P3
3.0	1
3.1	2 Is_White7
3.2	3 M1_D2
3.3	4 V_Battery
3.4	5 M1_IN1
3.5	6 M1_IN2
3.6	7 M1_D1
3.7	8

P1
Is_White6	8 1.7
V_Bias_U	7 1.6
Is_White5	6 1.5
V_Buzz_1	5 1.4
	4 1.3
V_Bias_M	3 1.2
	2 1.1
	1 1.0

J13 M1
Ibat	1
Vbat	2 V_Bat
D1	3 M1_D1
IN2	4 M1_IN2
IN1	5 M1_IN1
SLW	6
INV	7
EN	8 M1_EN
D2	9 M1_D2
NC	10

M2 J18
M2_D1	1 D1
M2_IN2	2 IN2
M2_IN1	3 IN1
	4 SLW
	5 INV
M2_EN	6 EN
M2_D2	7 D2
	8 NC
M2_QA	9 ENCD
M2_QB	10 ENCD

P15
15.0	1 M1_EN
15.1	2 Is_White4
15.2	3 M1_QB
15.3	4 Is_White3
15.4	5
15.5	6 M1_QA
ENCD	7 M1_QB
ENCD	8 M1_QA

P12
M2_IN2	1 12.0
M2_D2	6 12.5
M2_EN	3 12.2
M2_QB	5 12.4
M2_IN1	4 12.3
M2_D1	2 12.1
	7 12.6
M2_QA	8 12.7

P0
0.0	1 DB0
0.1	2 DB1
0.2	3 DB2
0.3	4
0.4	5 DB3
0.5	6 Is_White1
0.6	7 V_Bias_L
0.7	8 Is_White2

P2
DB4	8 2.7
DB5	7 2.6
	6 2.5
	5 2.4
	4 2.3
Button	3 2.2
DB7	2 2.1
DB6	1 2.0

5V 5V
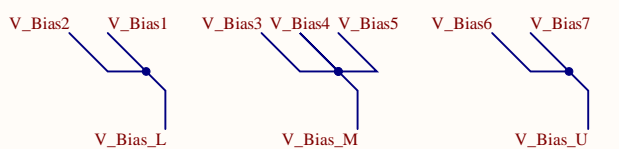| |
|---|
| 1 |
| 2 |
| 3 |
| 4 |
GND

5V 5V
1
2
3
4
GND

Connector Headers

User Button
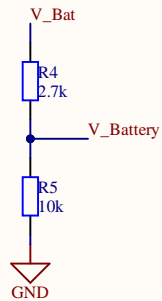
5V
S1
Button
R20
10k
GND

Battery Voltage Sensor
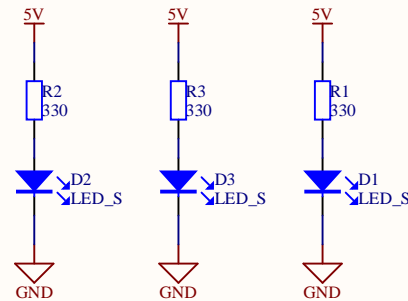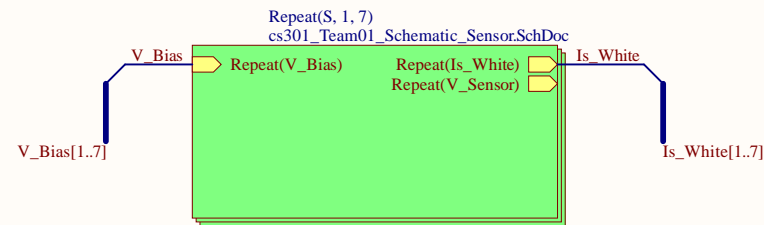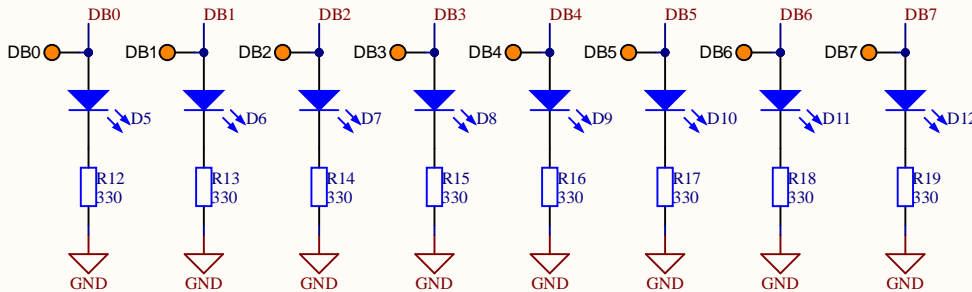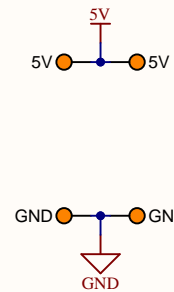
V_Bat
R4 2.7k
V_Battery
R5 10k
GND

