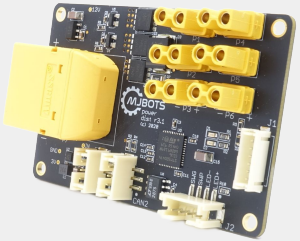
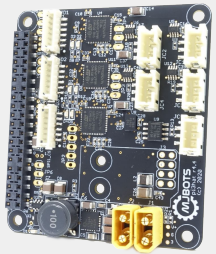




Capable Open Source Robotics

https://mjbots.com

About Josh (me)

I’m an engineer who is passionate about robotics!

I’ve been working in the commercial robotics space since graduating in 2004, and hobbying for more than a decade before that.

Bluefin Robotics

Jaybridge Robotics

Jaybridge Robotics

Toyota Research Institute

mjbots
November 2020
Update
MJBOTS

mjbots Robotic Systems

Founded in 2018, mission statement:

> “Allow researchers and enthusiasts to create world changing robotic systems with capable, affordable products and top quality support”

Open Source Software (and most hardware)

All of the firmware and software used in every mjbots product is licensed under the Apache 2.0 License.

All of the PCB designs are as well!

This means that you can not only study the software and PCB designs to understand how they work, but you can directly incorporate them into your work, even if you commercialize it -- with no royalties!

Products

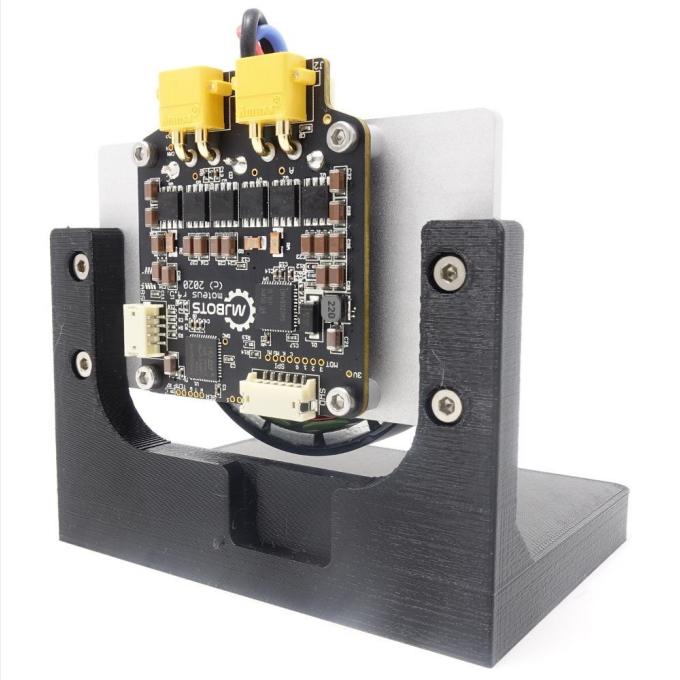
Product focus

Mjbots products are designed to encompass many of the components you need to build a dynamic, high performance robotic system:

- Brushless motor controllers
- High speed and low latency CAN-FD adapters
- Power conditioning and filtering
- Integrated servo drives

moteus brushless motor controller

- Same basic function and control performance as the MIT Mini-Cheetah controller:
  - Integrated absolute magnetic encoder
  - 3 phase current/torque sensing
  - 40kHz FOC based control
- ... with many enhancements
  - STM32G4 based
  - 100A peak phase current, 44V peak voltage
  - 5Mbps CAN-FD communication
  - Auxiliary I2C encoder for post-gearbox sensing
  - More comprehensive firmware
  - GUI for diagnostics and configuration



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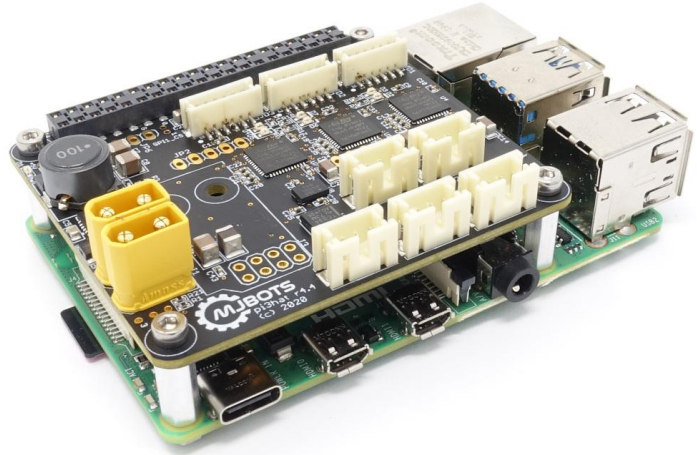
pi3hat

