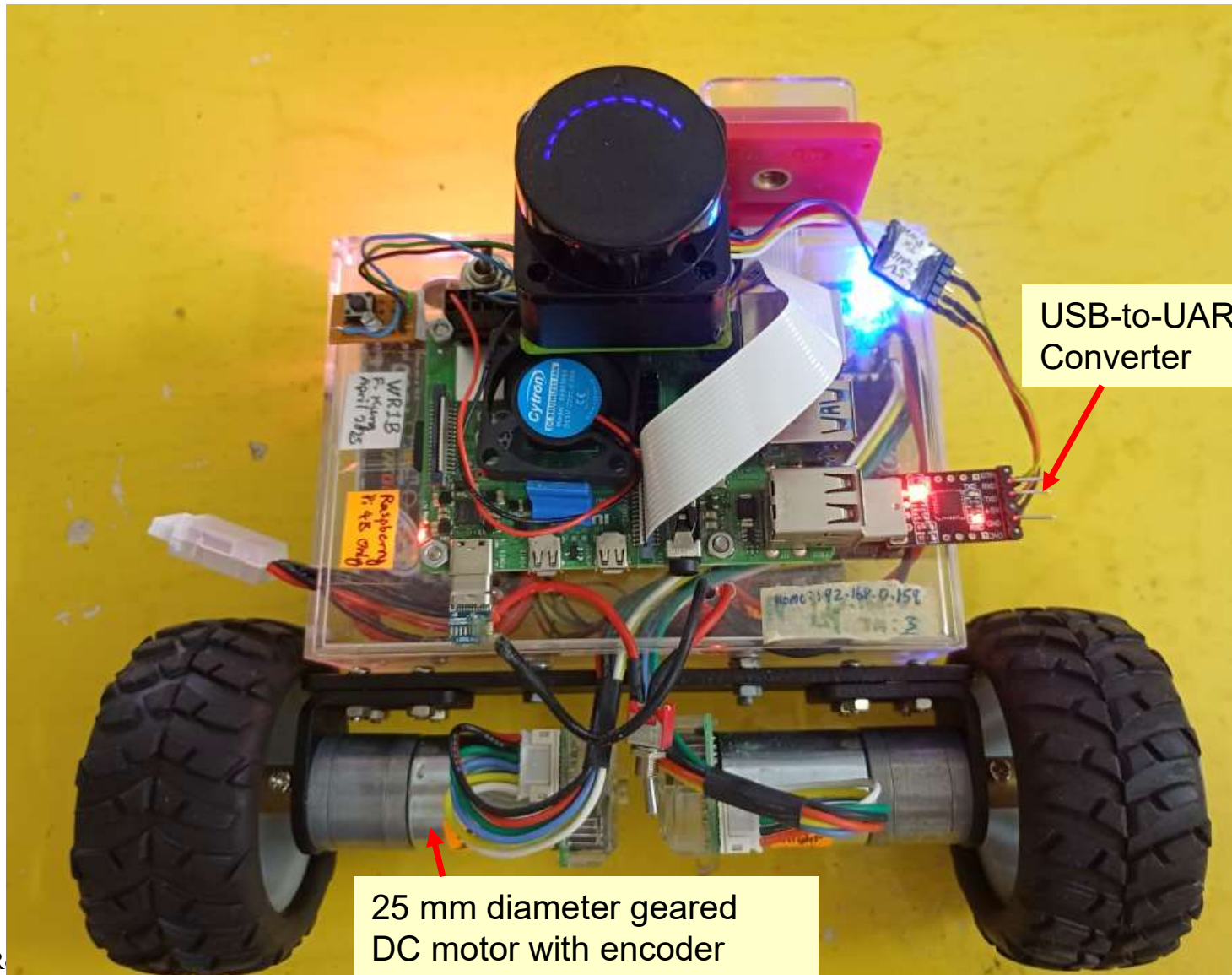
USB-to-UART Converter

25 mm diameter geared DC motor with encoder

11.1V 1500 mAH LiPo Battery

5V 3A Output DC-DC Buck Converter

Custom Robot Controller V3.81

Mini Speaker

Wheel Robo

Schematic of Robot Controller (V3.81) – MCU Core

Project: **Mini Robot Core V3.81**
Used for: **dsPIC33CK256MP506**
dsPIC33CK512MP606

