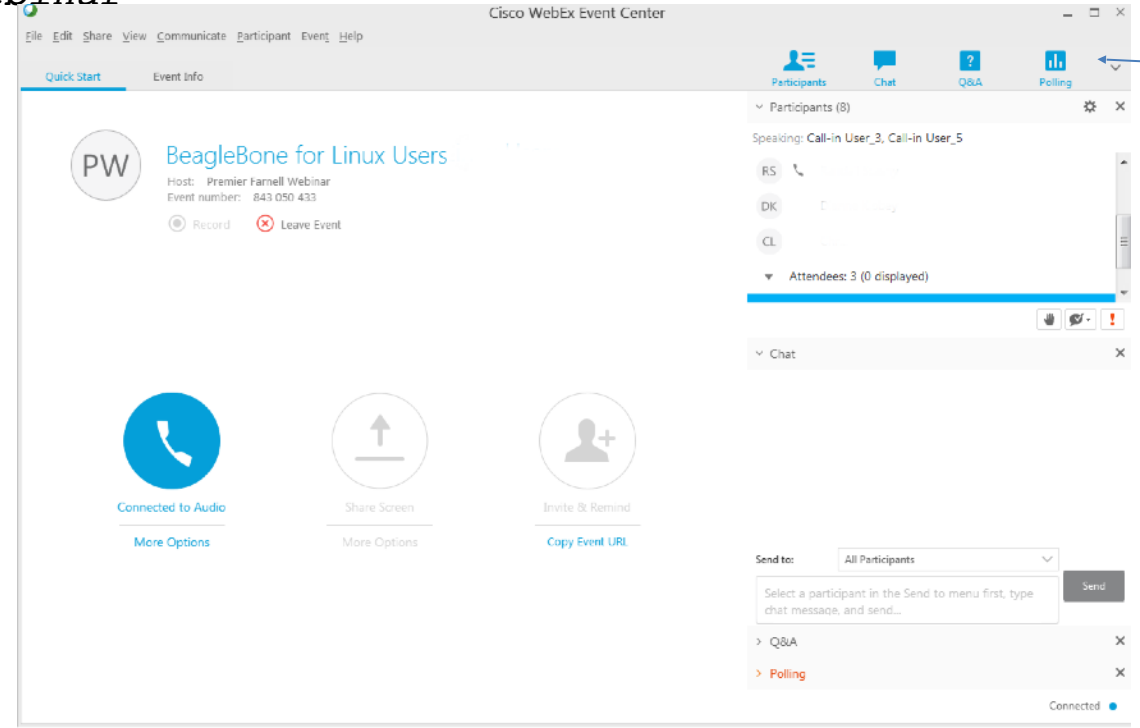
Welcome to “BeagleBone Blue for Robotics”

This webinar will begin on the hour.

- We invite you to join in the Chat, Q&A and Polls during this live webinar -



Join the Chat, Q&A and Polls Here

Farnell element14 Newark element14 element14 element14 COMMUNITY

beagleboard.org®

Training BeagleBoards

with Jason Kridner

Webinar 05 -
BeagleBone Blue for Robotics

Jason Kridner

Co-founder and board member at
BeagleBoard.org Foundation

Your DEVELOPMENT DISTRIBUTOR

Webinar Series

BeagleBone Webinar Series

Date	Time (UTC)	Topic
~~10th May~~	~~11:00 (CT) / 17:00 (UK)~~	~~Introduction to BeagleBoard.org and BeagleBone~~
~~24th May~~	~~11:00 (CT) / 17:00 (UK)~~	~~BeagleBone for Linux Users~~
~~6th June~~	~~11:00 (CT) / 17:00 (UK)~~	~~BeagleBone for Embedded Developers~~
~~21th June~~	~~11:00 (CT) / 17:00 (UK)~~	~~BeagleBone for Web Developers~~
9th August	11:00 (CT) / 17:00 (UK)	BeagleBone Blue for Robotics
23rd August	11:00 (CT) / 17:00 (UK)	BeagleBone in the Classroom

Today's Topics

- Topics
  - What is BeagleBone Blue and how is it special?
  - When to use BeagleBone Blue instead of BeagleBone Black?
  - Examples of use in robotics.
  - Available connectors, standards and how to use them.
  - LiPo and Power
  - How to turn my first wheel.
  - Control systems (ArduPilot / EDUMIP ROS / LabVIEW)
  - PRUs for Robotic applications
- Q&A
  - Posted Questions
  - Questions from chat

What is BeagleBone Blue and how is it special?

Image from https://makezine.com/product-review/beaglebone-blue/

What is BeagleBone Blue and how is it special?

