P02 CONTROL / INTERFACE R01 — BENCH PROTOTYPE

#FLG1
5V_IN 1 5V_IN
PWR_FLAG

#FLG2
5V_FUSED 1 5V_FUSED
PWR_FLAG

#FLG3
MCU_5V 1 MCU_5V
PWR_FLAG

#FLG4
HEAD_5V 1 HEAD_5V
PWR_FLAG

#FLG5
GND 1 GND
PWR_FLAG

#FLG6
6V_IN 1 6V_IN
PWR_FLAG

#FLG7
VM 1 VM
PWR_FLAG

BODY MCU / USB behind rear cover

U1
AIN1 1 D0/GPIO1 | D7/GPIO44 8 ENC_L_B
AIN2 2 D1/GPIO2 | D8/GPIO7 9 ENC_R_A
BIN1 3 D2/GPIO3 | D9/GPIO8 10 ENC_R_B
BIN2 4 D3/GPIO4 | D10/GPIO9 11 SLEEP_CMD
SDA 5 D4/GPIO5 | 3V3_OUT 12 3V3
SCL 6 D5/GPIO6 | GND 13 GND
ENC_L_A 7 D6/GPIO43 | 5V/VBUS 14 MCU_5V
XIAO ESP32-S3

DRV8833 / CURRENT LIMIT ~0.61A PER MOTOR

U7
DRIVE_EN 1 nSLEEP | BIN2 10 BIN2
M_L_P 2 AOUT1 | VCP 11 VCP
SENSE_L 3 AISEN | VM 12 VM
M_L_N 4 AOUT2 | GND 13 GND
M_R_N 5 BOUT2 | VINT 14 VINT
SENSE_R 6 BISEN | AIN2 15 AIN2
M_R_P 7 BOUT1 | AIN1 16 AIN1
FAULT_N 8 nFAULT | EP 17 GND
BIN1 9 BIN1
DRV8833PWPR

J7
M_L_P 1 M+ M- 2 M_L_N
MOTOR J7

J8
M_R_P 1 M+ M- 2 M_R_N
MOTOR J8

TP1
GND 1 GND
GND

TP2
3V3 1 3V3
3V3

R7
SENSE_L 1 2 GND
0.33R 1% 0.5W

R8
SENSE_R 1 2 GND
0.33R 1% 0.5W

REGULATED 5V ONLY / independent diode feeds

CAMERA 5V ONLY / WIFI DATA

J1
5V_IN 1 5V GND 2 GND
5V LOGIC IN

F1
5V_IN 1 2 5V_FUSED
2A fuse

D1
MCU_5V 1 2 5V_FUSED
STPS2L40U

D2
HEAD_5V 1 2 5V_FUSED
STPS2L40U

J3
HEAD_5V 1 5V GND 2 GND
CAMERA POWER / WIFI DATA

J5
DRIVE_EN 1 DRIVE_EN GND 2 GND
STOP / SHORT DISABLES

STOP PULLS nSLEEP LOW / NOT POWER ISOLATION

C1
5V_FUSED 1 2 GND
10u/10V

C2
MCU_5V 1 2 GND
10u/10V

C3
HEAD_5V 1 2 GND
22u/10V

C4
3V3 1 2 GND
10u/10V

R9
SLEEP_CMD 1 2 DRIVE_EN
1k

R14
DRIVE_EN 1 2 GND
100k

J6
6V_IN 1 6V GND 2 GND
6V MOTOR IN

F2
6V_IN 1 2 VM
2A fuse

C14
VM 1 2 GND
10u/16V

C15
VCP 1 2 VM
10n/25V

C16
VINT 1 2 GND
2.2u/10V

C17
VM 1 2 GND
22u/16V

R15
FAULT_N 1 2 3V3
10k

TP6
FAULT_N 1 FAULT_N
FAULT_N

IMU: I2C 0x6A / POLLED

C12
3V3 1 2 GND
100n/16V

C13
3V3 1 2 GND
100n/16V

U6
GND 1 SA0 | VDD 8 3V3
GND 2 SDx_MODE1_TIE | INT2 9
GND 3 SCx | OCS_AUX 10
4 INT1 | SDO_AUX 11
3V3 5 VDDIO | CS 12 3V3
GND 6 GND | SCL 13 SCL
GND 7 GND | SDA 14 SDA
LSM6DSOXTR

J4
GND 1 GND | SDA 3 SDA
3V3 2 3V3 | SCL 4 SCL
I2C 3V3 ONLY

J9
3V3 1 3V3 A 3 ENC_L_A_PIN
GND 2 GND B 4 ENC_L_B_PIN
L ENCODER 3V3

J10
3V3 1 3V3 A 3 ENC_R_A_PIN
GND 2 GND B 4 ENC_R_B_PIN
R ENCODER 3V3

H1
M2 / NPTH
H2
M2 / NPTH
H3
M2 / NPTH
H4
M2 / NPTH

R3
SDA 1 2 3V3
4k7

R4
SCL 1 2 3V3
4k7

ENCODERS: 3V3 / SEPARATE FOUR-WIRE CABLES

R10
ENC_L_A_PIN 1 2 ENC_L_A
1k

R11
ENC_L_B_PIN 1 2 ENC_L_B
1k

R12
ENC_R_A_PIN 1 2 ENC_R_A
1k

R13
ENC_R_B_PIN 1 2 ENC_R_B
1k

R16
ENC_L_A_PIN 1 2 3V3
10k

R17
ENC_L_B_PIN 1 2 3V3
10k

R18
ENC_R_A_PIN 1 2 3V3
10k

R19
ENC_R_B_PIN 1 2 3V3
10k

Not fabrication released: motor stall, thermal and power tests pending

Zoo Robotics

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File: snail-control-r01.kicad_sch

Title: P02 Snail Control Interface

Size: A3	Date: 2026-11-10	**Rev: R01 DRAFT**
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