


uStepper Rev. B

product description

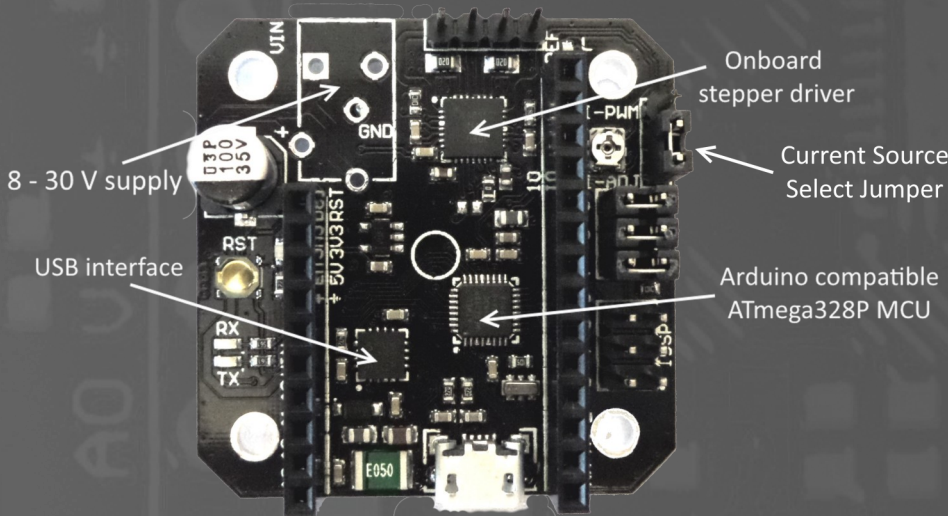
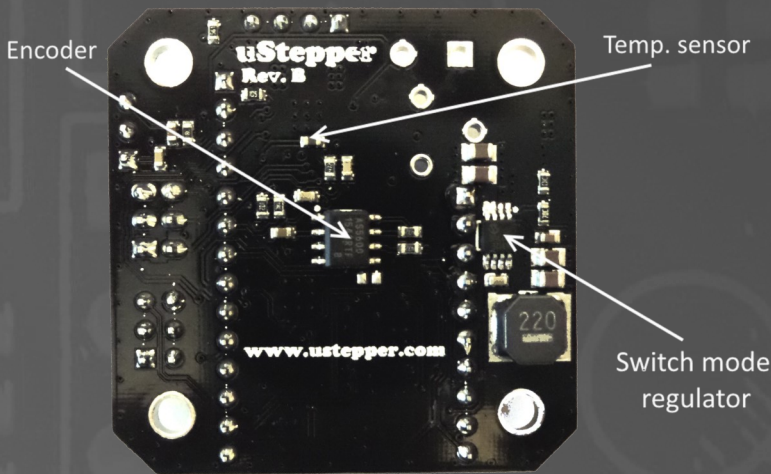
Microcontroller, stepper driver and encoder in an ultra-compact design!

By uStepper ApS



Features & technical specifications

uStepper is an ultra-compact Arduino compatible board, with integrated stepper driver and 12-bit rotary encoder, enabling the uStepper to be mounted directly on the back of a NEMA 17 size stepper motor. This makes it possible to develop applications using a stepper motor, without the need for long and messy wiring to an external Arduino/stepper shield. Furthermore the 12-bit rotary encoder ensures that the absolute position of the motor shaft can be tracked, enabling the uStepper to detect any loss of steps.



| | |
|--------------------------------|-----------------------------------|
| Microcontroller | ATmega328P (16 MHz) |
| I/O Voltage | 5 V |
| Input Voltage (recommended) | 8 - 24 V |
| Input Voltage (max) | 8 - 30 V |
| Digital I/O pins | 12 (6 of which provide PWM) |
| Analog I/O pins | 4 |
| DC Current per I/O Pin (max) | 40 mA (max 200 mA total I/O draw) |
| DC Current for 5 V Pin (max) | 800 mA (not on USB power) |
| DC Current for 3.3 V Pin (max) | 50 mA |
| Stepper drive current | Up to 2A (adjustable) |
| Microstepping | Up to 16x (selectable) |
| Encoder resolution | 12 bit |
| Dimensions | 41.8 x 41.8 x 14.5 mm |
| Weight | ~13g |

The 5 V switch mode regulator makes it possible to supply uStepper with up to 30 V (24 V recommended). This would be impossible with a linear regulator design.

A temperature sensor is located near the stepper driver, allowing you to continuously monitor the temperature and take action, should the temperature get too high.