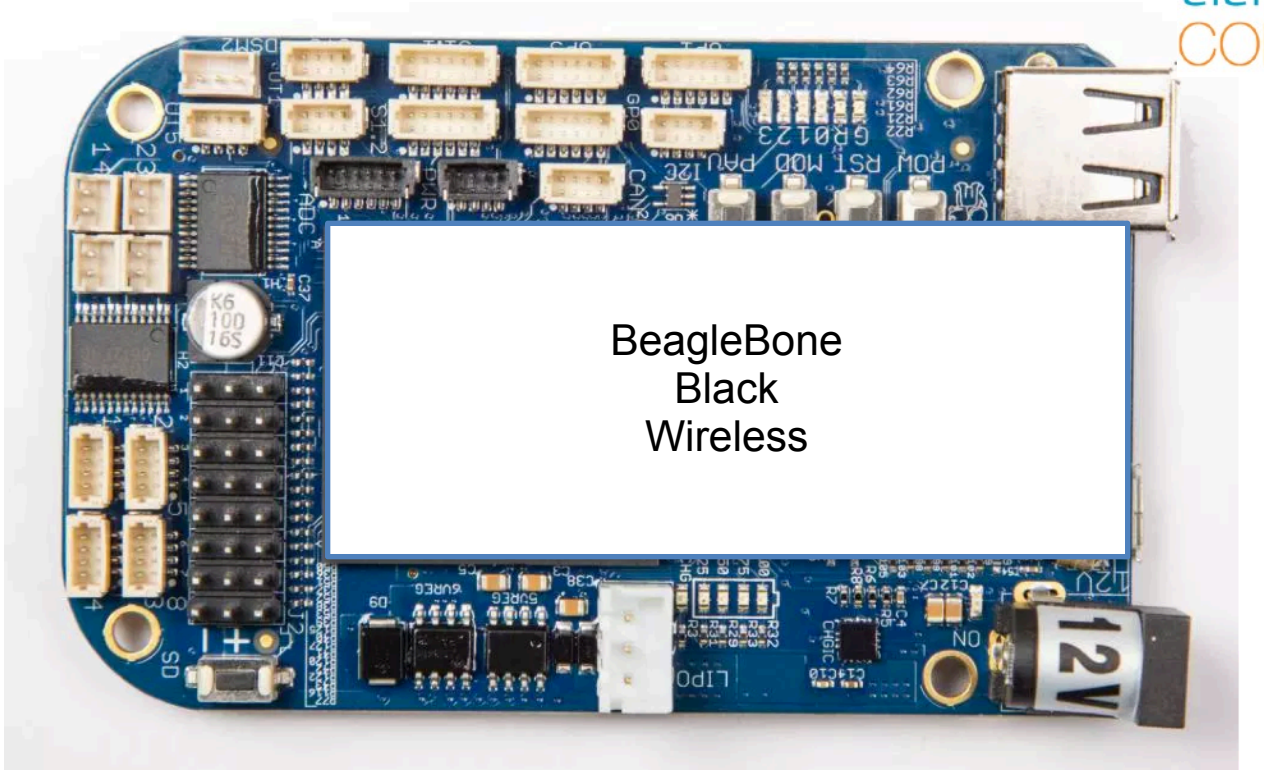


Image from https://makezine.com/product-review/beaglebone-blue/

What is BeagleBone Blue and how is it special?

