

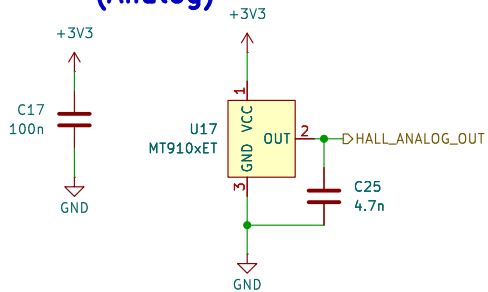
Each symbol/footprint
has 3x holes.
Footprint: Braille_Block_MountingHoles_M2_3x

**Housing Mounting Holes
(M2, 3-in-a-row)**

Sheet: /Mechanical_Holes/ File: Mechanical_Holes.kicad_sch		
Title: Braille Cam Rod Prototype (Type 4)		
Size: USLetter	Date: 2025-01-06	Rev: Rev 1
KiCad E.D.A. 8.0.7		Id: 2/16

Hall Magnet Sensor (Analog)

The diagram illustrates the electrical connection for a Hall Magnet Sensor (Analog). The sensor, labeled U17 MT910xET, is a three-pin component. Pin 1 (VCC) is connected to a +3V3 power supply. Pin 3 (GND) is connected to a common ground (GND). Pin 2 (OUT) is connected to a 4.7nF capacitor (C25) and the HALL_ANALOG_OUT signal line. Additionally, a 100nF capacitor (C17) is connected between the +3V3 supply and GND.



Stepper Motor and Motor Driver

FAULT requires ext. pull-up.

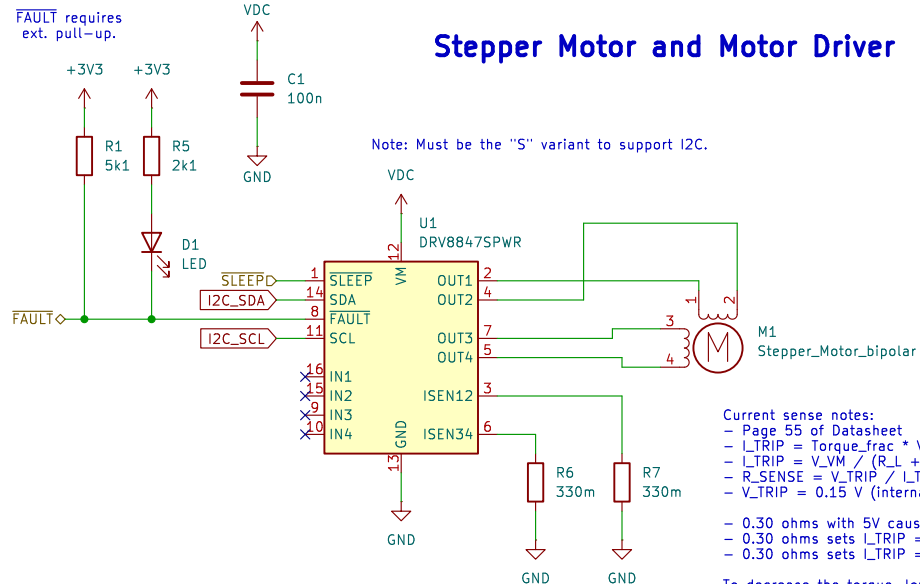
Note: Must be the "S" variant to support I2C.

Current sense notes:

- Page 55 of Datasheet
- $I_{TRIP} = \text{Torque}_{frac} \cdot V_{TRIP} / R_{SENSE_XX}$
- $I_{TRIP} = V_{VM} / (R_{L} + R_{DS_ON_SUM} + R_{SENSE_XX})$
- $R_{SENSE} = V_{TRIP} / I_{TRIP}$
- $V_{TRIP} = 0.15 \text{ V}$ (internally-regulated)
- 0.30 ohms with 5V causes near-overheat after a few seconds.
- 0.30 ohms sets $I_{TRIP} = 500 \text{ mA}$ at Torque=100%
- 0.30 ohms sets $I_{TRIP} = 250 \text{ mA}$ at Torque=50%

To decrease the torque, lower the voltage and/or set Torque = 50% register.

Note: Current sense can be 0 ohms or inf ohms probably. The resistors here are used to limit the current, via some amplifier circuit I think.



Current sense notes:

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- $I_{TRIP} = V_{VM} / (R_L + R_{DS_ON_SUM} + R_{SENSE_XX})$
- $R_{SENSE} = V_{TRIP} / I_{TRIP}$
- $V_{TRIP} = 0.15 \text{ V (internally-regulated)}$

- 0.30 ohms with 5V causes near-overheat after a few seconds.
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Hall Magnet Sensor (Analog)

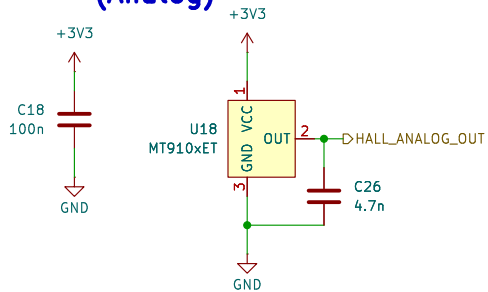
The diagram illustrates the electrical connections for a Hall Magnet Sensor (Analog). It features two main components: a capacitor C18 and a Hall sensor U18 (MT910xET).

Power Supply Section:

- A red arrow labeled **+3V3** indicates the positive supply voltage.
- A capacitor **C18** with a value of **100n** is connected between the +3V3 line and **GND** (Ground).