- Multi-purpose Raspberry Pi 4 (and 3) robot controller
  - Power source for Raspberry Pi, accepts up to 44V input
  - 5x independent CAN-FD channels (up to 8Mbps each)
  - 1kHz IMU with built-in UKF based attitude solution
  - Port for nrf24l01 RF transceiver



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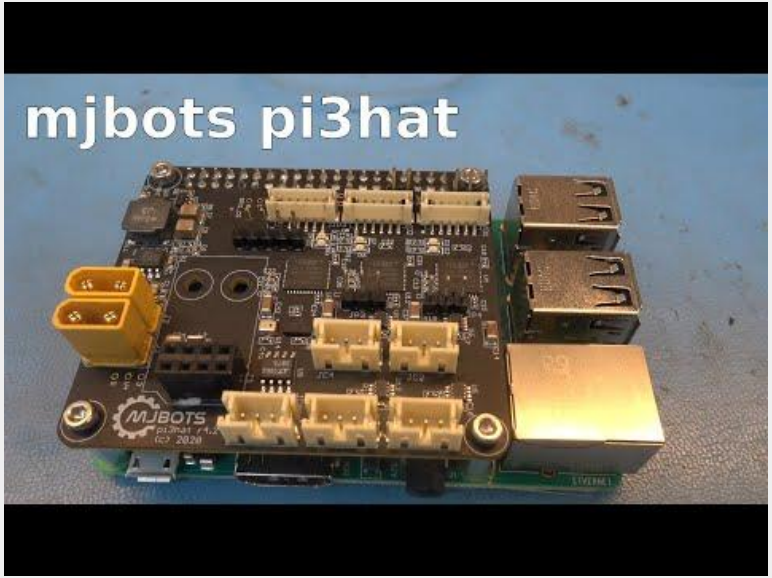
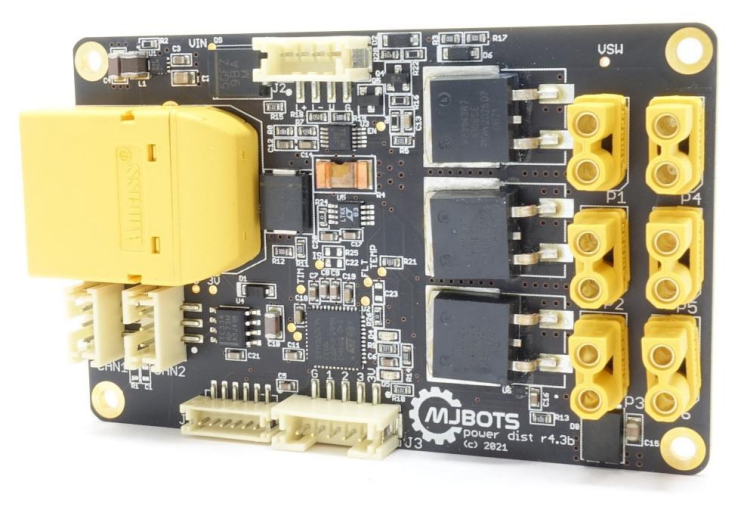


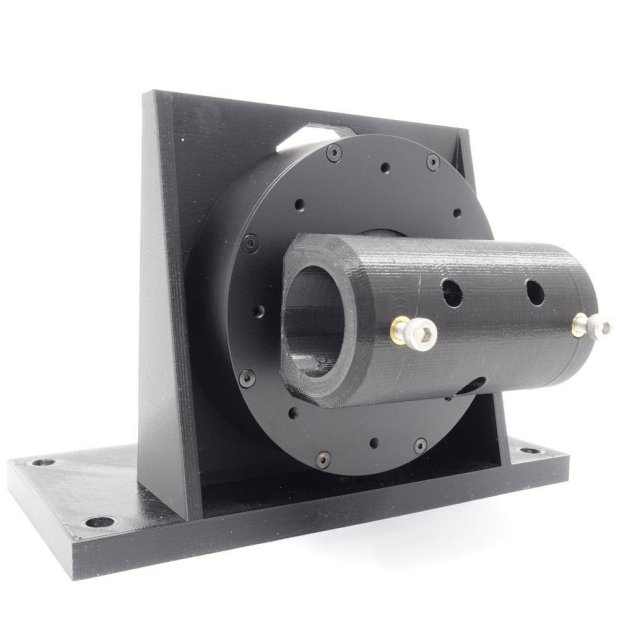
power_dist



- Pre-charge, soft switch, and fault detection
  - 44V input
  - 45A continuous, 80A peak current
  - 6x XT30 output connectors
  - 4000uF max downstream capacitance
  - 300uA quiescent draw when off

qdd100

- High torque, low mass quasi-direct drive brushless servo
  - Peak torque: 16Nm
  - Maximum speed @36V: 3,700dps (616rpm)
  - Mass: 485g
  - Powered by an integrated moteus controller
  - Fully supported by bearings, can directly support large robot mass with cantilevered output



