

Adding Linux to Your Design

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Why Linux?

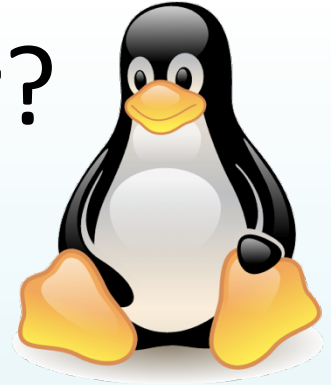
- High-level language support
- Flexible networking stack
- Multitasking
- Hardware abstraction and portability



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Why Linux in particular?

- Free is good
- Examples/Community
- It runs everywhere



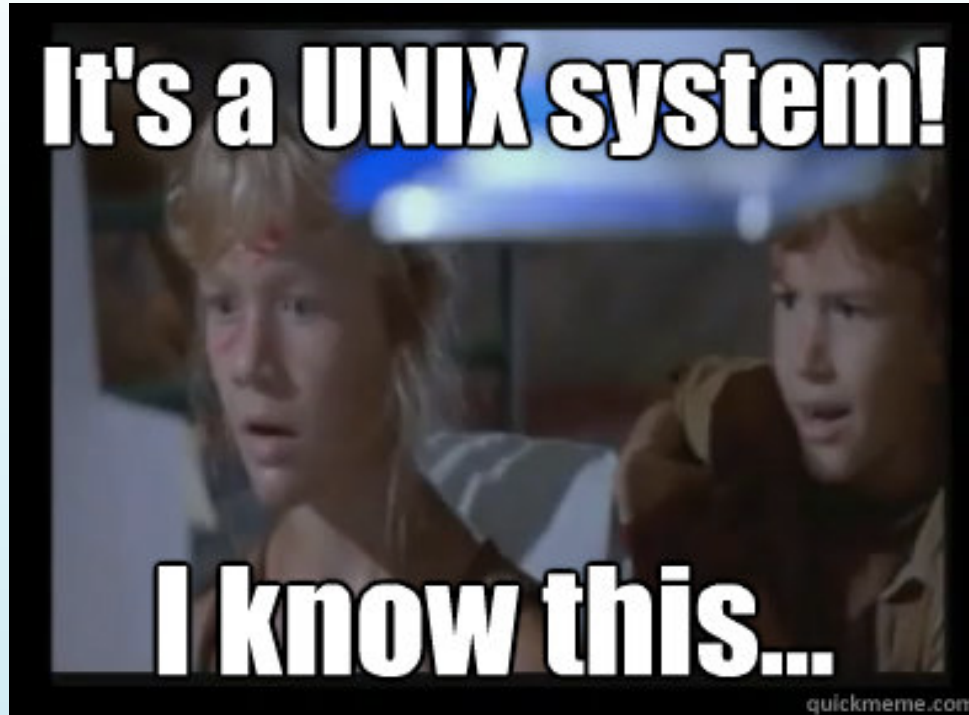
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Why Linux, *really*?



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Why Linux, *really*?



"Jurassic Park" by Universal Pictures. Used without permission.



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Why Linux, *really*?

- Hackability
 - “It’s a Unix system, I know this”
 - Lots of eyes on security vulnerabilities
- When you know it will save you time
 - Prototype fast
 - Something will go wrong