Sensor Section:

- The sensor is labeled **U18** and **MT910xET**.
- Pin 1 (VCC):** Connected to the +3V3 supply line.
- Pin 3 (GND):** Connected to the common ground.
- Pin 2 (OUT):** The output signal pin, connected to a green line labeled **HALL_ANALOG_OUT**.
- A capacitor **C26** with a value of **4.7n** is connected between the output pin (2) and ground.



Stepper Motor and Motor Driver

FAULT requires ext. pull-up.

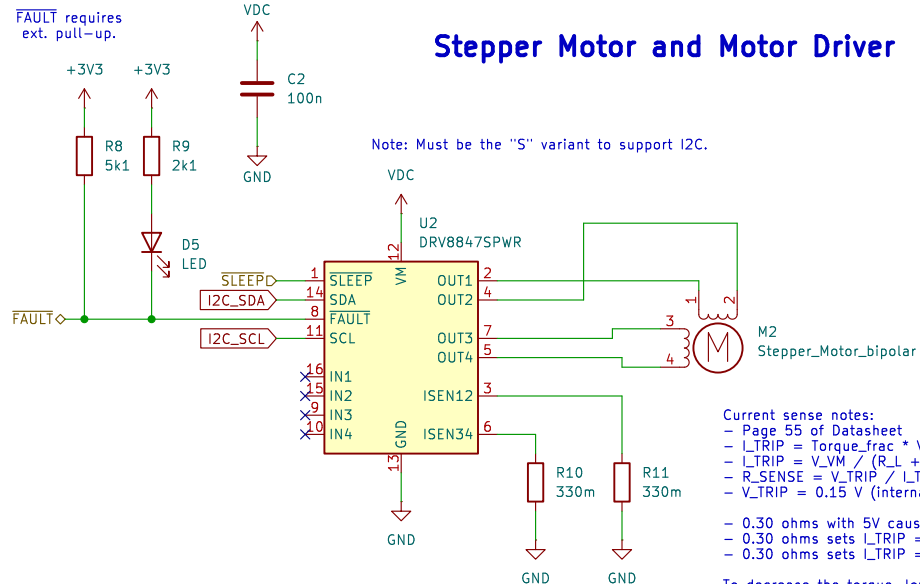
Note: Must be the "S" variant to support I2C.

Current sense notes:

- Page 55 of Datasheet
- $L_TRIP = \text{Torque_frac} * V_TRIP / R_SENSE_XX$
- $L_TRIP = V_VM / (R_L + R_DS_ON_SUM + R_SENSE_XX)$
- $R_SENSE = V_TRIP / L_TRIP$
- $V_TRIP = 0.15 \text{ V}$ (internally-regulated)
- 0.30 ohms with 5V causes near-overheat after a few seconds.
- 0.30 ohms sets $L_TRIP = 500 \text{ mA}$ at Torque=100%
- 0.30 ohms sets $L_TRIP = 250 \text{ mA}$ at Torque=50%

To decrease the torque, lower the voltage and/or set Torque = 50% register.

Note: Current sense can be 0 ohms or inf ohms probably. The resistors here are used to limit the current, via some amplifier circuit I think.



- Current sense notes:
 - Page 55 of Datasheet
 - $L_TRIP = \text{Torque_frac} \times V_TRIP / R_SENSE_XX$
 - $L_TRIP = V_VM / (R_L + R_DS_ON_SUM + R_SENSE_XX)$
 - $R_SENSE = V_TRIP / L_TRIP$
 - $V_TRIP = 0.15 \text{ V}$ (internally-regulated)
- 0.30 ohms with 5V causes near-overheat after a few seconds.
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To decrease the torque, lower the voltage and/or set Torque = 50% register.

Note: Current sense can be 0 ohms or inf ohms probably.
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via some amplifier circuit I think.

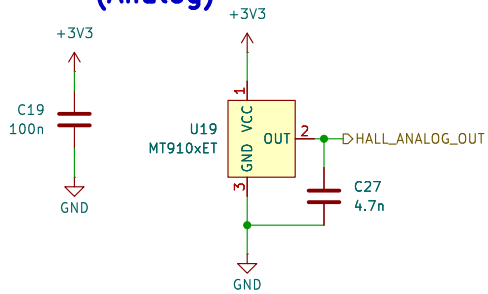
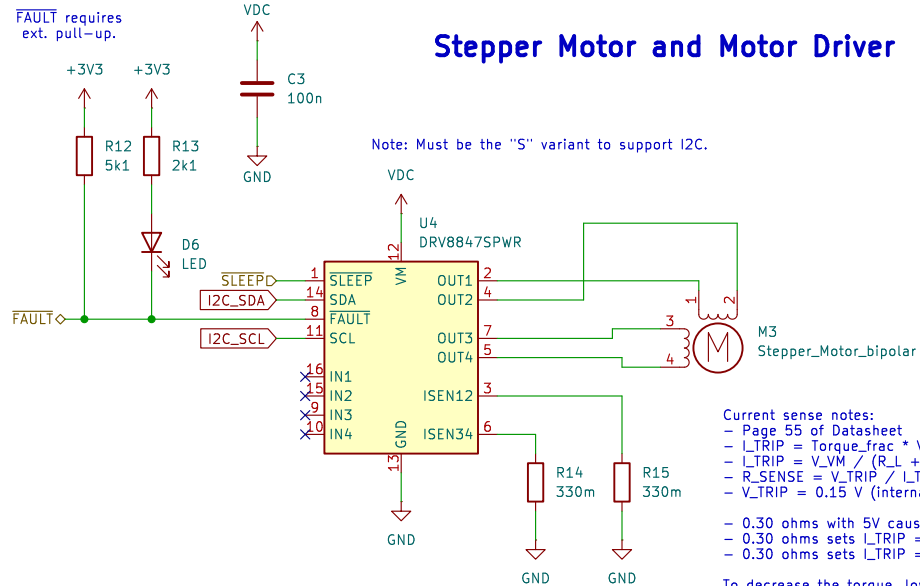
Title: Braille Cam Rod Prototype (Type 4)