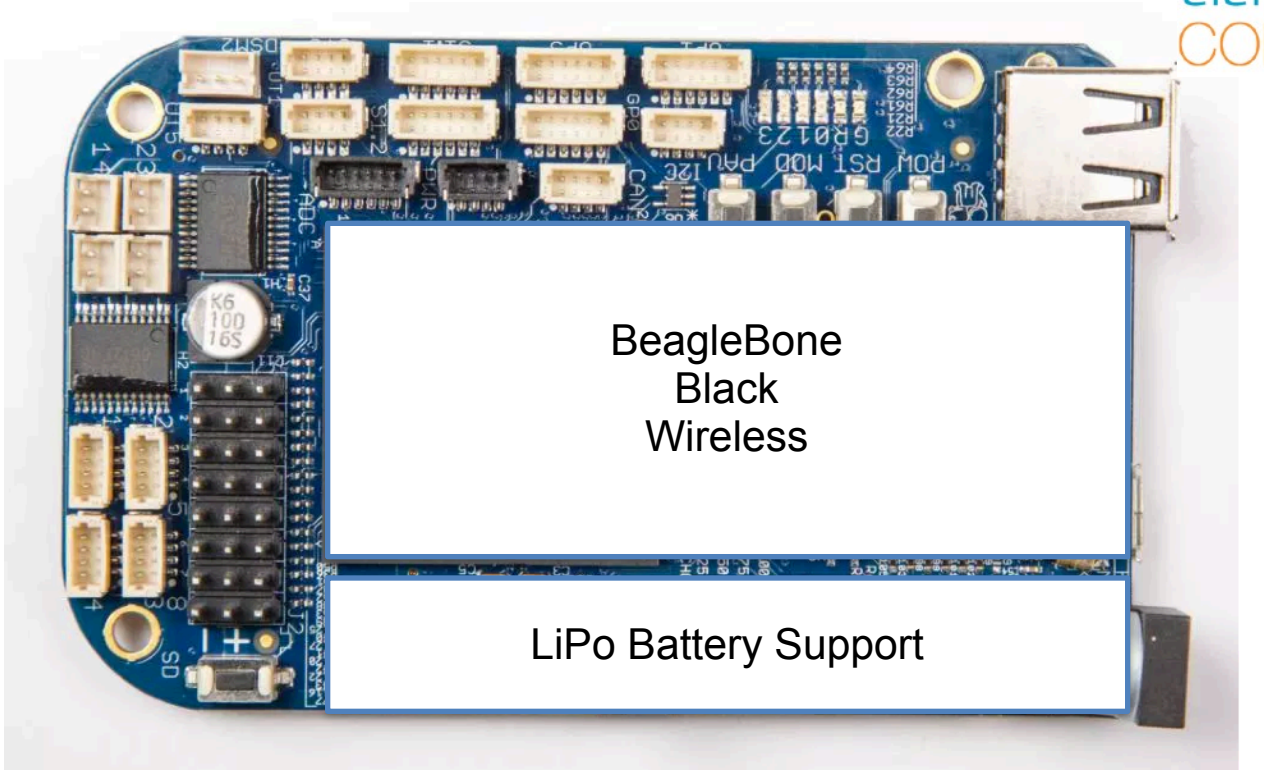


Image from https://makezine.com/product-review/beaglebone-blue/

What is BeagleBone Blue and how is it special?

