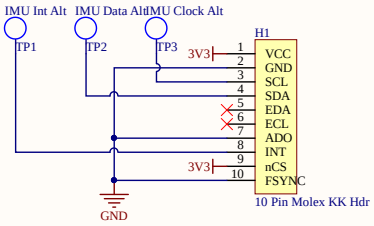
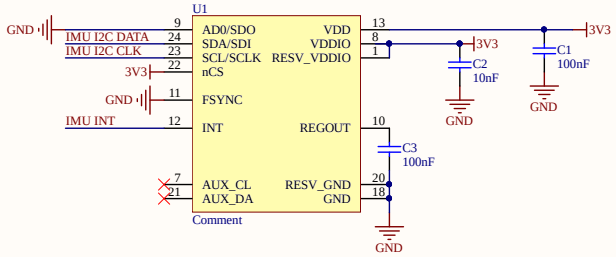
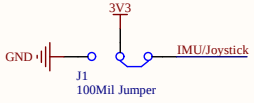
IMU

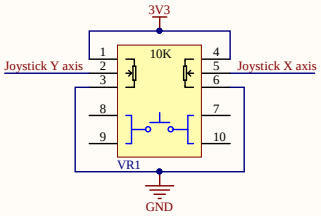
Alt IMU



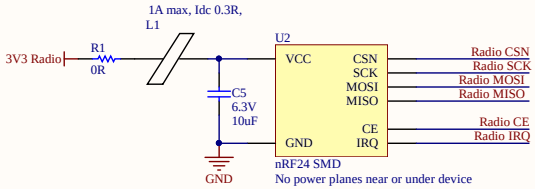


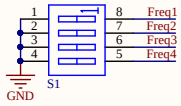


Joystick

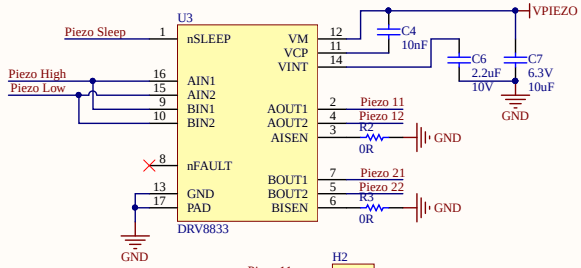


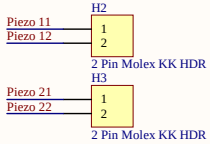
Radio Module



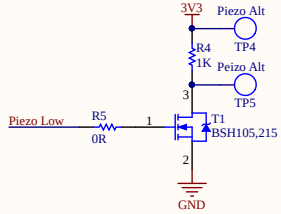


Peizo Driver

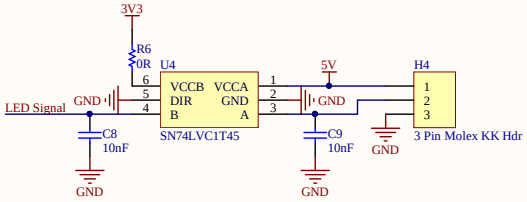




Alt Peizo Driver

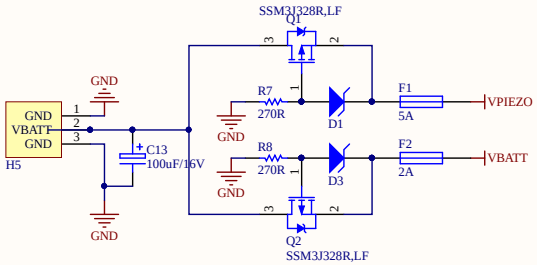


LED Tape

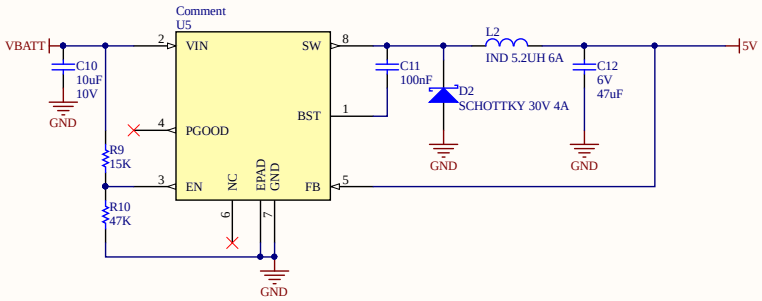


Title **Wacky Hat Schematic**		*Group 17* *ECE Department* *University of Canterbury* *Christchurch 8041* *New Zealand*	Cannot open file V:\AltiumDesigner\Templates\uc-logo.png
Drawn by A. Finlayson, H. Pollard	Revision: 1		
Date: 29/04/2021 Time: 8:21:29 am	Sheet 1 of 3		
File: C:\Users\ADAM\Desktop\ENCE461 Embedded Systems 2\Assignment\Wacky Racers Group Repo Clone\wacky-racers\Wacky H			