Rev: Rev 1
Id: 4/16

Hall Magnet Sensor (Analog)

The diagram illustrates the electrical connections for a Hall Magnet Sensor (Analog). It features a yellow rectangular component labeled "U19 MT910xET".

- Power Supply:** A red arrow labeled "+3V3" indicates the supply voltage. A capacitor "C19 100n" is connected in parallel with the supply line. The sensor's pin 1 is labeled "VCC" and is connected to the +3V3 supply. The sensor's pin 3 is labeled "GND" and is connected to ground.
- Signal Output:** The sensor's pin 2 is labeled "OUT". This pin is connected to a green line labeled "D-HALL_ANALOG_OUT". A capacitor "C27 4.7n" is connected in parallel with the output line.

[illegible]

Current sense notes:

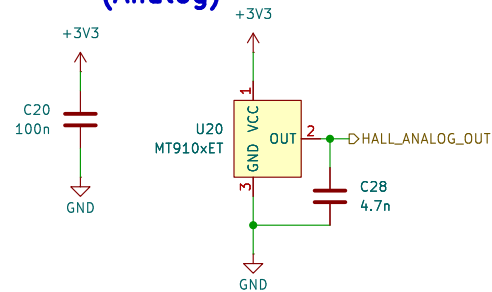
- Page 55 of Datasheet
- $I_{TRIP} = \text{Torque_frac} \cdot V_{TRIP} / R_{SENSE_XX}$
- $I_{TRIP} = V_{VM} / (R_L + R_{DS_ON_SUM} + R_{SENSE_XX})$
- $R_{SENSE} = V_{TRIP} / I_{TRIP}$
- $V_{TRIP} = 0.15 \text{ V}$ (internally-regulated)

- 0.30 ohms with 5V causes near-overheat after a few seconds.
- 0.30 ohms sets I_{TRIP} = 500 mA at Torque=100%
- 0.30 ohms sets I_{TRIP} = 250 mA at Torque=50%

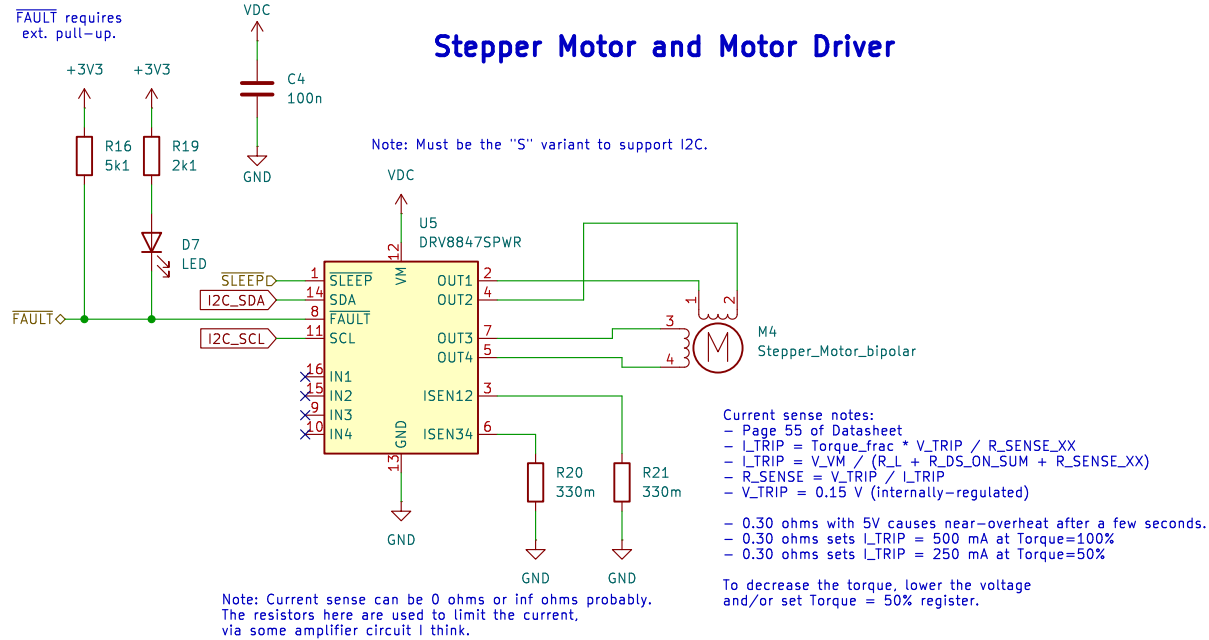
To decrease the torque, lower the voltage and/or set Torque = 50% register.

Note: Current sense can be 0 ohms or inf ohms probably.
The resistors here are used to limit the current,
via some amplifier circuit I think.

