Micromouse - Kit Overview

MTRN3100 - UNSW School of Mechanical and Manufacturing Engineering

1 Introduction

This kit provides all the necessary components to be competitive for the Micromouse challenge. This document provides an overview of the components within the kit as well as the PCB wiring.

1.1 IMPORTANT NOTE

DO NOT SOLDER THE CORE COMPONENTS DIRECTLY TO THE PCB. YOU MUST USE THE PROVIDED HEADERS. IF YOU SOLDER COMPONENTS DIRECTLY TO THE PCB AND ENCOUNTER A PROBLEM WE WILL NOT SUPPLY REPLACEMENT PARTS.

2 Component Overview

2.1 Core components

These components are supplied initially, Replacements will not be provided unless you can prove the component was damaged when you received it.

COMPONENT	DESCRIPTION	MAUFACTURER	PART No.
HARDWARE	USB-A to Micro USB cable		
XA1	Arduino Nano	Arduino	A000005
XA2	IMU	Core Electronics	018-MPU-6050
XA3	Dual Motor Driver Carrier, DRV8835 (for Motor-Driver)	Pololu	2135
HARDWARE	2x Micro Metal Gearmotor 100:1 w/Encoder	DF Robot	FIT0483
HARDWARE	Pololu Wheel 32*7mm Pair - White	Pololu	1088
XA4	OLED screen, White, 64x128 pixels	Core Electronics	CE09493
A2, A3 & A4	TOF Distance Sensor (Lidar)	Pololu	2489
HARDWARE	Li-Ion battery holder - 2 Cell		
HARDWARE	2x Li-Ion battery		
HARDWARE	Micromouse PCB		

Figure 1: Bill of Materials for core components.

2.2 Trolley components

These components can be found in a trolley within the mechatronics lab. Please only take the required amount. If you damage one of these components you may replace it. If your team decides to make your own custom PCB you are free and encouraged to take these components such that you do not solder a sensor directly to your PCB.

COMPONENT	DESCRIPTION	MAUFACTURER	PART No.
D1	Diode, Schottky, 30V, 5A, 480mV (for Pwr)	Vishay	SB530-E3/54
D2	LED, 5mm, Red, Round (for Batt Pwr)		
D3	LED, 5mm, Green, Round (for Pwr On)		
F1	Fuse Holder - PCB Mount for MINI, Horizontal	Littelfuse	01530007Z
FUSE	Fuse, MINI, 4A	Littelfuse	0297004.WXNV
HARDWARE	Standoff - M3 x 11mm, F-F (for IMU)	Wurth Elektronik	970110365
HARDWARE	M3x6 SEMS Screw (for IMU)	Hobson Engineering	23P36FS
HARDWARE	Standoff - M2 x 12mm, F-F (for OLED)	Essentra Components	HTSN-M2-12-5-1
HARDWARE	M2x6 PH Screw (for OLED)	Hobson Engineering	21PS26
HARDWARE	M2 Spring Washer (for OLED)	Brighton Best	71PS2
J1	DC Socket, PCB Mount, Right Angle, 5A, 12VDC	RS PRO	8051699
J2, J6 & J7	Socket Head, Single Row, 2 way (for Spare AIO, 5V & 3.3V)	Wurth Elektronik	61300211821
J4, J5 & J13	Socket Head, Single Row, 4 way (for I2C, GND & OLED)	Wurth Elektronik	61300411821
J3	Socket Head, Single Row, 6 way (for Spare DIO)	Wurth Elektronik	61300611821
J8, J9, J14-J16	Socket Head, Single Row, 7 way (for Motor-Driver & Lidars)	Wurth Elektronik	61300711821
J12	Socket Head, Single Row, 8 way (for IMU)	Wurth Elektronik	61300811821
J10 & J11	Socket Head, Single Row, 15 way (for Nano)	Amphenol	76341-315LF
R1 & R4	Resistor - 330 Ohm, 0.6W, 1%, TC50 (for Batt Pwr LED)		
R2	Resistor - 2K2, 250mW, 1%, 50ppm (for Batt Mon R5)		
R3	Resistor - 3K3, 250mW, 1%, 50ppm (for Batt Mon R6)		
ST1 & ST2	Screw Terminals - 6 way	Buchanan	282834-6
SW1	Switch, SPDT, Right Angle (for Pwr)	E-Switch	100SP1T2B4M6QE

Figure 2: Bill of Materials for trolley components.

2.3 Batteries

Batteries will be charged in the mechatronics lab, Demonstrators are responsible for charging batteries. If you need new batteries ask a demonstrator and they will exchange them. Your team is only allowed 2 Li-Ion cells at a time.

3 Wiring information

Wiring information for the PCB has been supplied in the schematic attached to this document.