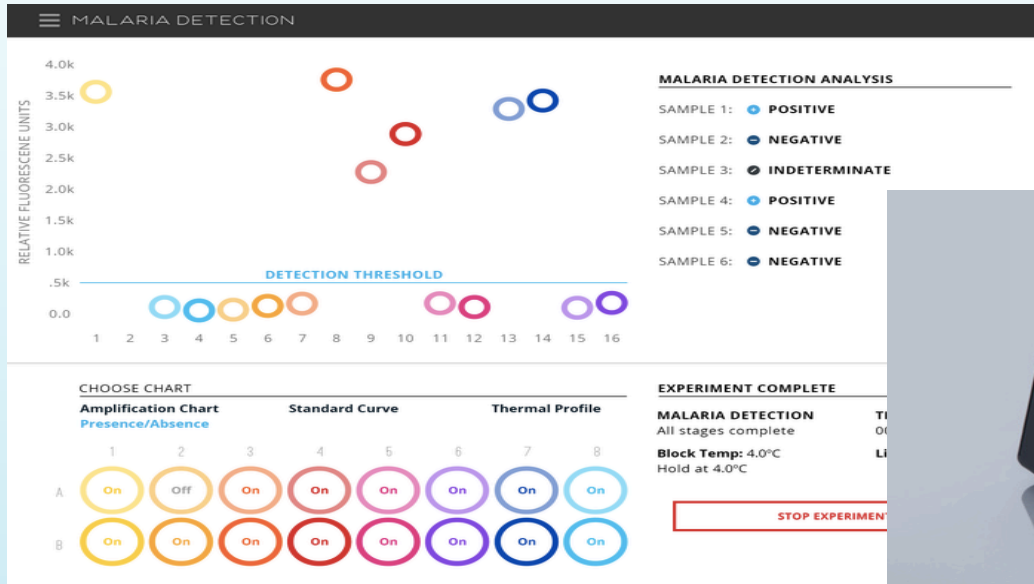
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Examples

- What types of machines get value out of Linux?

Open qPCR

DNA Diagnostics for Everyone



OpenROV

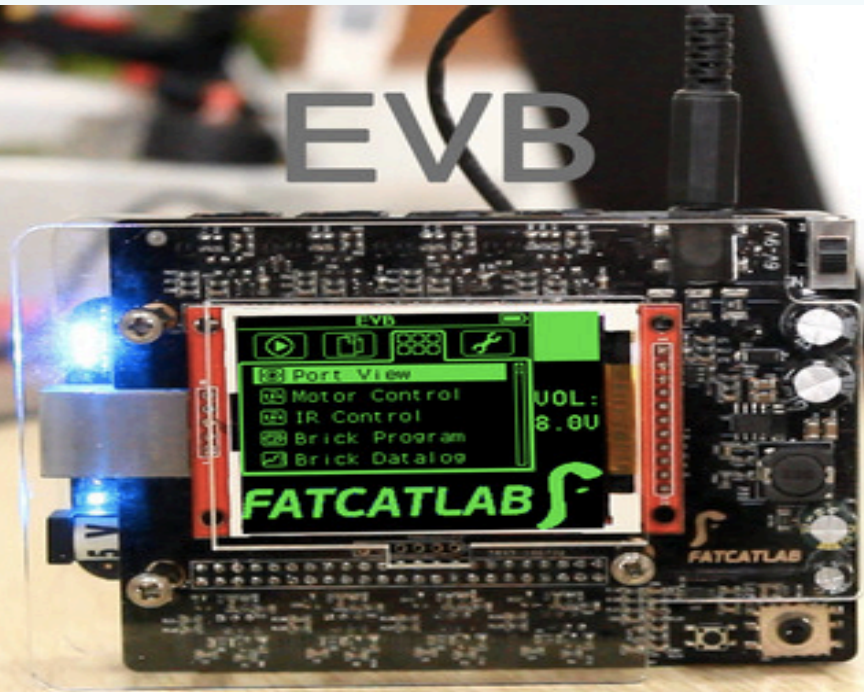
Open source underwater robots for exploration and education