Hall Magnet Sensor (Analog)



Stepper Motor and Motor Driver



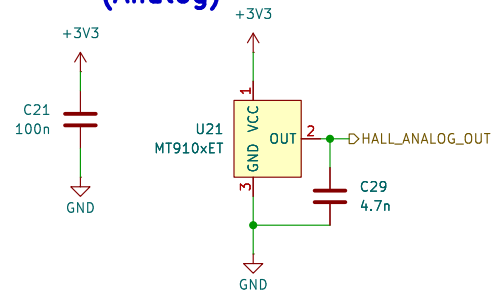
Sheet: /Motor_Control/Braille_Cell_Column3/
File: Braille_Cell_Column.kicad_sch

Title: Braille Cam Rod Prototype (Type 4)

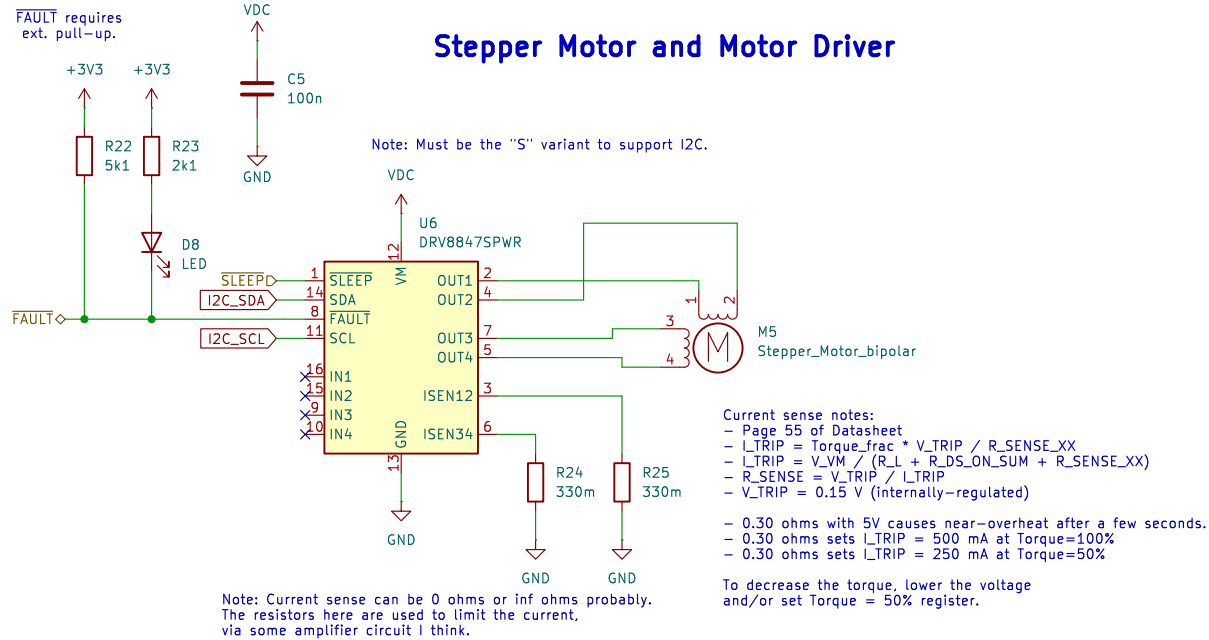
Size: USLetter Date: 2025-01-06
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Rev: Rev 1
Id: 6/16

Hall Magnet Sensor (Analog)



Stepper Motor and Motor Driver



Sheet: /Motor_Control/Braille_Cell_Column4/
File: Braille_Cell_Column.kicad_sch

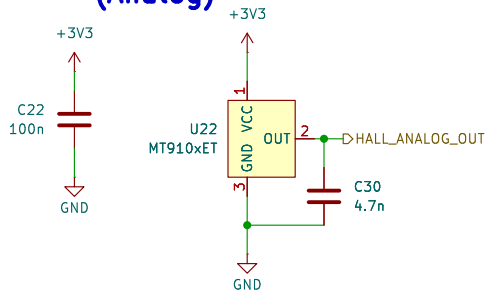
Title: Braille Cam Rod Prototype (Type 4)

Size: USLetter Date: 2025-01-06
KiCad E.D.A. 8.0.7

Rev: Rev 1
Id: 7/16

Hall Magnet Sensor (Analog)

The diagram illustrates the electrical connection for a Hall Magnet Sensor (Analog). The sensor, labeled U22 MT910xET, is a yellow rectangular component with three pins. Pin 1 (VCC) is connected to a +3V3 supply. Pin 3 (GND) is connected to a common ground (GND). Pin 2 (OUT) is connected to a green wire labeled HALL_ANALOG_OUT. A 4.7nF capacitor (C30) is connected between the HALL_ANALOG_OUT line and GND. Additionally, a 100nF capacitor (C22) is connected between the +3V3 supply and GND.



Stepper Motor and Motor Driver

FAULT requires ext. pull-up.

Note: Must be the "S" variant to support I2C.