Fiducial LEDs

5V R2 330 D2 LED_S GND
5V R3 330 D3 LED_S GND
5V R1 330 D1 LED_S GND

Buzzer

V_Buzz_1
B1
GND

Sensor Bias Voltages

V_Bias2 V_Bias1 V_Bias3 V_Bias4 V_Bias5 V_Bias6 V_Bias7
V_Bias_L V_Bias_M V_Bias_U

Sensor Circuitry

Repeat(S, 1, 7)
cs301_Team01_Schematic_Sensor.SchDoc
V_Bias — Repeat(V_Bias) Repeat(Is_White) — Is_White
Repeat(V_Sensor)
V_Bias[1..7] Is_White[1..7]

Debug Pins

DB0 DB1 DB2 DB3 DB4 DB5 DB6 DB7
DB0 DB1 DB2 DB3 DB4 DB5 DB6 DB7
D5 D6 D7 D8 D9 D10 D11 D12
R12 330 R13 330 R14 330 R15 330 R16 330 R17 330 R18 330 R19 330
GND GND GND GND GND GND GND GND

5V
5V 5V
GND GND
GND
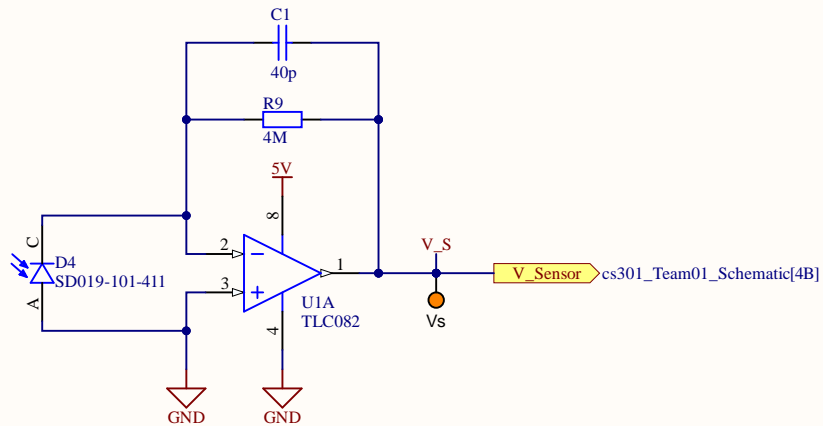
Transimpedance Amplifier

C1
40p

R9
4M

5V

8

D4
SD019-101-411

2

3

1

U1A
TLC082

4

V_S

V_Sensor   cs301_Team01_Schematic[4B]