LEGO EV3 and derivatives

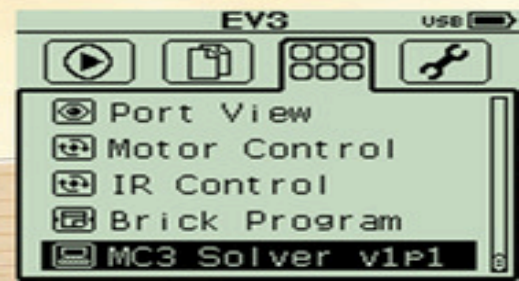
EVB



With BBB



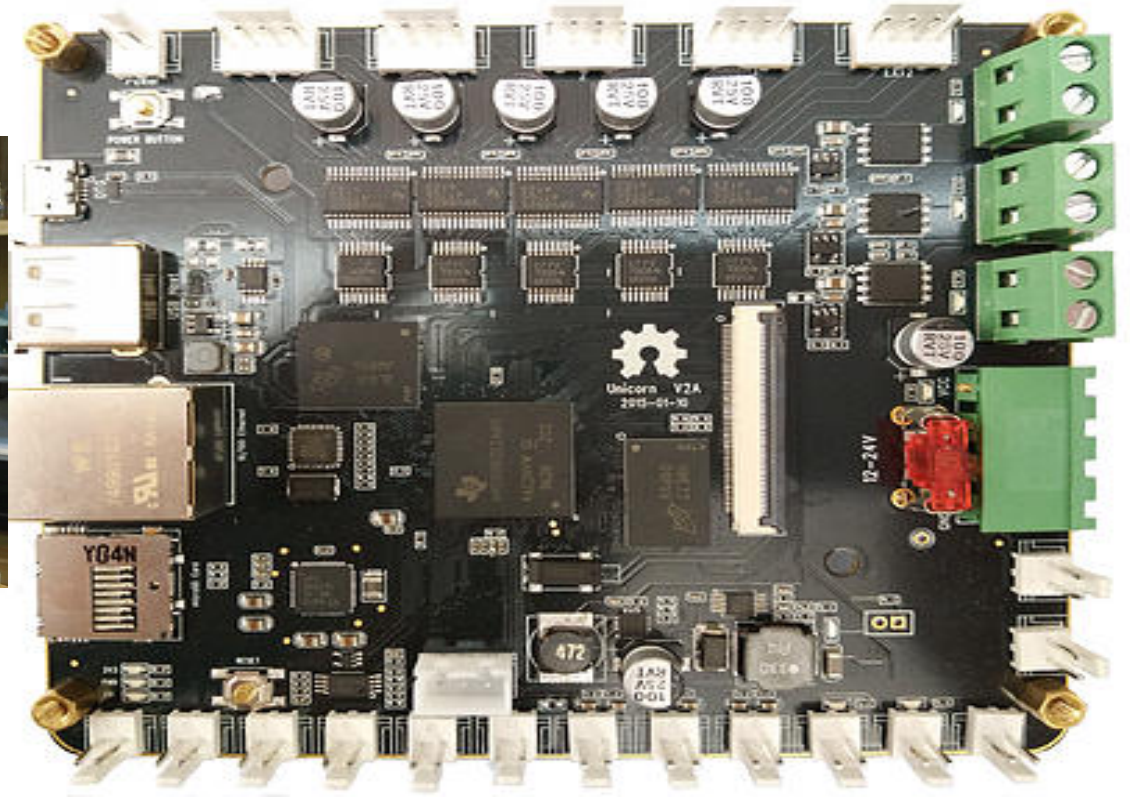
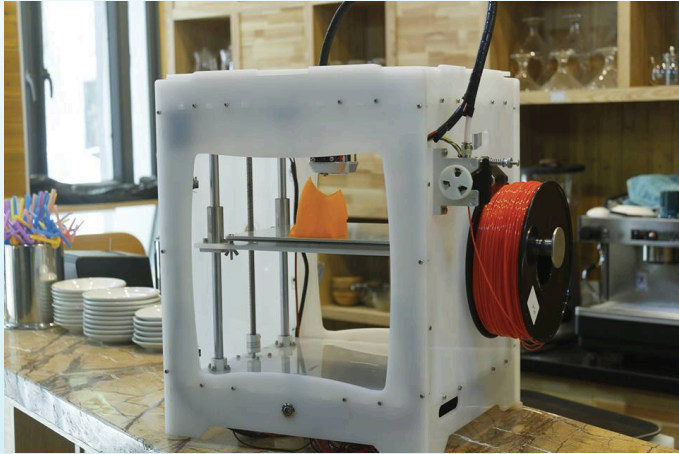
EV3