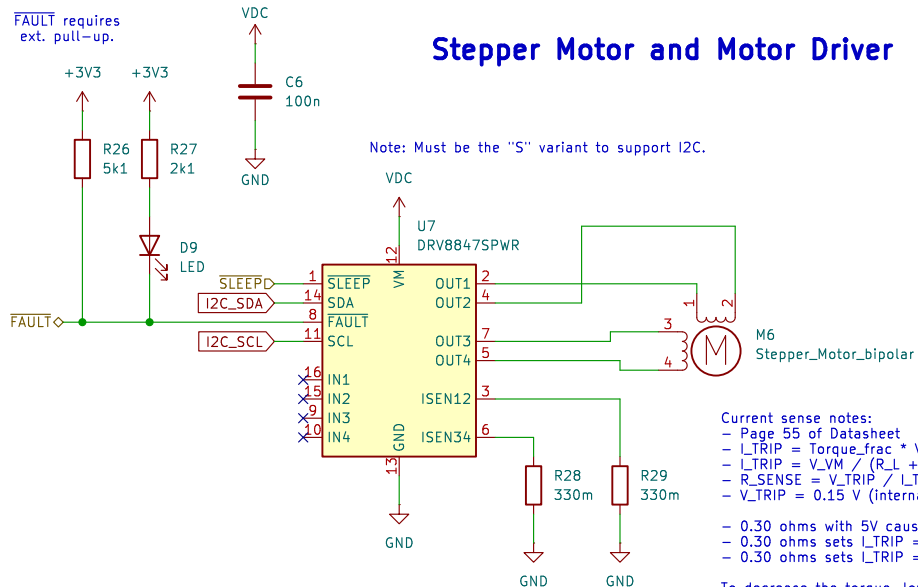
Current sense notes:

- Page 55 of Datasheet
- $L_TRIP = Torque_frac * V_TRIP / R_SENSE_XX$
- $L_TRIP = V_VM / (R_L + R_DS_ON_SUM + R_SENSE_XX)$
- $R_SENSE = V_TRIP / L_TRIP$
- $V_TRIP = 0.15\text{ V}$ (internally-regulated)
- 0.30 ohms with 5V causes near-overheat after a few seconds.
- 0.30 ohms sets $L_TRIP = 500\text{ mA}$ at Torque=100%
- 0.30 ohms sets $L_TRIP = 250\text{ mA}$ at Torque=50%

To decrease the torque, lower the voltage and/or set Torque = 50% register.

Note: Current sense can be 0 ohms or inf ohms probably. The resistors here are used to limit the current, via some amplifier circuit I think.

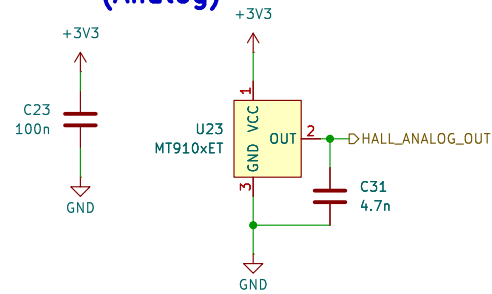
Note: Must be the "S" variant to support I2C.



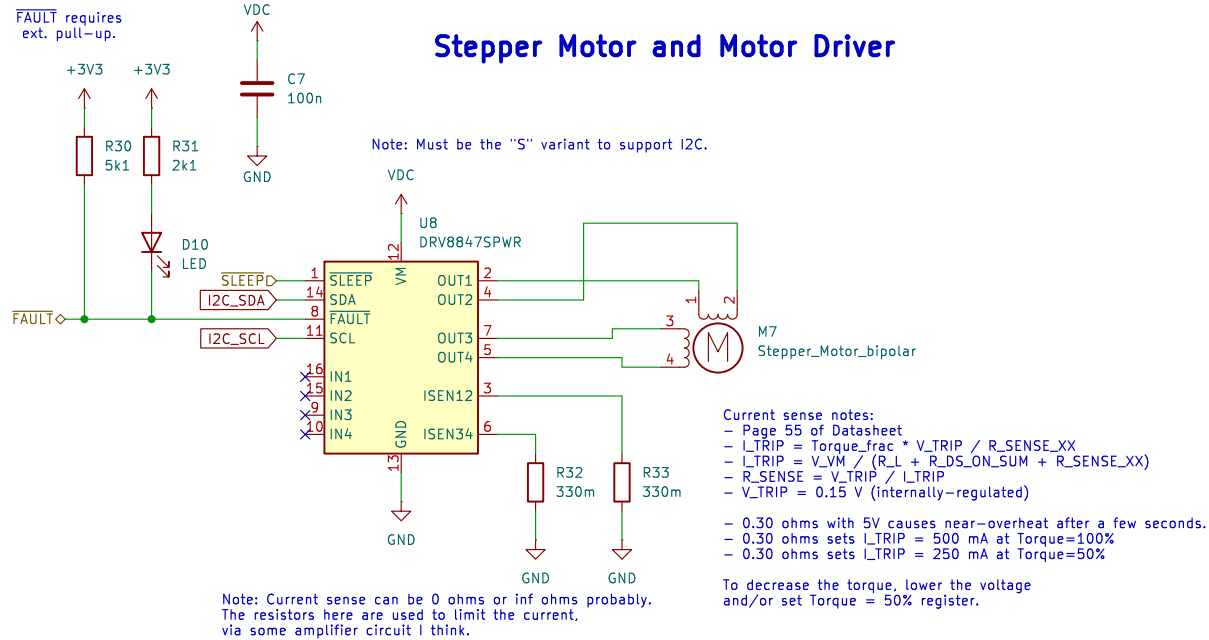
- Current sense notes:
 - Page 55 of Datasheet
 - $L_{TRIP} = V_{VM_frac} \cdot V_{TRIP} / R_{SENSE_XX}$
 - $L_{TRIP} = V_{VM} / (R_L + R_{DS_ON_SUM} + R_{SENSE_XX})$
 - $R_{SENSE} = V_{TRIP} / L_{TRIP}$
 - $V_{TRIP} = 0.15\text{ V}$ (internally-regulated)
- 0.30 ohms with 5V causes near-overheat after a few seconds.
- 0.30 ohms sets $L_{TRIP} = 600\text{ mA}$ at Torque=100%
- 0.30 ohms sets $L_{TRIP} = 250\text{ mA}$ at Torque=50%

To decrease the torque, lower the voltage and/or set Torque = 50% register.

