



When Open Source Hardware Fall in love with Fedora

Presented by
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About Tong Hui



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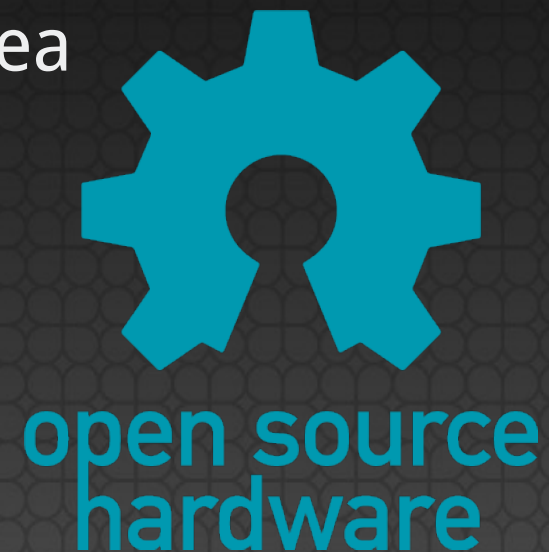
Agenda

- What is Open Source Hardware(OSHW)
- Developing OSHW in Fedora
 - Arduino
 - ARM-based Chips
 - Embedded Linux
- Good News for Fedora
- Plans and Hopes
- Q & A

What is Open Source Hardware (OSHW)

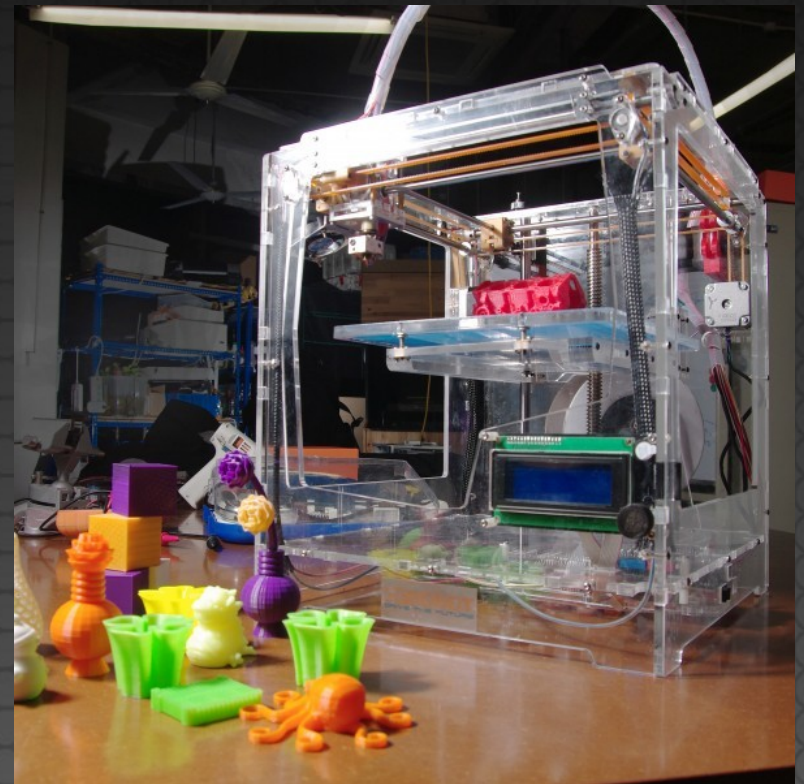
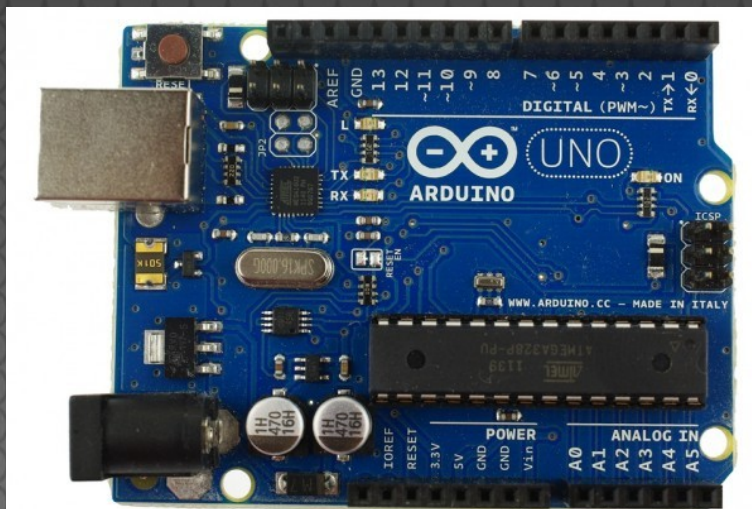
Open Source Hardware