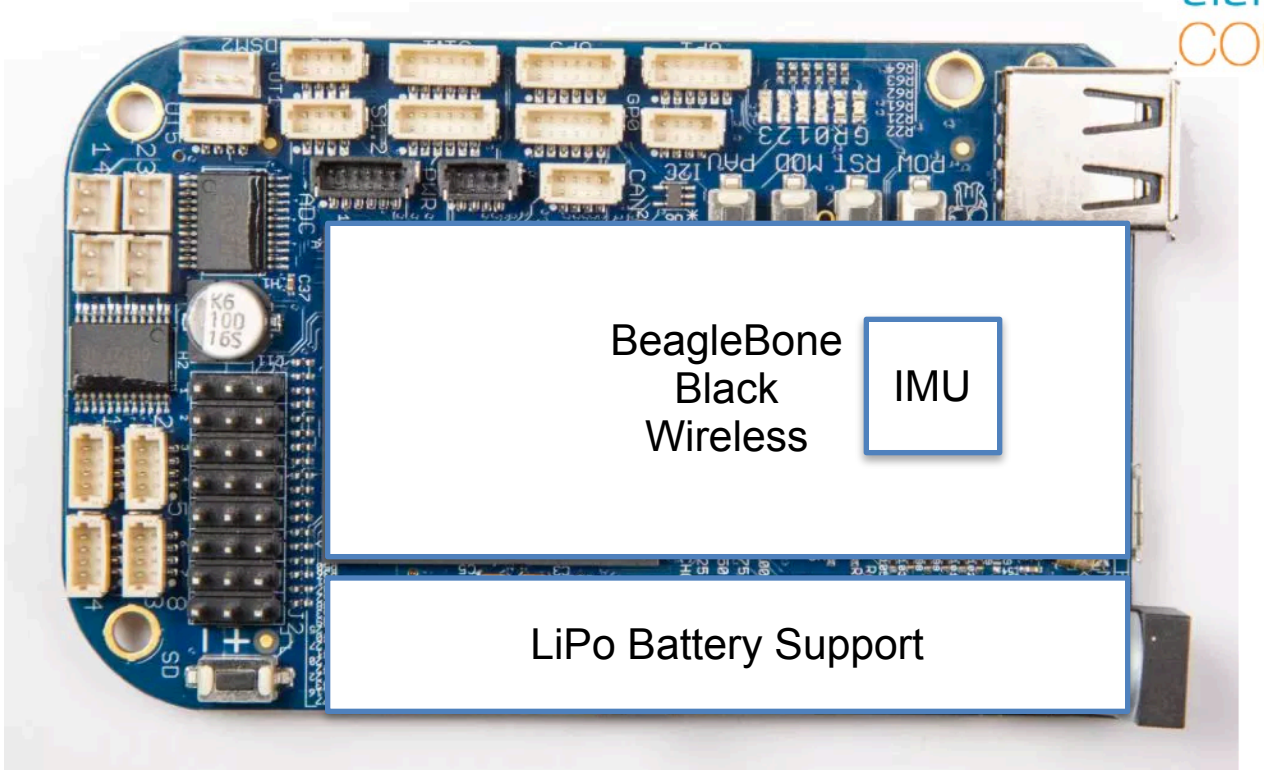


Image from https://makezine.com/product-review/beaglebone-blue/

What is BeagleBone Blue and how is it special?

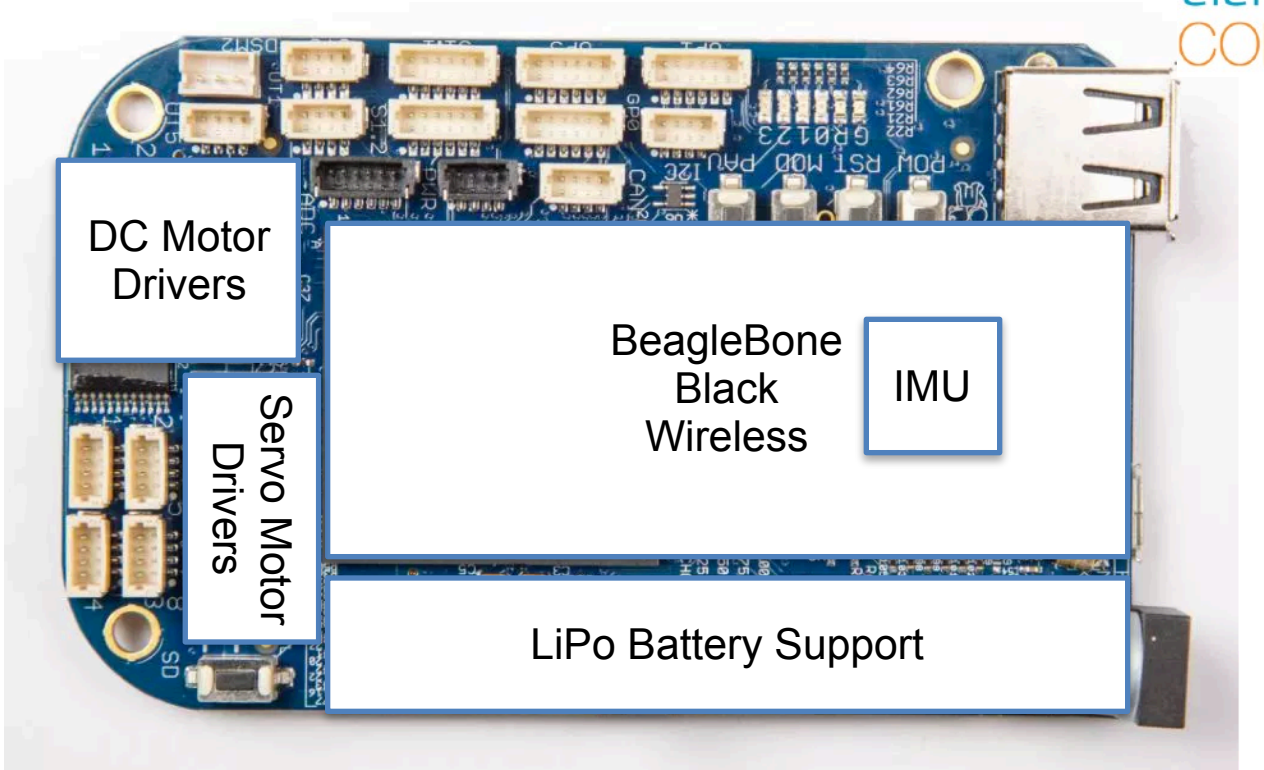


Image from https://makezine.com/product-review/beaglebone-blue/

What is BeagleBone Blue and how is it special?