Hall Magnet Sensor (Analog)



Stepper Motor and Motor Driver



Sheet: /Motor_Control/Braille_Cell_Column6/
File: Braille_Cell_Column.kicad_sch

Title: Braille Cam Rod Prototype (Type 4)

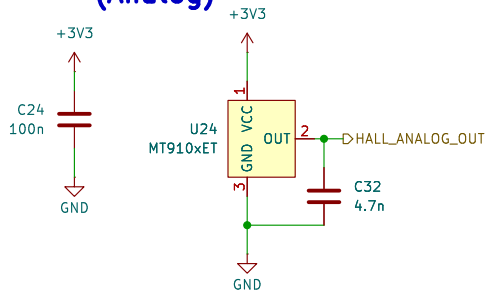
Size: USLetter Date: 2025-01-06
KiCad E.D.A. 8.0.7

Rev: Rev 1
Id: 9/16

Hall Magnet Sensor (Analog)

The diagram illustrates the electrical connections for a Hall Magnet Sensor (Analog). It features two main components: a capacitor and the sensor module.

- Capacitor C24:** A 100nF capacitor is connected between the +3V3 supply and GND.
- Sensor Module (U24, MT910xET):**
 - VCC:** Connected to the +3V3 supply.
 - GND:** Connected to GND.
 - OUT:** The output signal pin, connected to the signal line labeled `HALL_ANALOG_OUT`.
- Capacitor C32:** A 4.7nF capacitor is connected between the `HALL_ANALOG_OUT` signal line and GND.



Stepper Motor and Motor Driver

The circuit diagram shows a DRV8847SPWR motor driver IC connected to a bipolar stepper motor (M8). The IC has several pins: SLEEP (1), SDA (14), FAULT (8), SCL (11), IN1 (16), IN2 (15), IN3 (9), IN4 (10), VM (12), OUT1 (2), OUT2 (4), OUT3 (7), OUT4 (5), ISEN12 (3), and ISEN34 (6). The VM pin is connected to VDC. The ISEN12 and ISEN34 pins are connected to sense resistors R36 and R37 (both 330mΩ) which are grounded. The OUT1 and OUT2 pins drive one terminal of the stepper motor, while OUT3 and OUT4 drive the other. A fault LED (D11) is connected between the FAULT pin and ground through a 2kΩ resistor (R35). The FAULT pin also has a pull-up resistor (R34, 5kΩ) to +3V3. The SDA and SCL pins are connected to an I2C interface. A sleep pin (SLEEP) is shown with a connection to a +3V3 supply through a 5kΩ resistor (R34) and a diode (D11) to ground. A capacitor C8 (100nF) is connected between VDC and ground.

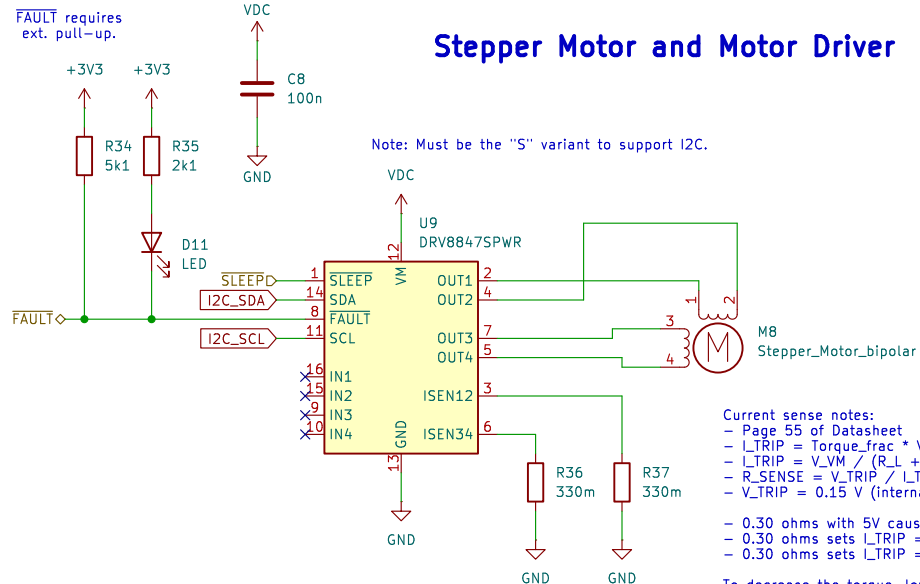
Note: Must be the "S" variant to support I2C.

Current sense notes:

- Page 55 of Datasheet
- $I_{TRIP} = \text{Torque_frac} * V_{TRIP} / R_{SENSE_XX}$
- $I_{TRIP} = V_{VM} / (R_L + R_{DS_ON_SUM} + R_{SENSE_XX})$
- $R_{SENSE} = V_{TRIP} / I_{TRIP}$
- $V_{TRIP} = 0.15\text{ V}$ (internally-regulated)
- 0.30 ohms with 5V causes near-overheat after a few seconds.
- 0.30 ohms sets $I_{TRIP} = 500\text{ mA}$ at Torque=100%
- 0.30 ohms sets $I_{TRIP} = 250\text{ mA}$ at Torque=50%

To decrease the torque, lower the voltage and/or set Torque = 50% register.