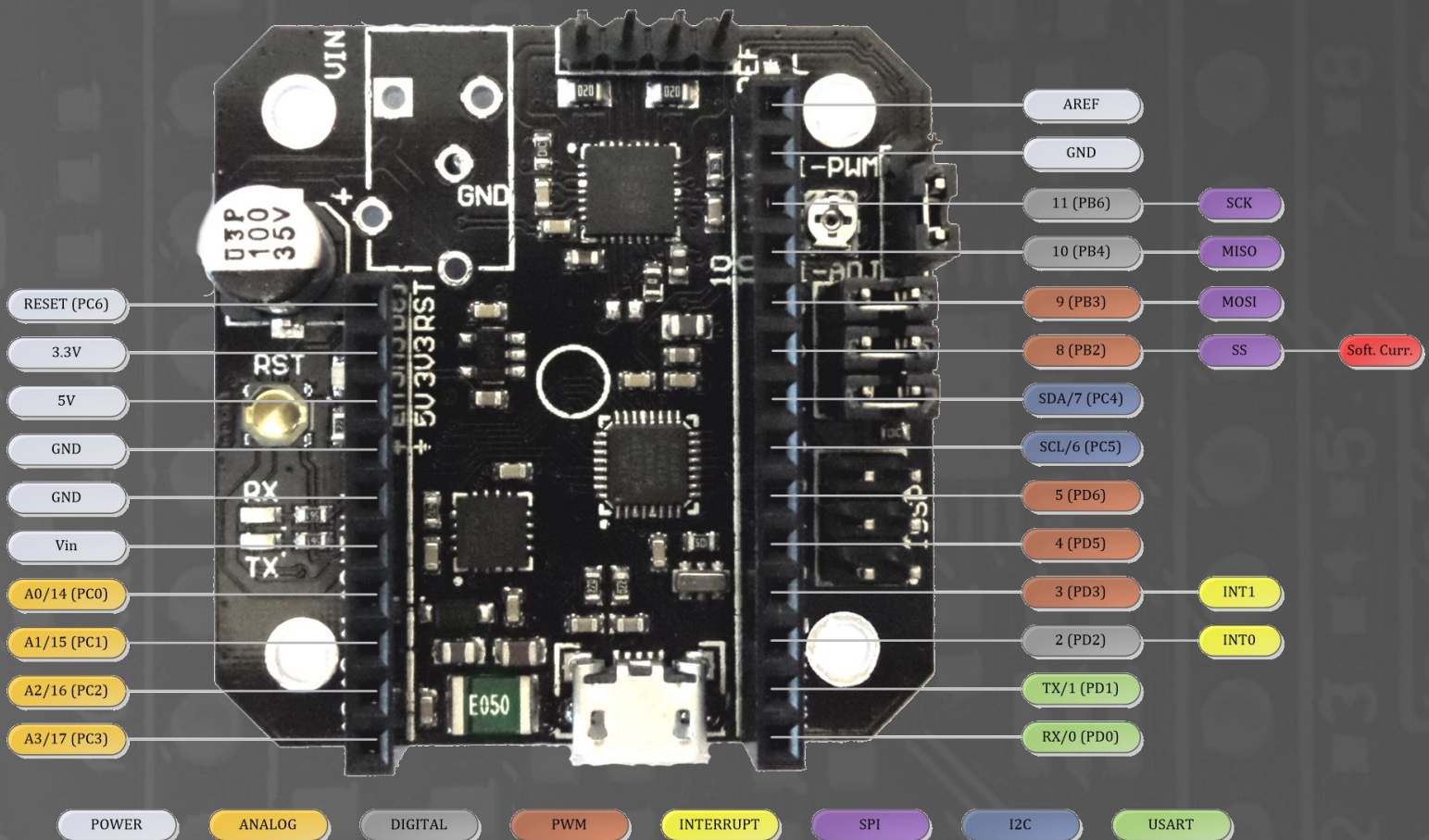
Microstepping is selected by jumpers MS1 to MS3 (it is also possible to solder them on the back of the board for permanent microstep setting). Current limit is adjusted using the on-board potentiometer or using software. Current source is chosen using the Current Source Select Jumper (see picture on the left), where lower position is chosen for the potentiometer as source.

| Microstep setting | MS1 | MS2 | MS3 |
|-------------------|-----|-----|-----|
| Full step | No | No | No |
| 1/2 step | Yes | No | No |
| 1/4 step | No | Yes | No |
| 1/8 step | Yes | Yes | No |
| 1/16 step | Yes | Yes | Yes |

$$\text{Current Limit} = 6.25 \times V_{\text{ref}}$$

Where V_{ref} is measured on the potentiometer screw and can be between 0 and 313 mV, resulting in 0 - 2 A current limit.

uStepper PIN mapping



As it can be seen from the PIN mapping above, uStepper offers a vast amount of GPIO's from it's ATmega328P MCU. This makes the uStepper capable of interacting with various sensors, actuators, communication modules etc. - Besides functioning as a stepper driver with feedback capability.

