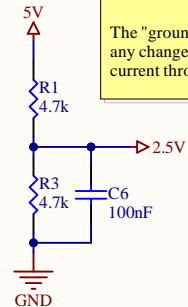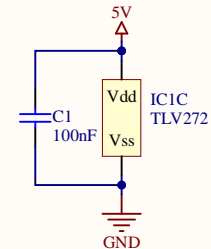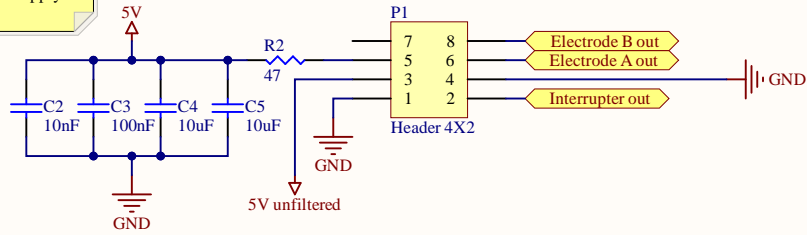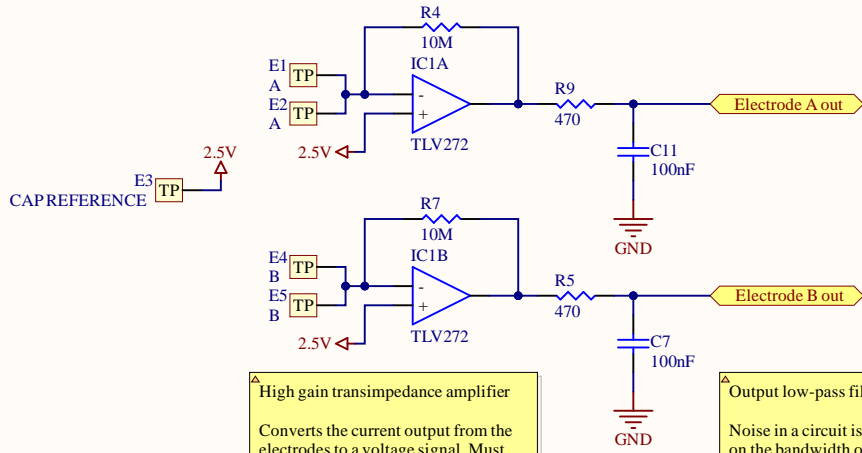**Input Filter**

Not really necessary, but I like to remove some noise from the supply rail of the opamp.

Half rail reference.

In order to allow positive and negative current sensing we create a virtual ground at 2.5V. Negative current will then result in a voltage lower than 2.5V and positive in a voltage higher than 2.5V

The "ground" electrode is also at 2.5V to prevent any changes in the supply voltage creating a current through the capacitor.
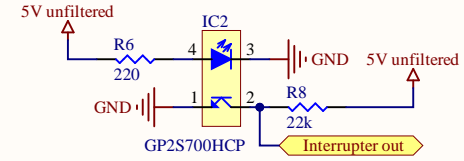
5V

C2 10nF   C3 100nF   C4 10uF   C5 10uF

R2 47

GND

5V unfiltered

GND

P1
7   8
5   6
3   4
1   2
Header 4X2

GND

Electrode B out
Electrode A out

Interrupter out

GND

5V

C1 100nF

Vdd
Vss
IC1C TLV272

GND

5V

R1 4.7k

R3 4.7k

C6 100nF

2.5V

GND

R4 10M
IC1A

E1 A
E2 A
TP
TP

2.5V

TLV272

R9 470

C11 100nF

GND

Electrode A out

E3
CAP REFERENCE
TP

2.5V

5V unfiltered

IC2

R6 220

4   3

GND   5V unfiltered

GND

1   2

R8 22k

5V unfiltered

GP2S700HCP

Interrupter out

R7 10M
IC1B

E4 B
E5 B
TP
TP

2.5V

TLV272

R5 470

C7 100nF

GND

Electrode B out

High gain transimpedance amplifier

Converts the current output from the electrodes to a voltage signal. Must use a low input bias current opamp (< 10pA) to prevent measurement errors

Output low-pass filter

Noise in a circuit is dependent on the bandwidth of the system. Because of this any unused bandwidth only increases the noise floor. This filter cuts out everything over 3KHz, which is almost only noise.

Rotor position sensor

To know the direction of the field we need to measure the rotor position. This sensor detects the light reflected by the copper layer of the rotor

Title		
Size	Number	Revision
A4		
Date:	4.14.2021	Sheet of
File:	F:\OneDrive\..\Front End.SchDoc	Drawn By:

Line #	Name	Description	Designator	Quantity	TargetPrice	Manufacturer 1	Manufacturer Part Number 1	Manufacturer Lifecycle 1	Supplier 1	Supplier Part Number 1	Supplier Unit Price 1	Supplier Subtotal 1
	100nF		C1, C3, C6, C7, C11	5	0	KEMET	C0402C104K8PACTU	Volume Production	Digi-Key	399-3027-1-ND	0,042	0,42
	10nF		C2	1	0	Samsung	CL21B103KBANNNC	Volume Production	Digi-Key	1276-1015-1-ND	0,1	0,1
	10uF		C4, C5	2	0	Murata	GRM188R60J106ME47D	Volume Production	Digi-Key	490-3896-1-ND	0,25	0,5
	A		E1, E2	2	0							
	CAP REFERENCE		E3	1	0							
	B		E4, E5	2	0							
	TLV272		IC1	1	0,99	Texas Instruments	TLV272IDR	Volume Production	Digi-Key	296-10655-1-ND	0,99	0,99
	4.7k		R1, R3	2	0	Yageo	RT0805FRE074K7L	Not Recommended for New Design	Digi-Key	YAG3364CT-ND	0,1	0,2
	47		R2	1	0	Yageo	RC0805JR-0747RL	Volume Production	Digi-Key	311-47ARCT-ND	0,1	0,1
	10M		R4, R7	2	0	Yageo	RC0805JR-0710ML	Volume Production	Digi-Key	311-10MARCT-ND	0,1	0,2
	470		R5, R9	2	0	Yageo	RC0805JR-07470RL	Volume Production	Digi-Key	311-470ARCT-ND	0,1	0,2
	220		R6	1	0	Yageo	RC0805FR-07220RL	Volume Production	Digi-Key	311-220CRCT-ND	0,1	0,1
	22k		R8	1	0	Yageo	RC0805FR-0722KL	Volume Production	Digi-Key	311-22.0KCRCT-ND	0,1	0,1
	Header 4X2	Header, 4-Pin, Dual row	P1	1	0							
	GP2S700HCP	Optical reflection interrupter	IC2	1	0	Socle Technology	GP2S700HCP	Unknown	Digi-Key	1855-1020-1-ND	1,71	1,71