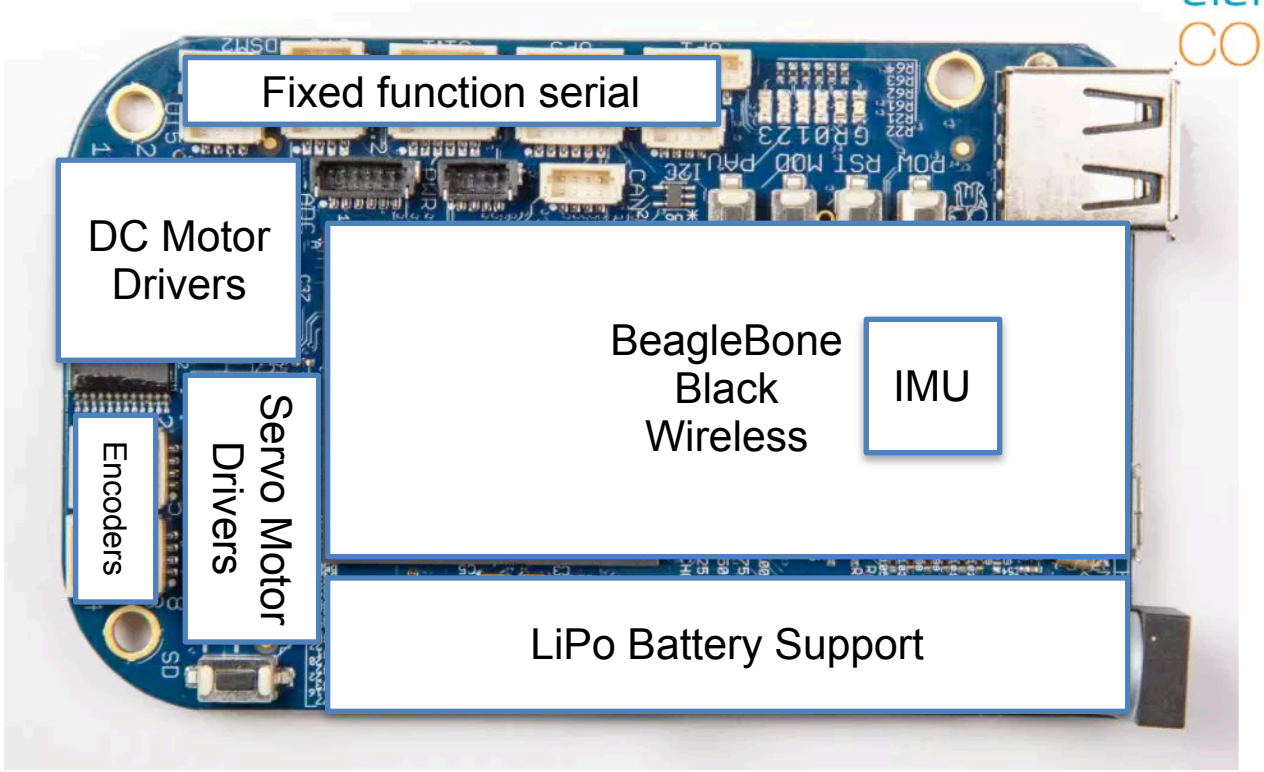


Image from https://makezine.com/product-review/beaglebone-blue/

What is BeagleBone Blue and how is it special?