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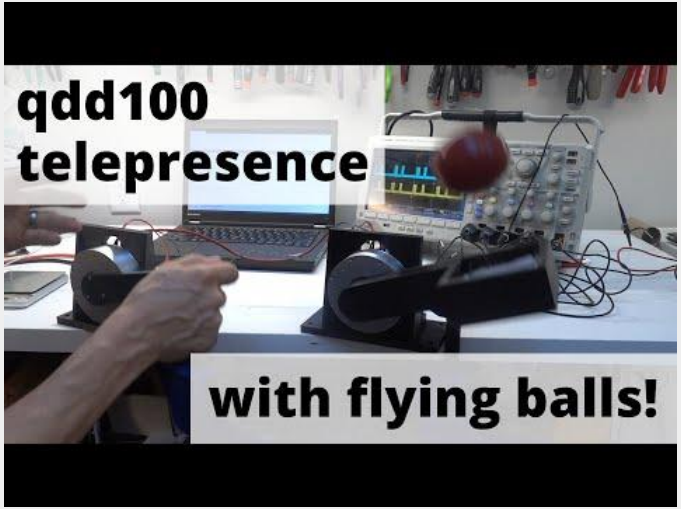


quad A1

- 12 DoF quadrupedal robot
- 10kg mass (with battery)
- 2.5m/s maximum speed
- 50 min battery life
- Chassis nearly entirely 3D printed with design files public
- Multiple interface options
  - Wifi with HTML/JS UI
  - JSON/Websocket interface for programmatic command and monitoring

Speed: 1.4 m/s - 10% slow motion

Getting started kits

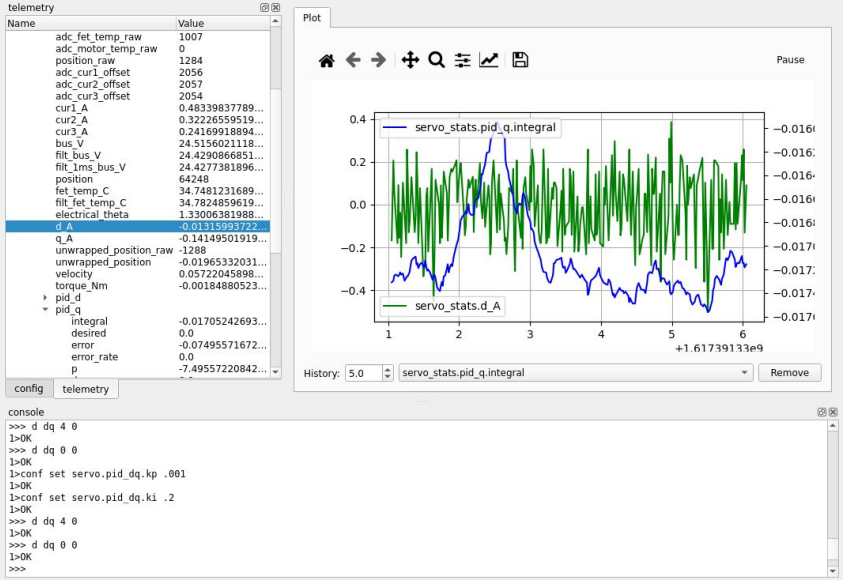
Both the moteus controller and qdd100 have “developer kits”, which include everything necessary to make things move out of the box.

No extra parts or cable building required!