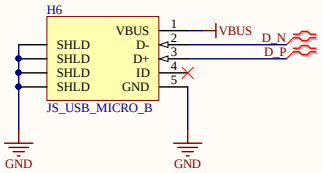
Battery Pin

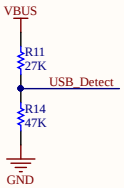


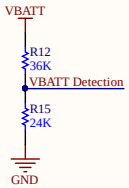
Battery Buck Regulator



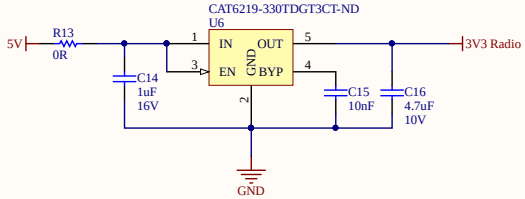
USB



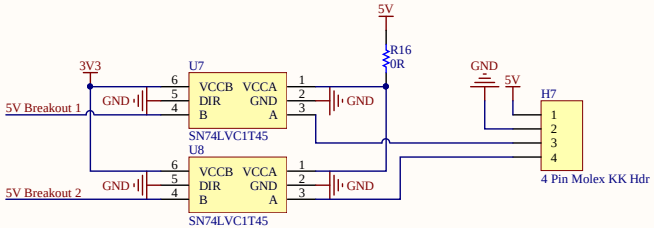


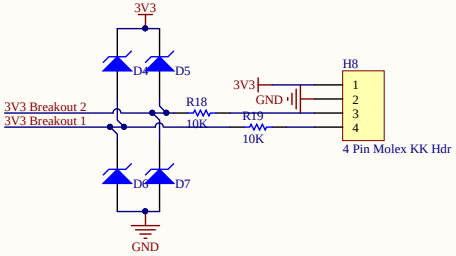


3.3V Regulation Radio

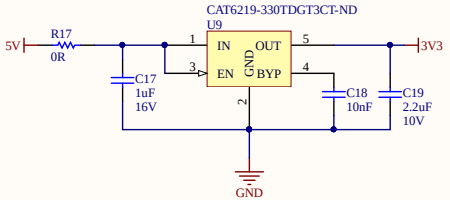


GPIO Breakout



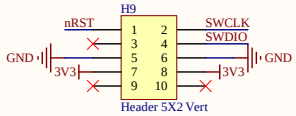


3.3V Regulation

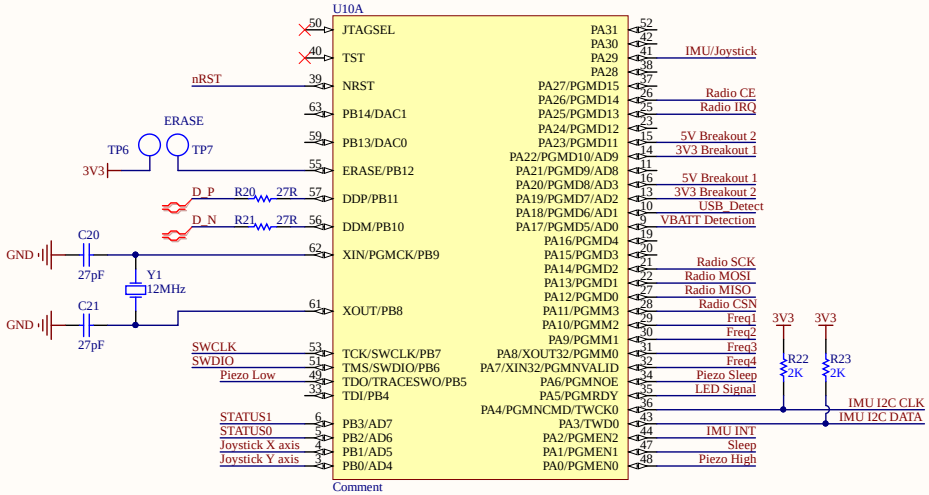


Title **Wacky Hat Schematic**		*Group 17*	Cannot open file V:\AltiumDesigner\Templates\uc-logo.png
Drawn by A. Finlayson, H. Pollard	Revision: 1	*ECE Department*	
Date: 29/04/2021 Time: 8:21:29 am	Sheet 2 of 3	*University of Canterbury*	
File: C:\Users\ADAM\Desktop\ENCE461 Embedded Systems 2\Assignment\Wacky Racers Group Repo Clone\wacky-racers\Wacky H		*Christchurch 8041*	
		New Zealand	

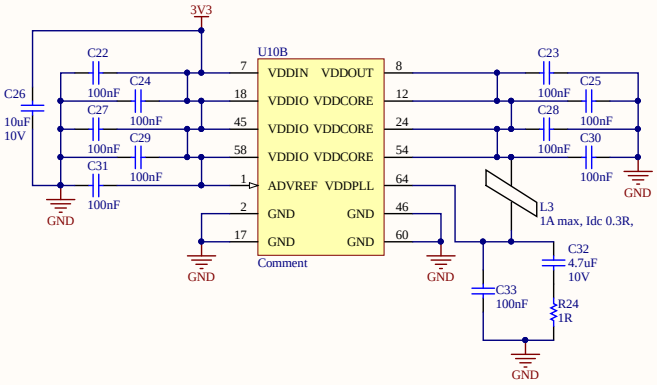
Programmer



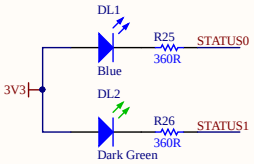
SAM4S



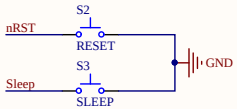
SAM4S Power



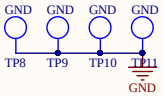
Status LEDs



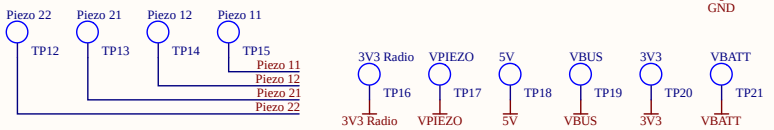
Switches



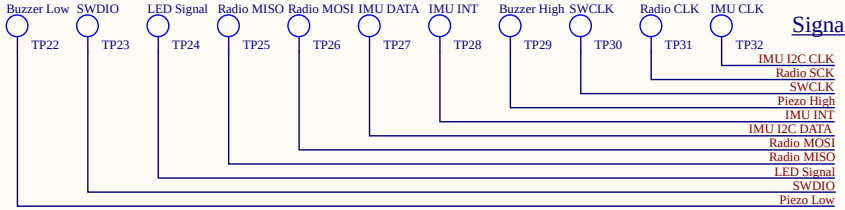
Ground Test Points



Voltage Test Points



Signal Test Points



TO DO:
In General:
- Short circuit protection for MCU pins going to external headers.
- Have a few spare PIO pins connected to pads for last minute mods.

Final Checklist Before Submission:
- Check I/O connections.
- Check power connections.
- Check power supplies and protection circuits.
- Can I isolate circuit sections whilst hardware debugging.

Notes From Lectures:
- USARTs are UARTs on steriods, use them.
- Pins are the limiting factor on microcontrollers.
- PWMx can be available from multiple pins.
- PWMHx and PWMLx are not independant, but inverse.
- CMOS inverters are on every pin of the MCU and periferals. Backdrive protection must be implemented. Add additional (ideally TVS) clamping diodes that can handle higher currents.
- Shut off periferals when not in use.
- Always check UART TXD/RXD are input/output.

Schematic Guidelines:
- Connect every power and ground pin on a chip, they are not optional.
- Ensure you hace pleantly of bulk power supply decoupling.
- Use local decoupling capacitors for every IC power supply pin.
use seperate ground symbols for analogue and digital grounds. If you have high voltages or high currents use seperate grounds for these aswell. The grounds should all be tied back to the main ground point where power is supplied to the board. It is common proctice to connect the grounds via 0 ohm resistors.
- Ensure that external interfaces are protected with a current limiting resistor or replaceable buffers.