Vs

GND   GND

Comparator

cs301_Team01_Schematic[3B]   V_Bias

5V

8

2

3

1

U2A
TLC082

4

V_Comp

Vc

V_Amp

GND

Decoupling Capacitors

5V   5V

C4   C5
100n   100n

GND   GND

High Pass Filter

V_S

C3
47nF

V_F

R11
42k

GND

Non-Inverting OpAmp

R4
100k

GND

R10
42k

6

5

7

U1B
TLC082

V_Amp

V_F
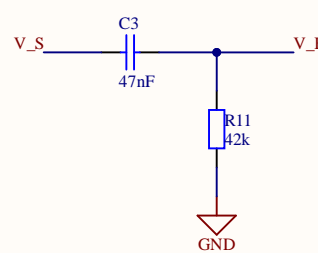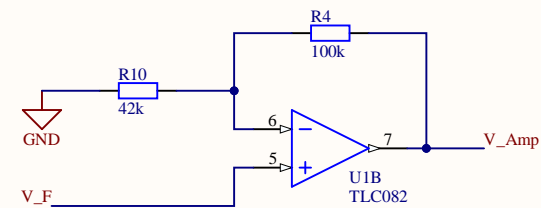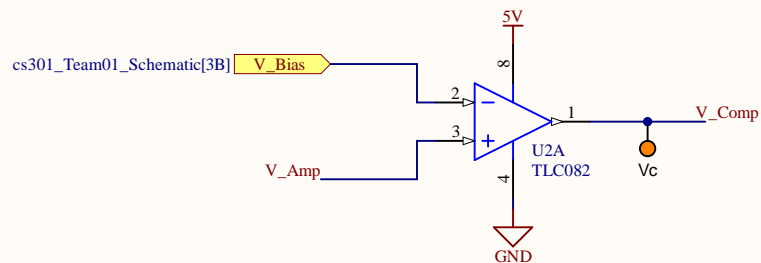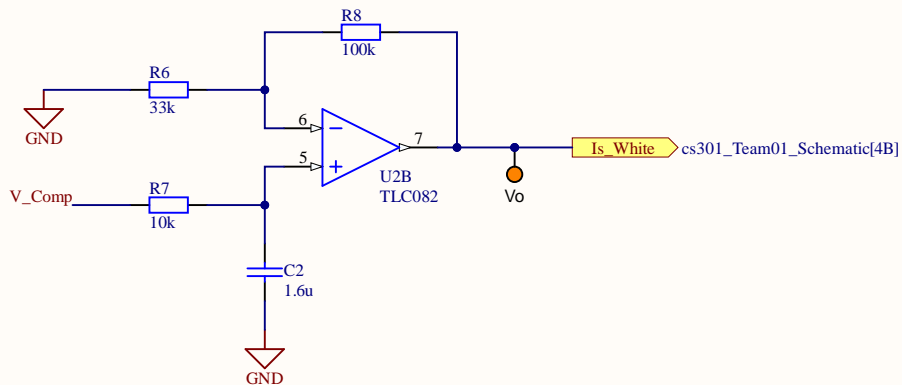
DC Signal Generator (Non-Inverting OpAmp)
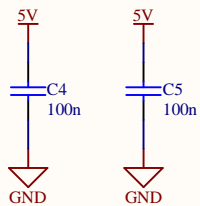
R8
100k

GND

R6
33k

V_Comp

R7
10k

6

5

7

U2B
TLC082

C2
1.6u

GND

Vo

Is_White   cs301_Team01_Schematic[4B]