DRAWING PRODUCED BY: UNSW SYDNEY, ENGINEERING, MECHANICAL & MANUFACTURING ENGINEERING, MECHATRONICS
www.engineering.unsw.edu.au/mechanical-engineering

MOTOR 1

ST1

MOT+	1	MOT1B
ENC+	2	+5V
ENCA	3	MOT1ENCA
ENCB	4	MOT1ENCB
ENCGND	5	GND
MOT-	6	MOT1A

MOTOR 2

ST2

MOT+	1	MOT2B
ENC+	2	+5V
ENCA	3	MOT2ENCA
ENCB	4	MOT2ENCB
ENCGND	5	GND
MOT-	6	MOT2A

DRV8835
DUAL LOW VOLTAGE
H-BRIDGE

XA3
DRV8835

GND	1	GND	GND	14	GND
VCC	2	VCC	VIN	13	VIN
MOT2PWM	3	BEN	BOUT2	12	MOT2B
MOT2DIR	4	BPH	BOUT1	11	MOT2A
MOT1PWM	5	AEN	AOUT2	10	MOT1B
MOT1DIR	6	APH	AOUT1	9	MOT1A
+5V	7	MODE	VMM	8	

PLUGS INTO J8 PLUGS INTO J9

ARDUINO
NANO

XA1
ARD_NANO

D1	1	D1/TX	VIN	30	VIN
D0	2	D0/RX	GND	29	
	3	RESET	RESET	28	
GND	4	GND	+5V	27	+5V
MOT1ENCA	5	D2	A7	26	BATTMON
MOT2ENCA	6	D3	A6	25	A6
D4	7	D4	A5	24	SCL
D5	8	D5	A4	23	SDA
D6	9	D6	A3	22	A3
MOT1ENCB	10	D7	A2	21	TOF3GP0
MOT2ENCB	11	D8	A1	20	TOF2GP0
MOT2PWM	12	D9	A0	19	TOF1GP0
MOT2DIR	13	D10	AREF	18	
MOT1PWM	14	D11	+3V3	17	+3V3
MOT1DIR	15	D12	D13	16	D13

VCC

PLUGS INTO J10 PLUGS INTO J11

MPU6050

XA2
MPU6050

VCC	1	VCC
GND	2	GND
SCL	3	SCL
SDA	4	SDA
	5	XDA
	6	XCL
	7	ADO
	8	INT

PLUGS INTO J12

VL6180X
TIME-OF-FLIGHT
DISTANCE SENSOR 1

A2
VL6180X

VCC	1	VDD
GND	2	VIN
SDA	3	GND
SCL	4	SDA
TOF1GP0	5	SCL
	6	GPIO0
	7	GPIO1

PLUGS INTO J14

VL6180X
TIME-OF-FLIGHT
DISTANCE SENSOR 2

A3
VL6180X

VCC	1	VDD
GND	2	VIN
SDA	3	GND
SCL	4	SDA
TOF2GP0	5	SCL
	6	GPIO0
	7	GPIO1

PLUGS INTO J15

VL6180X
TIME-OF-FLIGHT
DISTANCE SENSOR 3

A4
VL6180X

VCC	1	VDD
GND	2	VIN
SDA	3	GND
SCL	4	SDA
TOF3GP0	5	SCL
	6	GPIO0
	7	GPIO1

PLUGS INTO J16

SSD1306
WHITE I2C OLED
DISPLAY

VCC GND SCL SDA
1 2 3 4

PLUGS INTO J13

XA4
SSD1306

VCC GND SCL SDA

SPARE
ANALOGUE I/O
ACCESS

J2
2PIN

A3	1	
A6	2	

SPARE
DIGITAL I/O
ACCESS

J3
6PIN

D0	1	
D1	2	
D4	3	
D5	4	
D6	5	
D13	6	

I2C
ACCESS

J4
4PIN

VCC	1	
GND	2	
SCL	3	
SDA	4	

J1
DC JACK
1 VBATT
2
3

D1
SB530
A K

F1
4A

SW1
SPDT
3 2

VIN

R1
330

R2
2K2

BATTMON BATTERY
MONITOR

R3
3K3

R4
330

A
D2
RED
K
BATTERY
POWER

A
D3
GREEN
K
POWER
ON

ADDITIONAL
GND
ACCESS

J5
4PIN

GND	1	
GND	2	
GND	3	
GND	4	

ADDITIONAL
+5V
ACCESS

J6
2PIN

+5V	1	
+5V	2	

ADDITIONAL
+3V3
ACCESS

J7
2PIN

+3V3	1	
+3V3	2	

NOTES:
ALL DRAWING NUMBERS REFER TO MECHATRONICS DRAWINGS UNLESS SPECIFIED OTHERWISE.
EXAMPLE: ABCDX12C/3A REFERS TO MECHATRONICS DRAWING NUMBER ABCD, X = (Schematic, Wiring diagram, Cable assembly or PCB), SHEET 1, VERSION 2, REVISION C, SHEET REFERENCE COLUMN 3, ROW A.

UNSW SYDNEY 2024

PCB NO: MDIP12G

Title: MECHATRONICS MTRN3100 - MICRO DRONE INTERFACE SCHEMATIC		
Size: A3	Number: MDIS14	Revision: G
Date: 7-MAY 2024		Sheet 1 of 2
File: MDIS14G/1		Drawn By: S.KUHLE

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