Title	**Wacky Hat Schematic**	*Group 17* *ECE Department* *University of Canterbury* *Christchurch 8041* *New Zealand*	Cannot open file V:\AltiumDesigner\Templates\uc-logo.png
Drawn by	A. Finlayson, H. Pollard	Revision: 1	
Date: 29/04/2021	Time: 8:21:29 am	Sheet 3 of 3	
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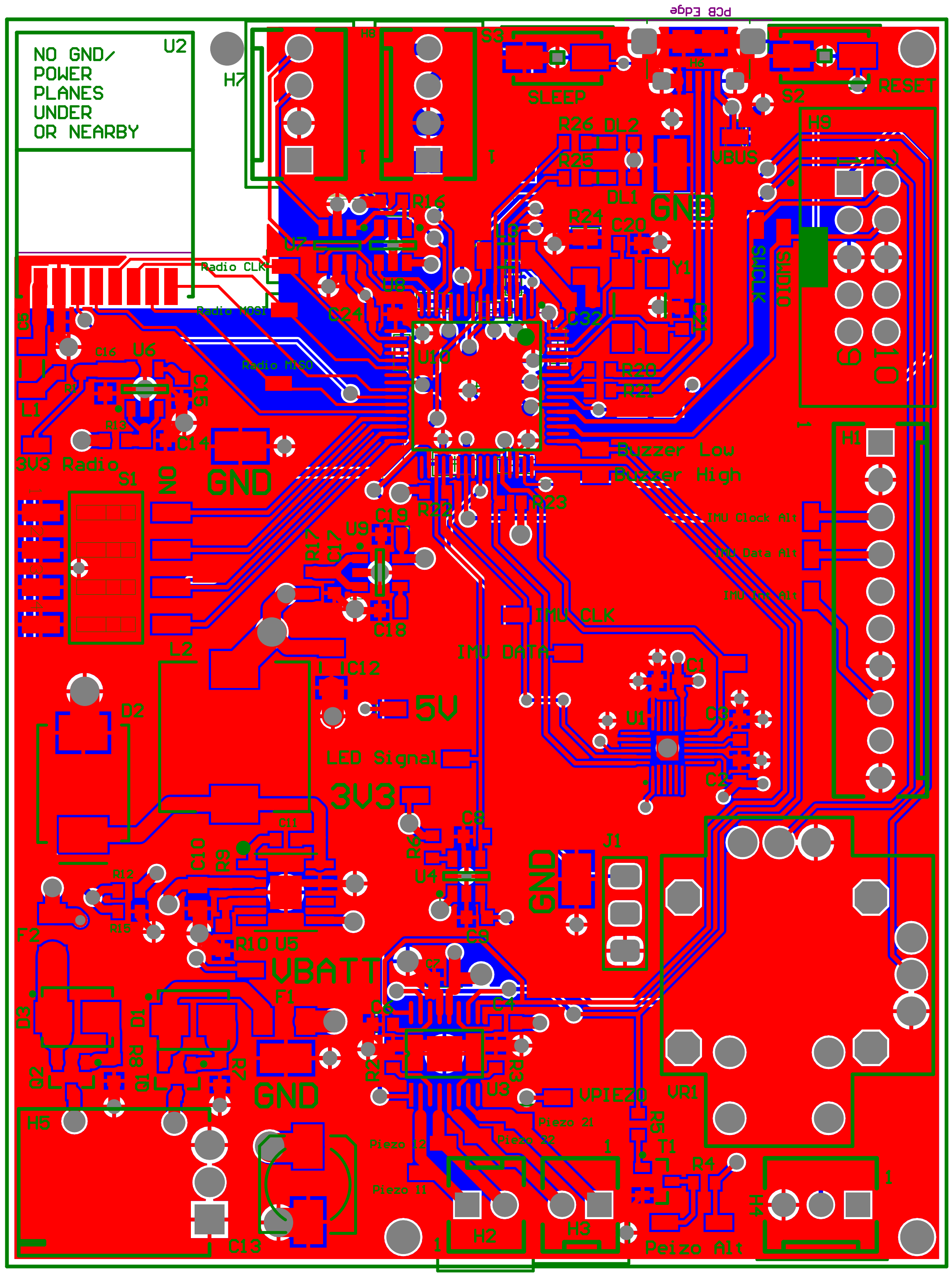