Ninja Sphere

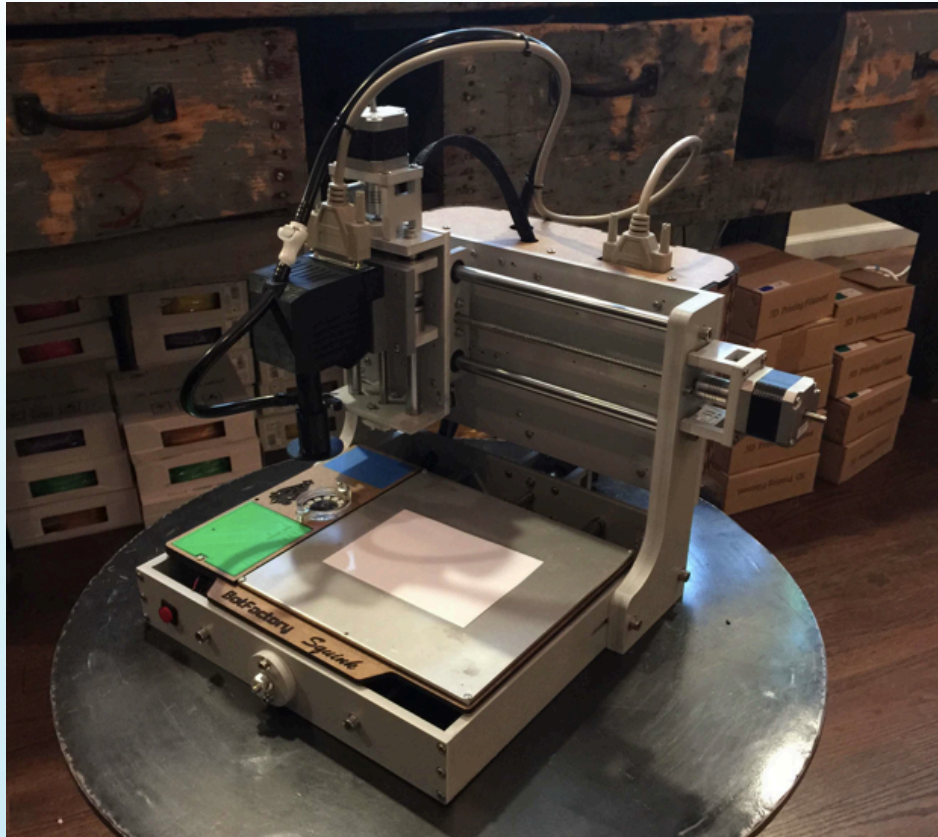


FastbotBBP



MakerCon

BotFactory Squink



POURSTEADY

FREE COFFEE!
SIGN UP



TIPS

COFFEE
MAKERS
makers.com



Picking a solution

Picking a solution



open source
hardware

Picking a solution

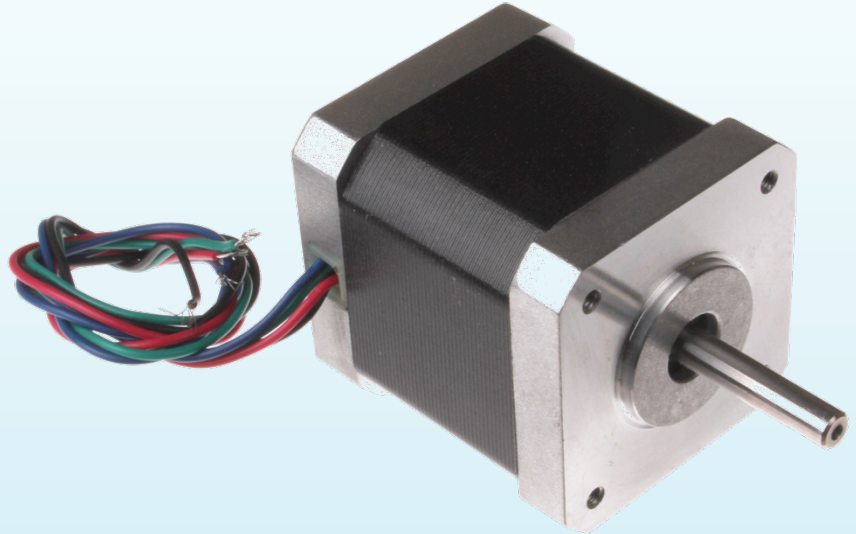
- Open hardware
 - Helps manage supply chain
 - Avoids hidden issues
 - Enables customization
- Mainline support
 - Vendor and community active

But what about... ?