Note: Current sense can be 0 ohms or inf ohms probably.
The resistors here are used to limit the current,
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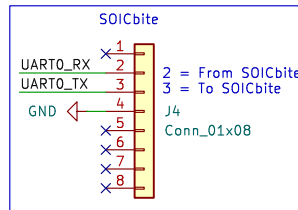
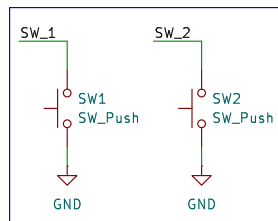
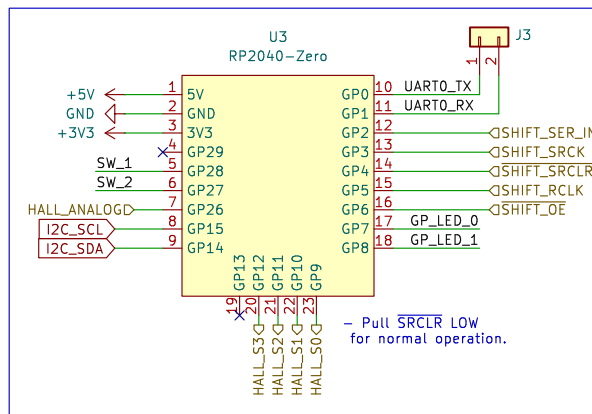
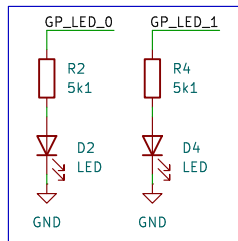
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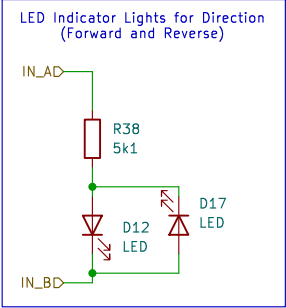
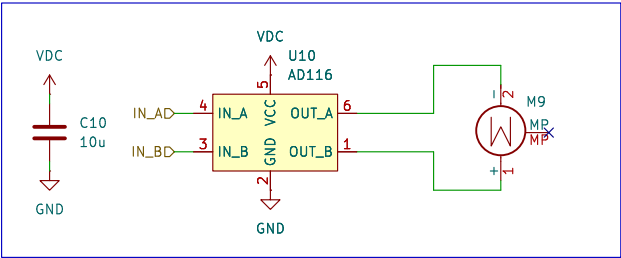
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To decrease the torque, lower the voltage and/or set Torque = 50% register.

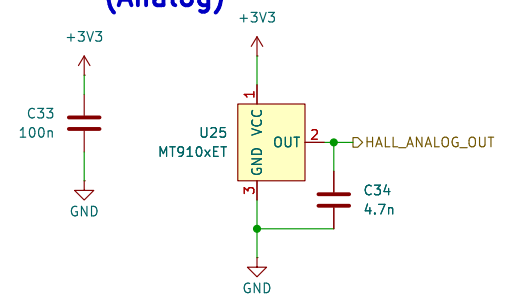
Note: Current sense can be 0 ohms or inf ohms probably.
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Motor: <https://www.aliexpress.com/item/1005008297964764.html>
6mm OD 270 RPM Planetary Gear Motor



Hall Magnet Sensor (Analog)



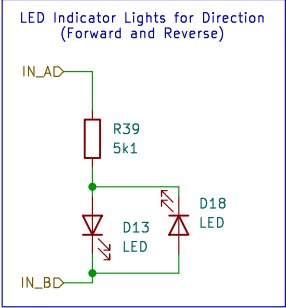
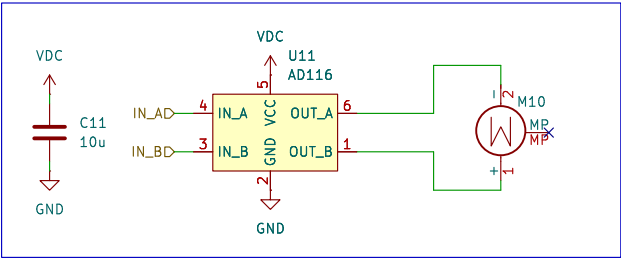
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File: Corner_DC_Motor.kicad_sch

Title: Braille Cam Rod Prototype (Type 4)

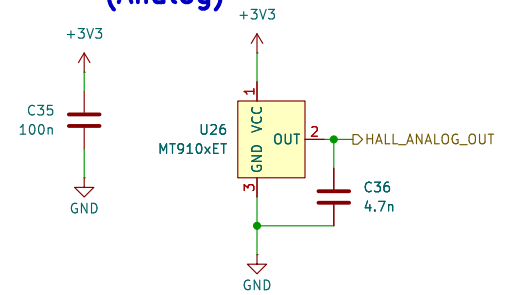
Size: USLetter Date: 2025-01-06
KiCad E.D.A. 8.0.7

Rev: Rev 1
Id: 12/16

Motor: <https://www.aliexpress.com/item/1005008297964764.html>
6mm OD 270 RPM Planetary Gear Motor



Hall Magnet Sensor (Analog)