Schematic Rev. V0.96 | Sheet of 1
Date: **21 March 2025** | Engineer: **FABIAN KUNG**
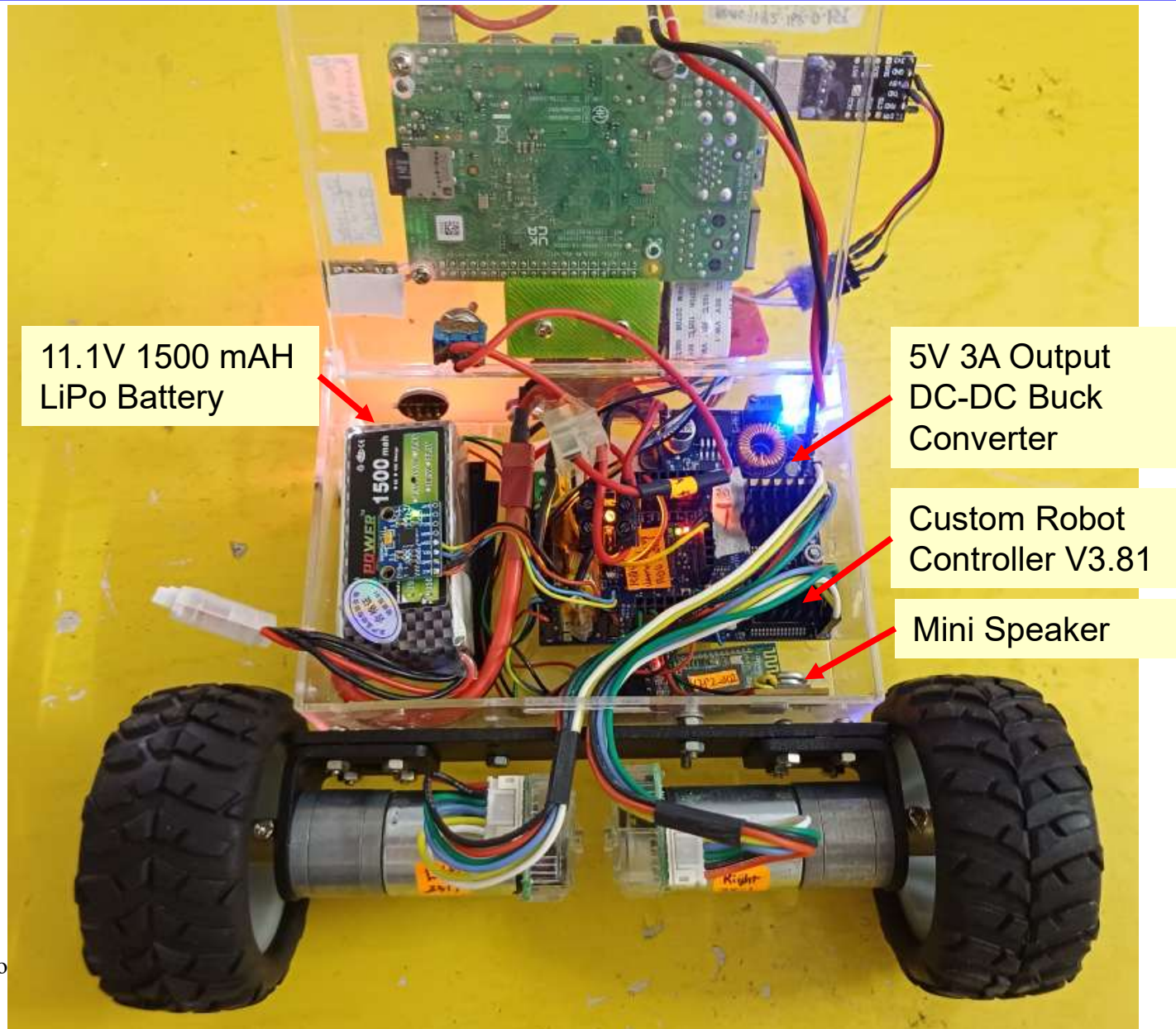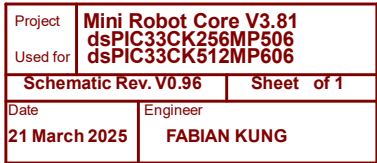
Schematic of Robot Controller (V3.81) – I/O Ports Connections