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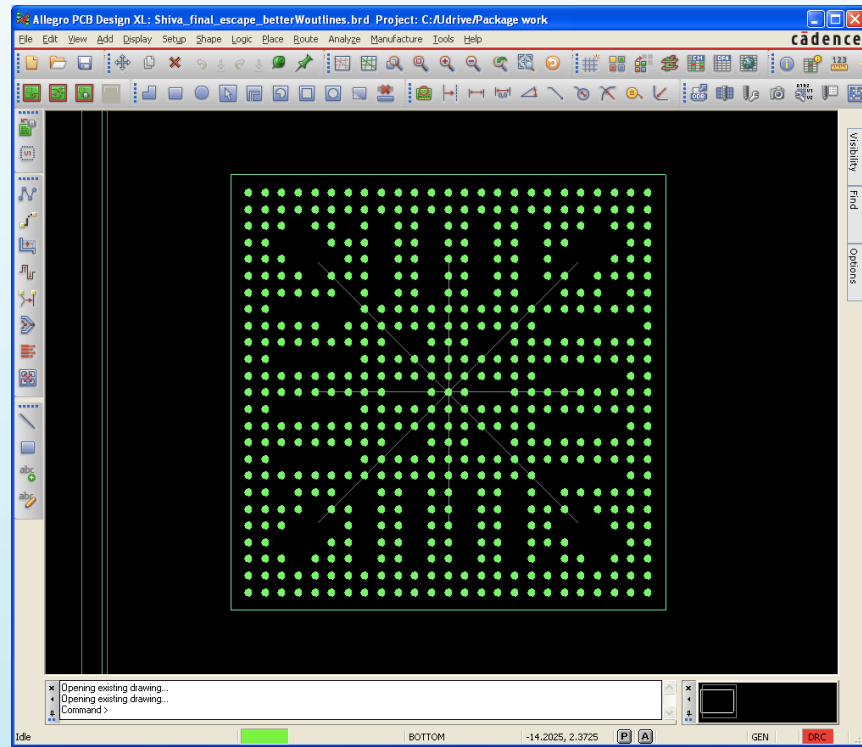
<http://www.machinekit.io/>



"Nema 17 Stepper Motor" by oomlout - STMO-17.
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But what about... ?

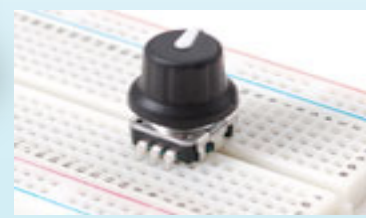
- Real-time
- Manufacturability



Want to learn Linux?



A central collage of images. At the top left is a browser window with a search bar and navigation arrows. Below it, the text 'digitalWrite()' is written. A blue arrow points from this text to a blue circle containing the text 'SOCKET IO'. To the left of this circle is a white laptop. To the right is an Arduino Uno board with a 'node JS' logo on it. The background is light blue.



Cloud9 IDE included

A screenshot of the Cloud9 IDE interface. The browser address bar shows the URL 192.168.3.25:3000/ide.html. The interface includes a menu bar (File, Edit, Find, View, Goto, Run, Tools, Window), a toolbar with 'Preview' and 'Run' buttons, and a user profile 'John Doe'. On the left, a 'Workspace' sidebar shows a file tree with folders like 'cloud9', 'examples', and 'static'. The main area is a code editor with a dark theme, displaying JavaScript code for controlling LEDs. The code includes an array of LED pins, a loop to set pin modes, a state variable, a toggle function, and a setInterval call. The code is as follows:

```
1 var b = require('bonescript');
2
3 var leds = ["USR0", "USR1", "USR2", "USR3", "P9_14"];
4
5 for(var i in leds) {
6   b.pinMode(leds[i], b.OUTPUT);
7 }
8
9 var state = b.LOW;
10 for(var i in leds) {
11   b.digitalWrite(leds[i], state);
12 }
13
14 setInterval(toggle, 1000);
15
16 function toggle() {
17   if(state == b.LOW) state = b.HIGH;
18   else state = b.LOW;
19   for(var i in leds) {
20     b.digitalWrite(leds[i], state);
21   }
22 }
23
```

At the bottom, a terminal window shows a 'Stop' button and a 'Restart' button. The terminal title bar includes 'Immediate (Javascr...', '/demo/blink.py - Sto...', '/demo/Blink.ino - Str...', 'sh - "jasonbone"', 'bash - "jasonbone"', and '/examples/blinkied.j...'. The terminal content shows 'Command: /examples/blinkied.js' and 'Runner: Node.js CWD Environment'.

Thanks!

Join <http://beagleboard.org/chat> and
<http://beagleboard.org/discuss> to chat about
Linux in making

Contact me at jkridner@beagleboard.org