NO GND/
POWER
PLANES
UNDER
OR NEARBY
U2
H7
SLEEP
RESET
S2
S3
VBUS
GND
Radio CLK
Radio MOSI
Radio MISO
SWCLK
SWDIO
3V3 Radio
S1
GND
Buzzer Low
Buzzer High
IMU CLK
IMU DATA
5V
LED Signal
3V3
VBATT
GND
GND
VPIEZO
Peizo Alt

Item #	Designator	Description	Comment	Quantity
1	3, C24, C25, C27, C2	CAP CER 100nF X7R +-10% 50V 0	100nF	13
2	2, C4, C8, C9, C15, C	CAP CER 10nF X7R +-10% 50V 06	10nF	6
3	C5, C7	CAP CER 10UF X5R +-20% 6V3 06	10uF	2
4	C6, C19	CAP CER 2.2uF X5R +-20% 10V 0	2.2uF	2
5	C10, C26	CAP CER 10uF X7R +-20% 10V 08	10uF	2
6	C12	CAP CER 47uF X5R -/+20% 6V 12	47uF	1
7	C13	CAP ALUM 100uF 16V SMD	100uF/16V	1
8	C14, C17	CAP CER 1uF Y5V -20% +80% 16V	1uF	2
9	C16, C32	CAP CER 4.7uF X5R +-20% 10V 0	4.7uF	2
10	C20, C21	CAP CER 27pF NPO/COG +-5% 50	27pF	2
11	D1, D3, D4, D5, D6, D	DIODE ZENER 5.6V 5W DO214AA	DIODE ZENER 5.6V	6
12	D2	DIODE SCHOTTKY 30V 4A SMC	SCHOTTKY 30V 4A	1
13	DL1	LED Blue 270mcd 0603 SMD	Blue	1
14	DL2	LED Dk Green 430mcd 0603 SMD	Dark Green	1
15	F1	Fuse 5.0A Fast Acting 1206 SMD	5A	1
16	F2	Fuse 2.0A Very Fast Acting 1206 SM	2A	1
17	H1	CONN HEADER 10POS 2.54mm VE	10 Pin Molex KK	1
18	H2, H3	CONN HEADER 2POS 2.54mm VE	2 Pin Molex KK	2
19	H4	CONN HEADER 3POS 2.54mm VE	3 Pin Molex KK Hdr	1
20	H5	3Pin Header 2.54mm spacing	Battery_HEADER	1
21	H6	CONN USB MICRO B RECPT SMT	JS_USB_MICRO_B	1
22	H7, H8	CONN HEADER 4POS 2.54mm VE	4 Pin Molex KK Hdr	2

46	TP1	Test Point 1.65X0.9X1.2mm SMD	IMU Int Alt	1	
47	TP2	Test Point 1.65X0.9X1.2mm SMD	IMU Data Alt	1	
48	TP3	Test Point 1.65X0.9X1.2mm SMD	IMU Clock Alt	1	
49	TP4	Test Point 1.65X0.9X1.2mm SMD	Piezo Alt	1	
50	TP5	Test Point 1.65X0.9X1.2mm SMD	Peizo Alt	1	
51	TP6	Test Point 1.65X0.9X1.2mm SMD	TP_0603	1	
52	TP7	Test Point 1.65X0.9X1.2mm SMD	ERASE	1	
53	TP12	Test Point 1.65X0.9X1.2mm SMD	Piezo 22	1	
54	TP13	Test Point 1.65X0.9X1.2mm SMD	Piezo 21	1	
55	TP14	Test Point 1.65X0.9X1.2mm SMD	Piezo 12	1	
56	TP15	Test Point 1.65X0.9X1.2mm SMD	Piezo 11	1	
57	TP16	Test Point 1.65X0.9X1.2mm SMD	3V3 Radio	1	
58	TP17	Test Point 1.65X0.9X1.2mm SMD	VPIEZO	1	
59	TP18	Test Point 1.65X0.9X1.2mm SMD	5V	1	
60	TP19	Test Point 1.65X0.9X1.2mm SMD	VBUS	1	
61	TP20	Test Point 1.65X0.9X1.2mm SMD	3V3	1	
62	TP21	Test Point 1.65X0.9X1.2mm SMD	VBATT	1	
63	TP22	Test Point 1.65X0.9X1.2mm SMD	Buzzer Low	1	
64	TP23	Test Point 1.65X0.9X1.2mm SMD	SWDIO	1	