Software and Support

Client libraries

- moteus and qdd100 have pure python and C++ libraries available
- The “tview” diagnostic tool lets you interactively modify configuration and inspect the state of the devices



github

Each of the various products has a distinct github repository with source and issues:

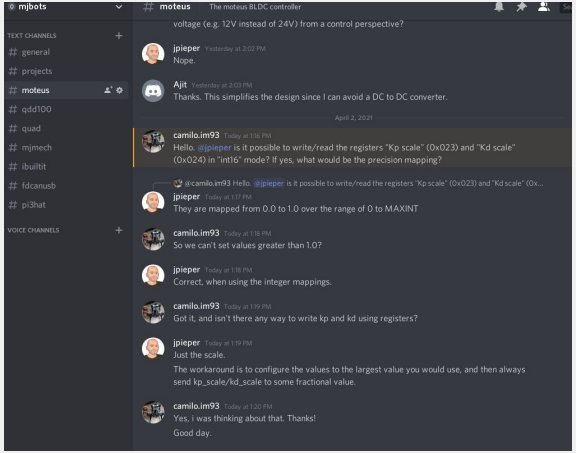
- moteus: https://github.com/mjbots/moteus
- pi3hat: https://github.com/mjbots/pi3hat
- power_dist: https://github.com/mjbots/power_dist
- quad A1: https://github.com/mjbots/quad

Discord

24/7 community and mjbots provided support via a Discord server: https://discord.gg/W4hUpBb

Questions, debugging, application engineering, and feature requests are all welcome.

Demonstration applications are typically turned around within a few days.



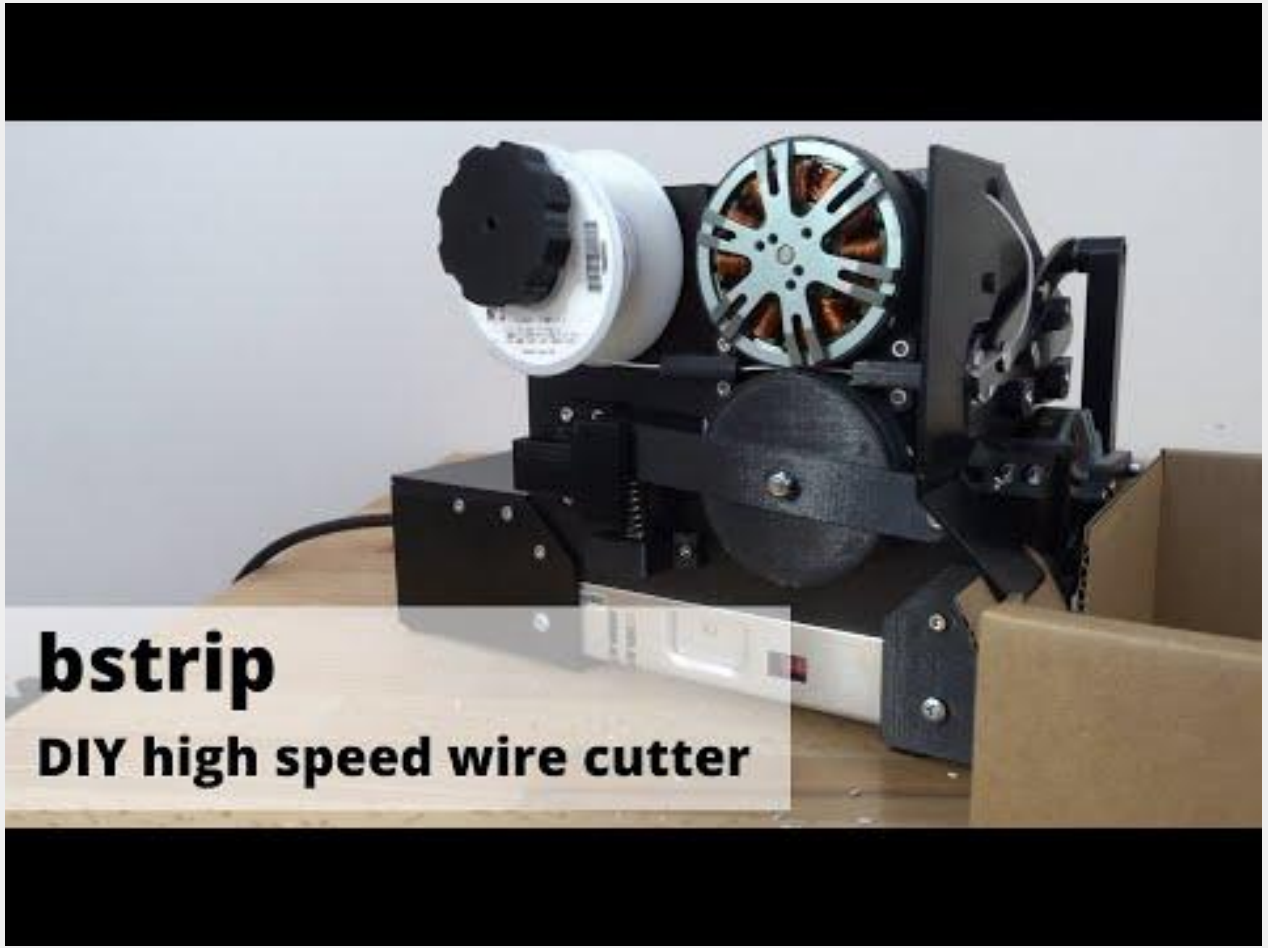
Worldwide reach

Customers on 5 continents (here’s looking at you Africa and Antarctica!)