beagleboard.org®

element14 COMMUNITY

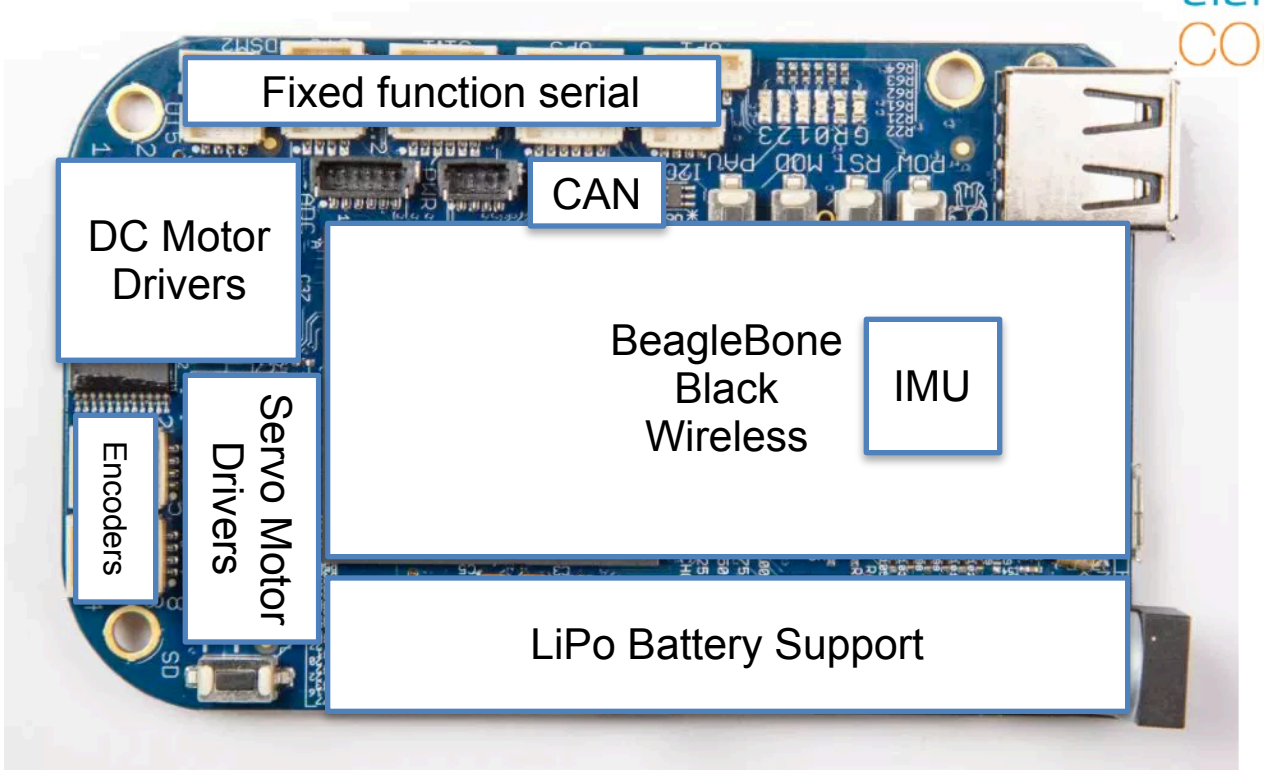
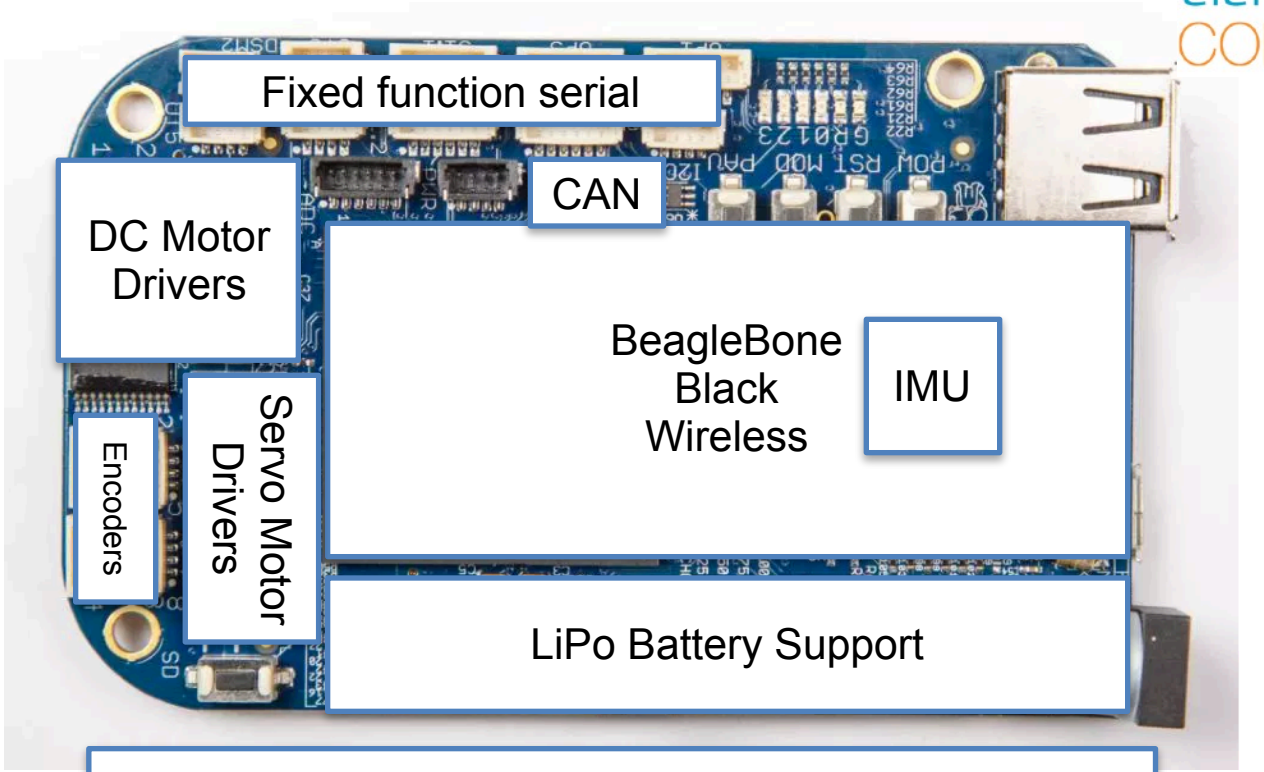


Image from https://makezine.com/product-review/beaglebone-blue/

What is BeagleBone Blue and how is it special?