PATHFINDING ROBOT

JAMES BENSON NICK VIKTOR

TEAM 01

COMPSYS 301

DEBUG

DEBUG

5V

GND

P3

P0

P1

P2

P12

P15

M1

M2

5V

5V

UNIVERSITY OF
AUCKLAND
NEW ZEALAND
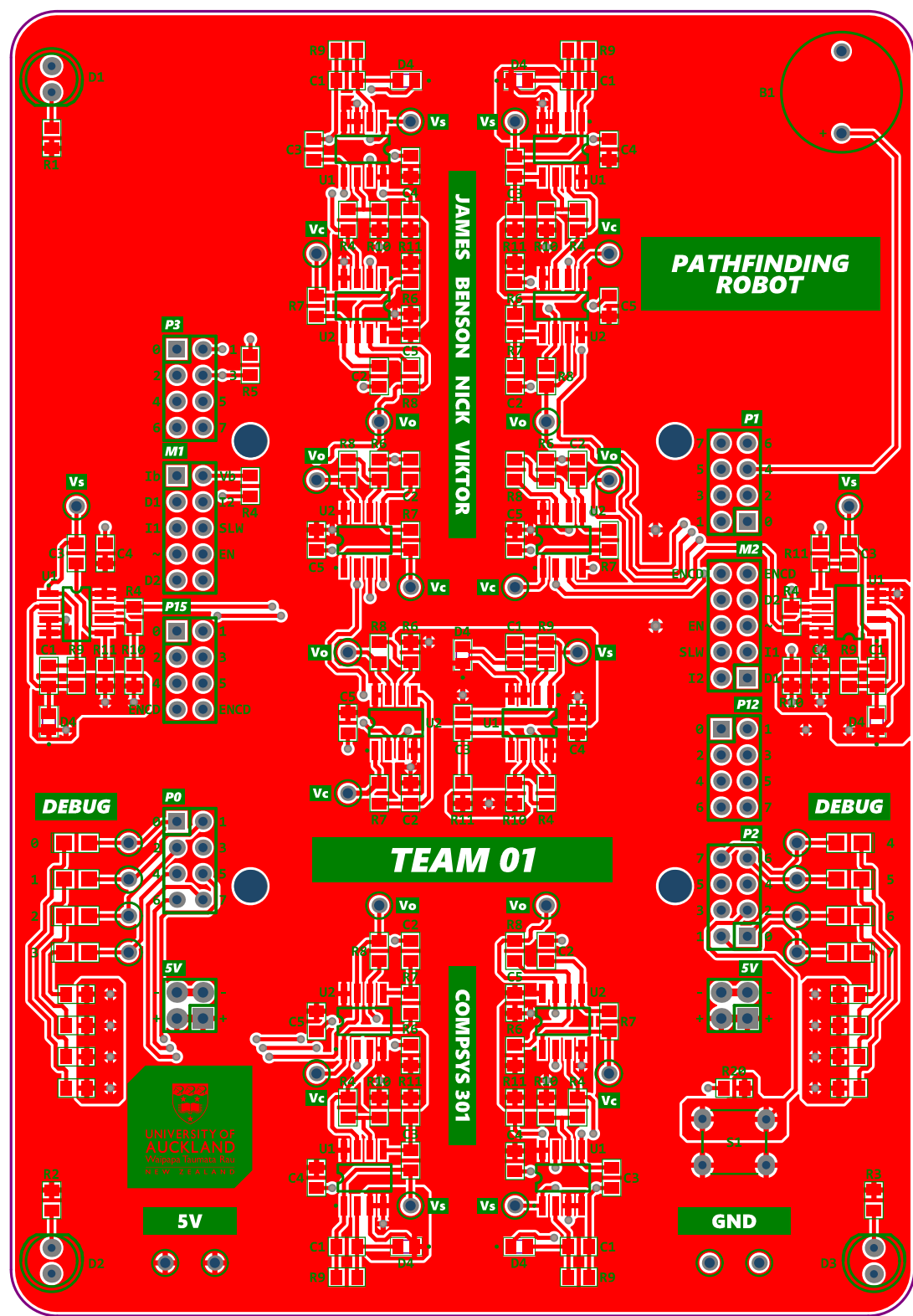
UNIVERSITY OF
AUCKLAND
Waipapa Taumata Rau
NEW ZEALAND