C23 and C24 to be placed near JM1 and JM2

Project	Mini Robot Core V3.81 dsPIC33CK256MP506
Used for	dsPIC33CK512MP606

Schematic Rev. V0.96		Sheet of 1
Date	Engineer	
21 March 2025	FABIAN KUNG	

Schematic of Robot Controller (V3.81) – Dual DC Motors Driver

Schematic diagram showing dual DC motor driver circuit.

Key components and labels:

- C21 0.1uF
- C22 0.1uF
- VCC_12V
- VCC_5V
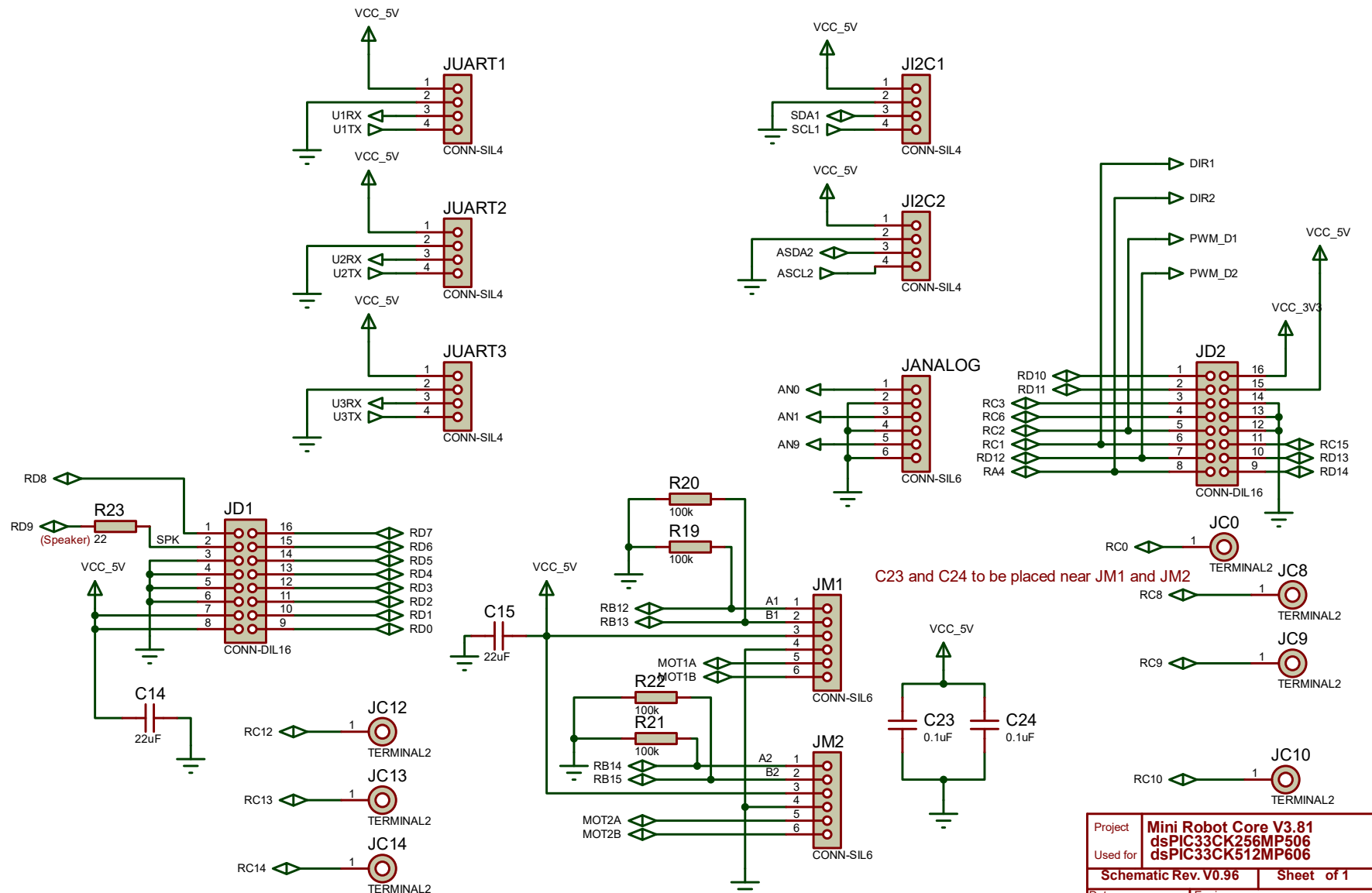- C19 100uF 35-50V, CAPACITOR ALU ELECTROLYTIC
- C20 100uF 35-50V, CAPACITOR ALU ELECTROLYTIC
- R7 10k, R10 10k
- R11 10k, R12 10k
- R13 330, R14 330
- DIR1, DIR2