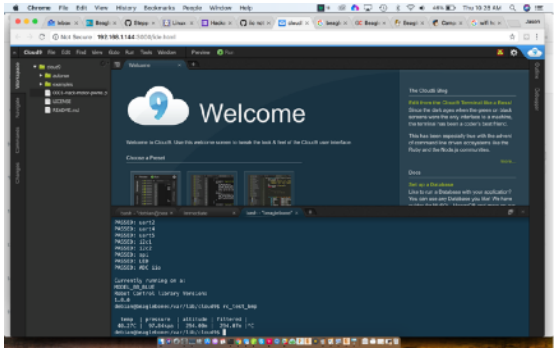
beagleboard.org®
element14 COMMUNITY



librobotcontrol

What is BeagleBone Blue and how is it special?

SSID: BeagleBone-*XXXX*
Password: BeagleBone



http://192.168.8.1:3000

rc_test_motors
rc_test_servos
rc_test_encoders
rc_test_bmp
rc_test_mpu
rc_test_dmp
…

librobotcontrol

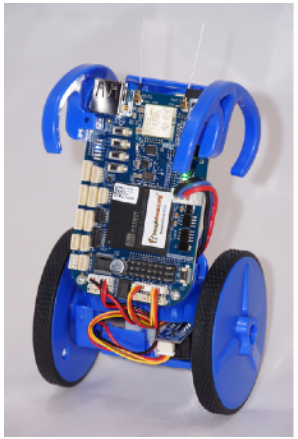
When to use BeagleBone Blue instead of BeagleBone Black?

beagleboard.org®

element14 COMMUNITY

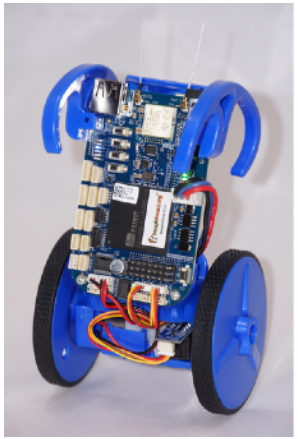
- Small
- Lowest cost for all the integration!
- Driving up to 4 6-9V/1.2A (3.2A peak) motors
- Driving up to 8 6V servo motors
- Point-to-point connections simplify in-case assembly
- Pre-defined port/pin functions simplify system

Examples of use in robotics.



bbb.io/edumip

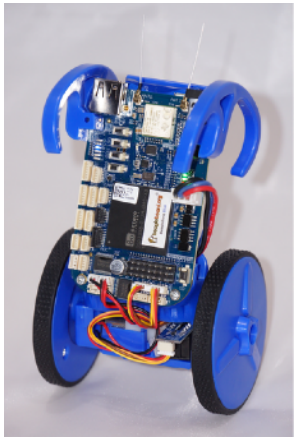
Examples of use in robotics.



bbb.io/edumip

bbb.io/bluedonkey

Examples of use in robotics.

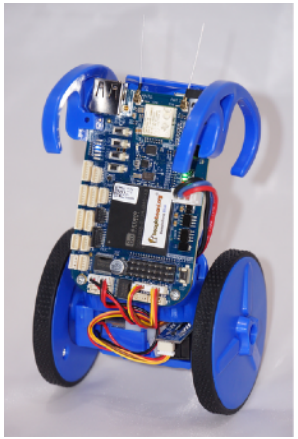


bbb.io/edumip

bbb.io/bluedonkey

bbb.io/ardupilot

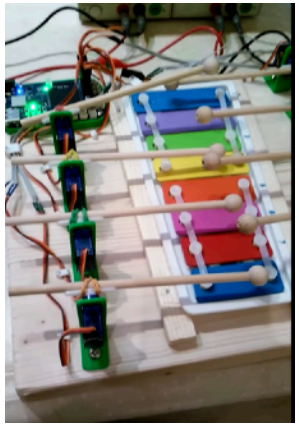
Examples of use in robotics.



bbb.io/edumip

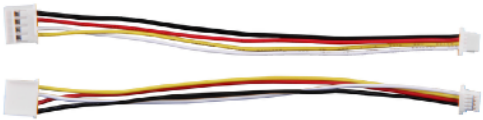
bbb.io/bluedonkey

bbb.io/ardupilot



bbb.io/glock

Available connectors, standards and how to use them.