ENGINEERING

STACK

FRAMED

Comment	Description	Designator	Footprint	LibRef	Quantity
5V	Connector	+5V, 5V	IDC4	CON4	2
5V	Test Point, Orange, 1-Pin THD, RoHS	5V_1, 5V_2	TP_TH	TestPoint	2
clown		B1	Buzzer	Buzzer	1
40p	SMT ceramic capacitor 0805 size	C1_S1, C1_S2, C1_S3, C1_S4, C1_S5, C1_S6, C1_S7	0805 CAP	CerCap_SMT_0805	7
1.6u	SMT ceramic capacitor 0805 size	C2_S1, C2_S2, C2_S3, C2_S4, C2_S5, C2_S6, C2_S7	0805 CAP	CerCap_SMT_0805	7
47nF	SMT ceramic capacitor 0805 size	C3_S1, C3_S2, C3_S3, C3_S4, C3_S5, C3_S6, C3_S7	0805 CAP	CerCap_SMT_0805	7
100n	SMT ceramic capacitor 0805 size	C4_S1, C4_S2, C4_S3, C4_S4, C4_S5, C4_S6, C4_S7, C5_S1, C5_S2, C5_S3, C5_S4, C5_S5, C5_S6, C5_S7	0805 CAP	CerCap_SMT_0805	14
LED_S		D1, D2, D3	LED0.1/5MM	LED	3
SD019-101-411	Photodiode SD019-101-411	D4_S1, D4_S2, D4_S3, D4_S4, D4_S5, D4_S6, D4_S7	XDCR_TEMD7000X01	TEMD7000X01	7
0	SMT LED 0805 size	D5	0805 LED	LED_SMT_0805	1
1	SMT LED 0805 size	D6	0805 LED	LED_SMT_0805	1
2	SMT LED 0805 size	D7	0805 LED	LED_SMT_0805	1
3	SMT LED 0805 size	D8	0805 LED	LED_SMT_0805	1
4	SMT LED 0805 size	D9	0805 LED	LED_SMT_0805	1
5	SMT LED 0805 size	D10	0805 LED	LED_SMT_0805	1
6	SMT LED 0805 size	D11	0805 LED	LED_SMT_0805	1
7	SMT LED 0805 size	D12	0805 LED	LED_SMT_0805	1
5003	Test Point, Orange, 1-Pin THD, RoHS	DB0, DB1, DB2, DB3, DB4, DB5, DB6, DB7, Vc_S1, Vc_S2, Vc_S3, Vc_S4, Vc_S5, Vc_S6, Vc_S7, Vo_S1, Vo_S2, Vo_S3, Vo_S4, Vo_S5, Vo_S6, Vo_S7, Vs_S1, Vs_S2, Vs_S3, Vs_S4, Vs_S5, Vs_S6, Vs_S7	TP_TH	TestPoint	29
GND	Test Point, Orange, 1-Pin THD, RoHS	GND_1, GND_2	TP_TH	TestPoint	2
M1	Connector	J13	idc10	CON10	1
M2	Connector	J18	IDC10	CON10	1
P0	Connector	P0	idc8	CON8	1
P1	Connector	P1	idc8	CON8	1
P2	Connector	P2	idc8	CON8	1
P3	Connector	P3	idc8	CON8	1
P12	Connector	P12	idc8	CON8_1	1
P15	Connector	P15	idc8	CON8_1	1
330	0805 resistor	R1, R2, R3, R12, R13, R14, R15, R16, R17, R18, R19	0805 RES	Res_SMT_0805	11
2.7k	0805 resistor	R4	0805 RES	Res_SMT_0805	1
100k	0805 resistor	R4_S1, R4_S2, R4_S3, R4_S4, R4_S5, R4_S6, R4_S7, R8_S1, R8_S2, R8_S3, R8_S4, R8_S5, R8_S6, R8_S7	0805 RES	Res_SMT_0805	14
10k	0805 resistor	R5, R7_S1, R7_S2, R7_S3, R7_S4, R7_S5, R7_S6, R7_S7, R20	0805 RES	Res_SMT_0805	9
33k	0805 resistor	R6_S1, R6_S2, R6_S3, R6_S4, R6_S5, R6_S6, R6_S7	0805 RES	Res_SMT_0805	7
4M	0805 resistor	R9_S1, R9_S2, R9_S3, R9_S4, R9_S5, R9_S6, R9_S7	0805 RES	Res_SMT_0805	7
42k	0805 resistor	R10_S1, R10_S2, R10_S3, R10_S4, R10_S5, R10_S6, R10_S7, R11_S1, R11_S2, R11_S3, R11_S4, R11_S5, R11_S6, R11_S7	0805 RES	Res_SMT_0805	14
PB switchTH_small	Push Button Switch thru hole	S1	ece-Sw-small	PB switchTH_small	1
TLC082	IC OPAMP GP 10MHZ 8SOIC	U1_S1, U1_S2, U1_S3, U1_S4, U1_S5, U1_S6, U1_S7, U2_S1, U2_S2, U2_S3, U2_S4, U2_S5, U2_S6, U2_S7	SO - 8	TLC082_SMT_SOIC8	14