Mounting

Follow the steps below to mount uStepper on a Nema 17 size stepper motor.

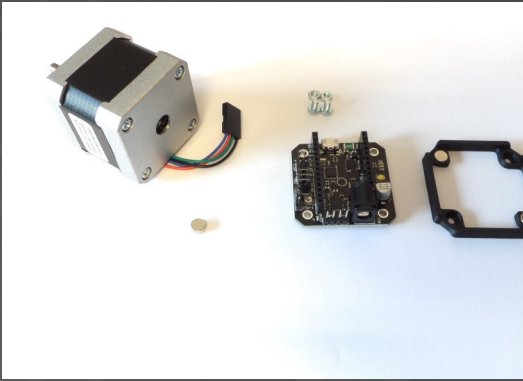


Fig.1: The uStepper Premium contains the items shown on the figure here.

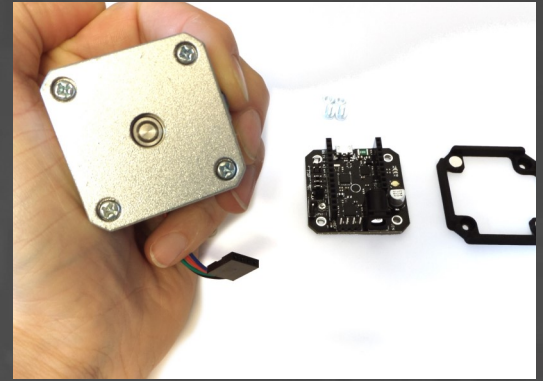


Fig.2: The motor has a hole on the back.



Fig.3: Drop in the encoder magnet.

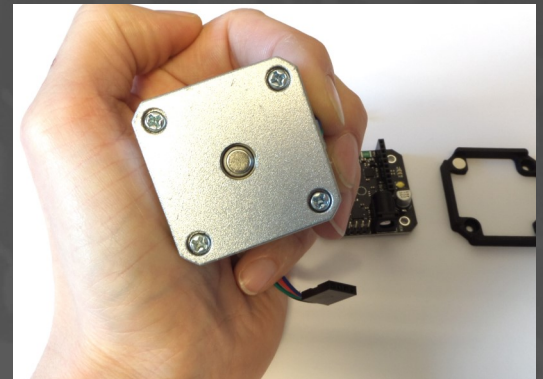


Fig.4: The magnet should snap in and align with the shaft center.

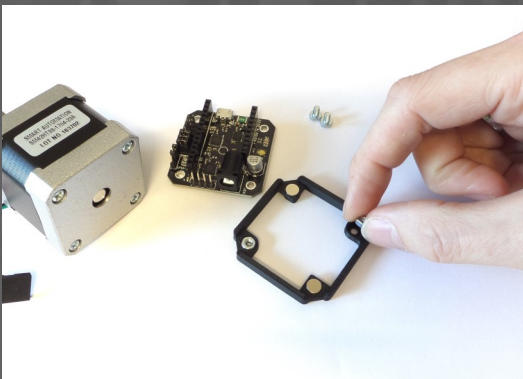


Fig.5: Place the two nuts in the mounting bracket as shown.

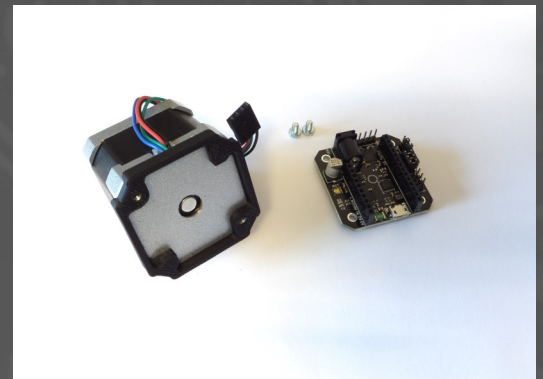


Fig.6: Snap the mounting bracket on the back of your stepper. Make sure it's orientation is as shown here.