U4 — VNH3SP30-E
- 1 OUTA_1
- 2 NC_1
- 3 VCC_1
- 4 NC_2
- 5 INA
- 6 ENA/DIAGA
- 7 NC_3
- 8 PWM
- 9 NC_4
- 10 ENB/DIAGB
- 11 INB
- 12 NC_5
- 13 VCC_2
- 14 NC_6
- 15 OUTB_1
- 16 OUTB_2
- 17 NC_7
- 18 GNDB_1
- 19 GNDB_2
- 20 GNDB_3
- 21 OUTB_3
- 22 NC_8
- 23 VCC_3
- 24 NC_9
- 25 OUTA_2
- 26 GNDA_1
- 27 GNDA_2
- 28 GNDA_3
- 29 NC_10
- 30 OUTA_3
- 31 VCC_(EP)
- 32 OUTB_(EP)
- 33 OUTA_(EP)

U5 — VNH3SP30-E
- 18 GNDB_1
- 19 GNDB_2
- 20 GNDB_3
- 21 OUTB_3
- 22 NC_8
- 23 VCC_3
- 24 NC_9
- 25 OUTA_2
- 26 GNDA_1
- 27 GNDA_2
- 28 GNDA_3
- 29 NC_10
- 30 OUTA_3
- 31 VCC_(EP)
- 32 OUTB_(EP)
- 33 OUTA_(EP)
- 1 OUTA_1
- 2 NC_1
- 3 VCC_1
- 4 NC_2
- 5 INA
- 6 ENA/DIAGA
- 7 NC_3
- 8 PWM
- 9 NC_4
- 10 ENB/DIAGB
- 11 INB
- 12 NC_5
- 13 VCC_2
- 14 NC_6
- 15 OUTB_1
- 16 OUTB_2
- 17 NC_7