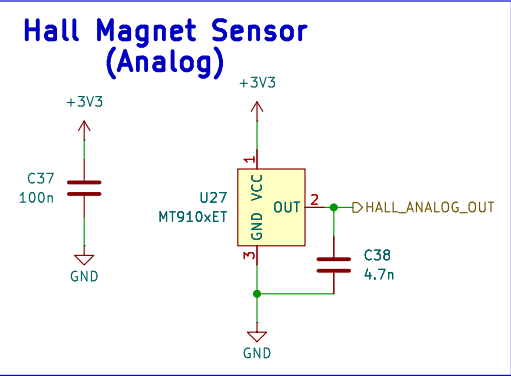
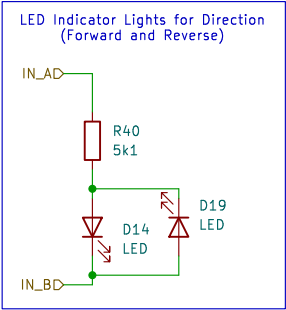
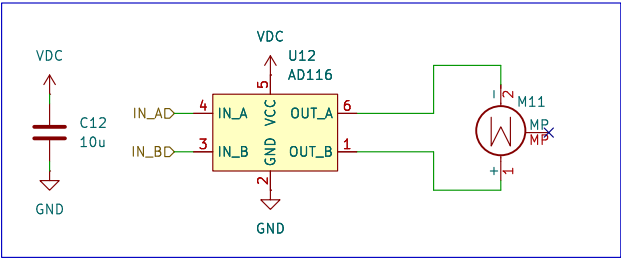
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Title: Braille Cam Rod Prototype (Type 4)

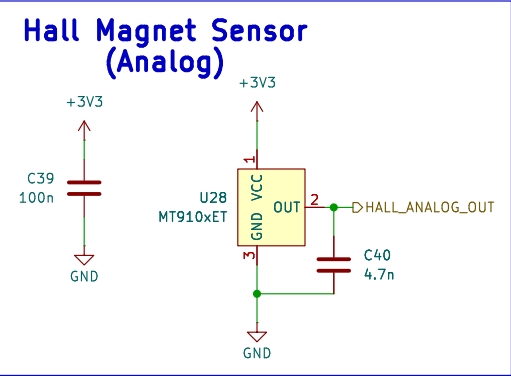
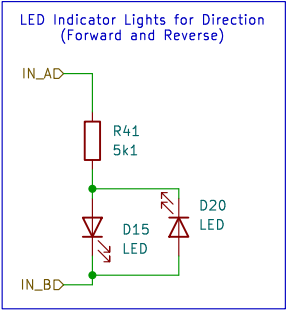
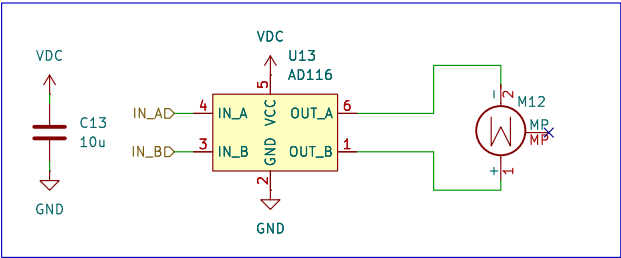
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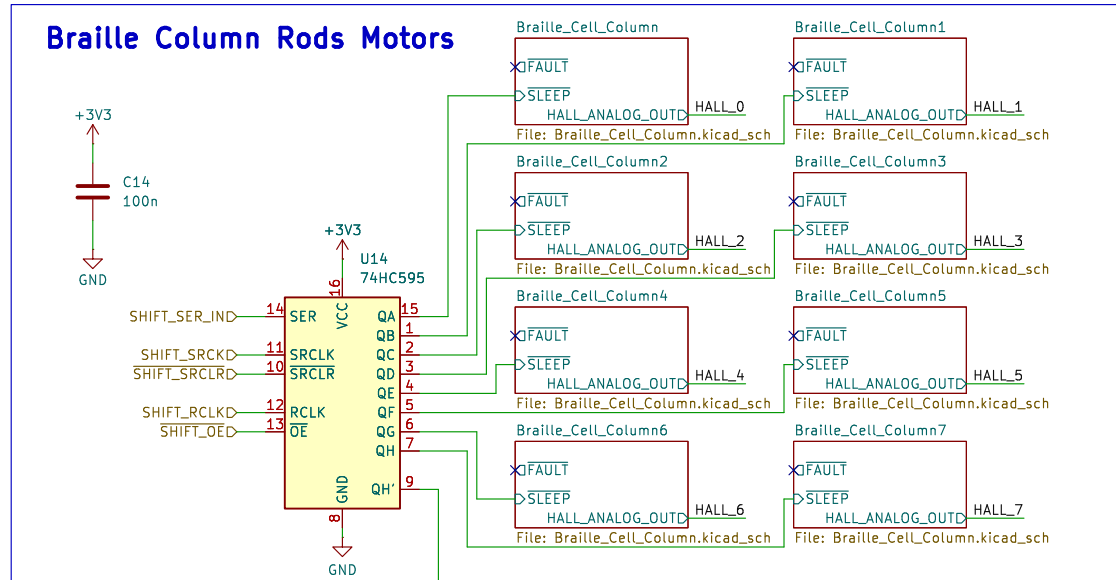
Rev: Rev 1
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Motor: <https://www.aliexpress.com/item/1005008297964764.html>
6mm OD 270 RPM Planetary Gear Motor



Motor: <https://www.aliexpress.com/item/1005008297964764.html>
6mm OD 270 RPM Planetary Gear Motor





TODO: Could save power by switching off the hall effect sensors and mux.