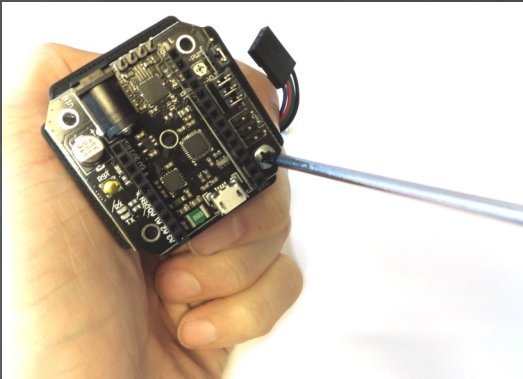


Fig.7: Secure the uStepper board with the two Philips screws.

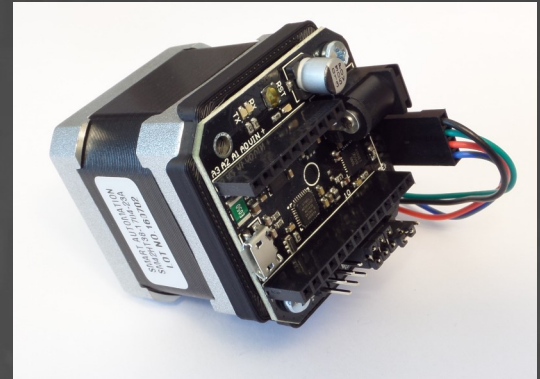


Fig.8: Connect the motor, and you are done!

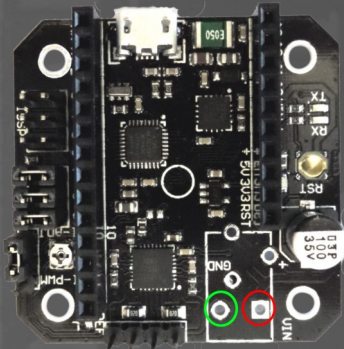


Fig.9: Using screw terminals or leads. Green = GND and Red = 8 - 24 V.

Before turning on the power, make sure that you have connected the leads correctly and that the source provides a DC supply between 8 and 24 V.

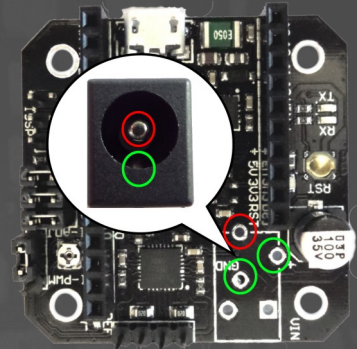


Fig.10: Using DC jack. Green = GND and Red = 8 - 24 V.

Applications

Because of low cost and reliability stepper motors are favored over servo drives in a variety of applications, as for example robots, CNC machines, 3D-printers etc. With added feedback uStepper can add a new dimension to stepper operation utilizing closed loop control or correction of missed steps - making the stepper even more appealing than a more costly servo drive. With the numerous features and the vast amount of I/O's (including various busses), uStepper is the choice for DIY hobbyists when in need of a reliable, precise and compact actuator for almost any application.

Almost unlimited applications and ease of programming using the Arduino IDE also makes uStepper well suited for educational purposes.

"After all, learning just gets a bit more fun when there's movement involved!"

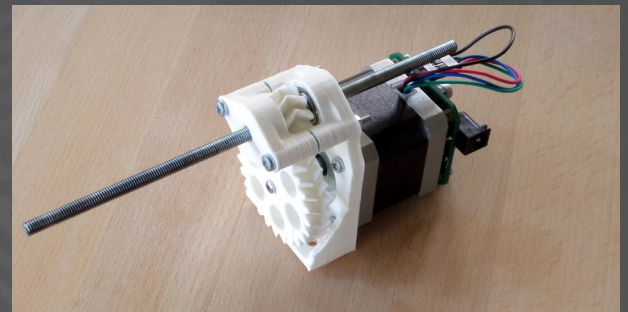
Application examples

Robotic arm using 3 uSteppers



The uStepper Robotic Arm is a good example of how 3 uSteppers can be put to use in an exciting and educational application. If you are eager to learn about kinematics, or just want to have your own cool robot arm at home, this could be a good candidate.

Multi purpose linear actuator



The linear actuator is fitted tightly on a NEMA 17 sized stepper motor. The ultra compact uStepper fitted on the stepper gives precise control with possibility for feedback – giving the opportunity to compensate for lost steps if needed.

Disclaimer

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1.1 uStepper ApS and/or ON Development IVS (or any individuals affiliated with either of the two companies) can not be held responsible for any damage inflicted upon mounting or interfacing with the uStepper board. This also includes damage to stepper motor (both electrical and mechanical) or any other 3rd party hardware connected to uStepper. Most stepper motor cases are made of aluminum, and care must be taken when preparing the mountings for uStepper.

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Detailed description, design files and examples can be found on www.uStepper.com

Contact

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www.uStepper.com