Public projects

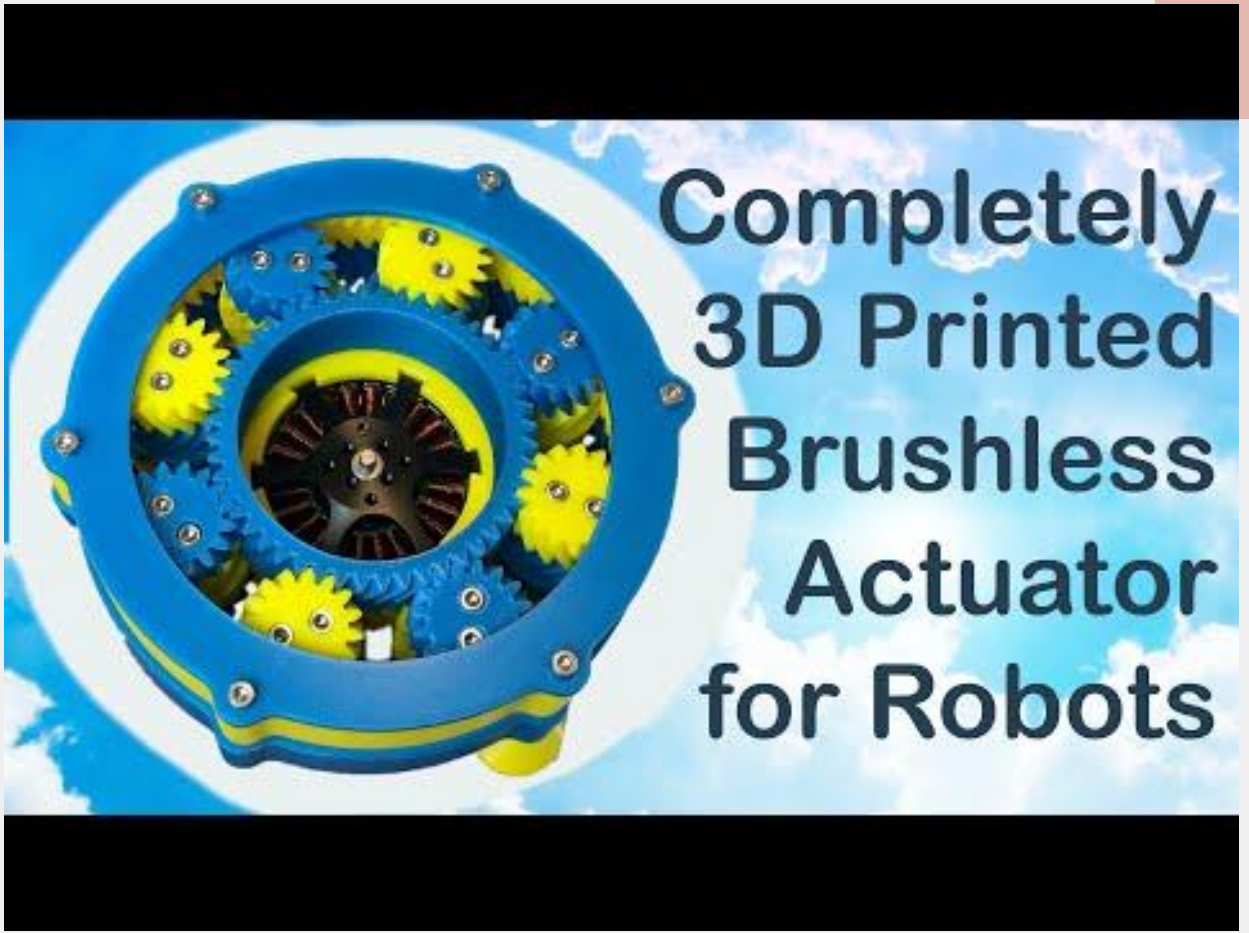
Stanley quadruped

bstrip



y2lso

3d printed actuators



Thank you!

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