https://www.digikey.com/short/jr0275

https://www.digikey.com/short/jr02tj

https://www.renaissancerobotics.com/JST_Jumper_Bundle.html

https://github.com/beagleboard/beaglebone-blue/wiki/Accessories

https://github.com/beagleboard/beaglebone-blue/wiki/One-Liner-Module-Tests

LiPo and Power

USB

2S LiPo
JST-PH

9-18V DC

Charger

BeagleBone
Function and
IMU

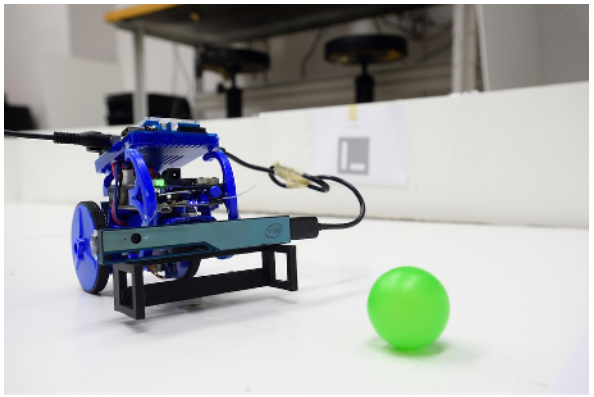
DC Motor and
Servo Drivers

How to turn my first wheel.

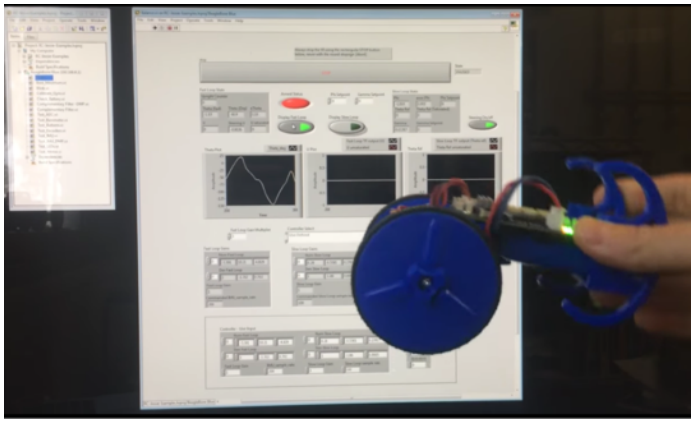
- Wire 2-pin JST-ZH red to M+, black to M-
- Connect to M1-4
- rc_test_motors -h
- rc_test_motors -m 1 -d 0.3
- python3
  - import rcpy
  - from rcpy.motor import motor1
  - motor1.set(0.3)
  - ^D

https://guitar.ucsd.edu/rcpy/html/modules.html#module-rcpy.motor
http://strawsondesign.com/docs/librobotcontrol/group___motor.html

bbb.io/ardupilot



bbb.io/edumipros



LabVIEW: http://bbb.io/+2005f8

Also Simulink: http://bbb.io/+59cd71

PRUs for Robotic applications

- Need more PWMs?
- Need more quadrature encoders?
- Need advanced pulse/signal measurement?
- Need to deliver precise stepper pulses?

- Start with existing integrations and modify:

https://github.com/StrawsonDesign/librobotcontrol/tree/master/pru_firmware/src

https://github.com/ArduPilot/ardupilot/blob/master/libraries/AP_HAL_Linux/RCInput_AioPRU.cpp
https://github.com/ArduPilot/ardupilot/tree/master/Tools/Linux_HAL_Essentials/pru/aiopru

Questions posted on the element14.com Community

- PRU (Programmable Real-Time Unit) tutorial : I'm curious what the best tutorial is currently. I've used it with the assembler, but I know there was a C compiler tutorial in the works, so I was just wondering what the best current resources were.
- Some of the device tree tutorials for the BBB are now outdated, so whatever the best current links are would be great to know.
-

Questions from the Webinar Chat.

Next Webinar Dates

beagleboard.org®
element14 COMMUNITY

Date	Time (UTC)	Topic
~~10th May~~	~~11:00 (CT) / 17:00 (UK)~~	~~Introduction to BeagleBoard.org~~
~~24th May~~	~~11:00 (CT) / 17:00 (UK)~~	~~BeagleBone for Linux Users~~
~~6th June~~	~~11:00 (CT) / 17:00 (UK)~~	~~BeagleBone for Embedded Developers~~
~~21th June~~	~~11:00 (CT) / 17:00 (UK)~~	~~BeagleBone for Web Developers~~
~~9th August~~	~~11:00 (CT) / 17:00 (UK)~~	~~BeagleBone Blue for Robotics~~
23rd Aug	11:00 (CT) / 17:00 (UK)	BeagleBone in the Classroom

Other Resources

www.beagleboard.org

www.element14.com/beagleboard