Signals: ENA1, INA1, PWM1, ENB1, INB1, ENA2, INA2, PWM2, ENB2, INB2

Inverters (74HC04, VCC=VCC_5V):
- U6:A, U6:B, U6:C, U6:D, U6:E, U6:F

- PWM_D1
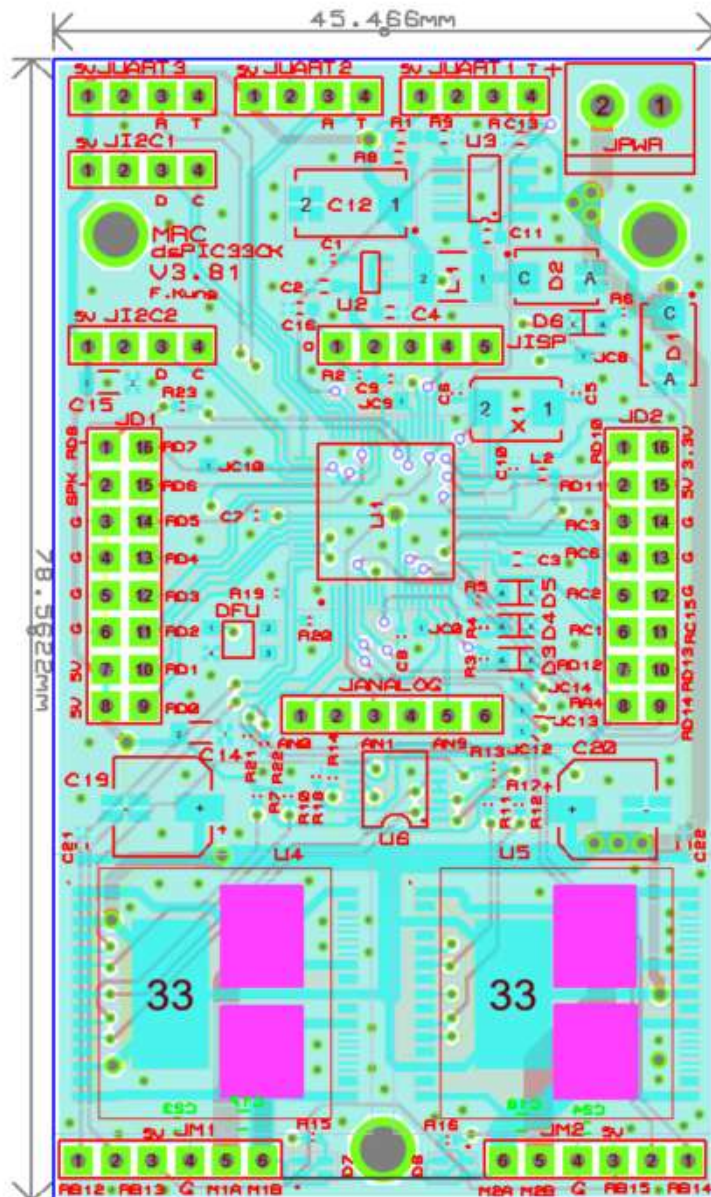- PWM_D2
- R17 100k, R18 100k
- R15 4k7, R16 4k7
- C17 0.1uF 100V, C18 0.1uF 100V
- D7 Red/Green KPHBM2012SURKCGKC
- D8 Green/Red KPHBM2012SURKCGKC
- MOT1B, MOT1A, MOT2A, MOT2B

Optional (not need if internal weak pull-down enabled)

Project	Mini Robot Core V3.81
Used for	dsPIC33CK256MP506 dsPIC33CK512MP606
Schematic Rev. V0.96	Sheet of 1
Date 21 March 2025	Engineer FABIAN KUNG

PCB Artwork of Robot Controller (V3.81)

Wiring Diagram

Sharp Analog IR Distance Sensor (4-30 cm)

WS2812 RGB LED

Mini Speaker

MPU6050 Inertia Measurement Sensor

HC-05 Bluetooth Radio Module

Right Motor & Encoder

Left Motor & Encoder

To UART Port of Raspberry Pi or USB-to-UART Converter

GND
TX
RX

To 7.4V or 11.1V LiPo Battery Pack

7A Fast-Blow Fuse

DC-to-dc Buck Converter

5V 3A Supply to Raspberry Pi

Wheel Robot Platform

© 2025 by Fabian Kung Wai Lee

9