- Based on Open Source Software idea
 - Mechanical drawings
 - Schematics
 - BOM table
 - PCB layout
 - HDL layout
 -
- One of open source culture movement
- License – Most of FOSS are suitable OSHW
- https://en.wikipedia.org/wiki/Open_source_hardware



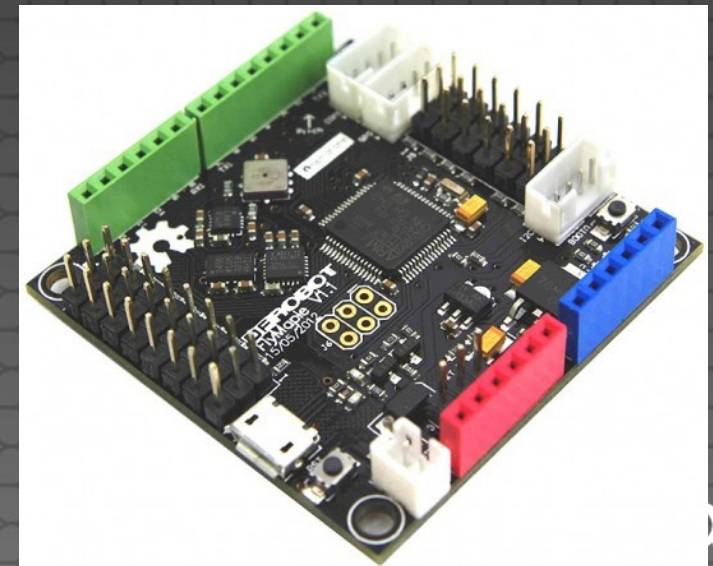
Some OSHW projects

- Arduino
- RepRap – 3D Printer
- OpenSPARC / OpenRISC
- OpenMoko / GTA04
- Open Embedded / Yocto



My Contributing Projects

- OpenDrone Quadcopter
 - www.open-drone.org
- FlyMaple – forked from “Leaflabs Maple”
 - ARM Cortex-M, STM32 Boards
- Dreamer MEGA - Arduino-based Boards



Development OSHW in Fedora

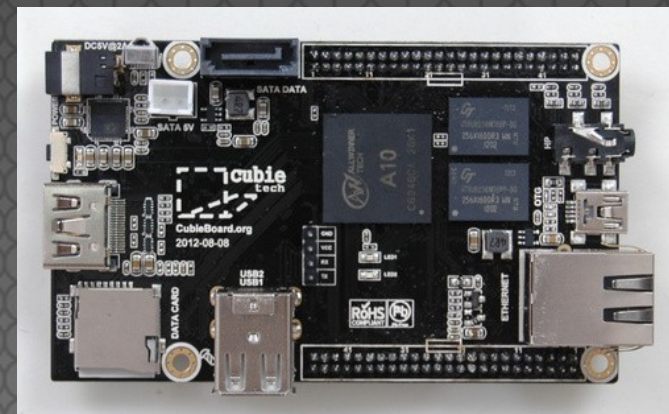
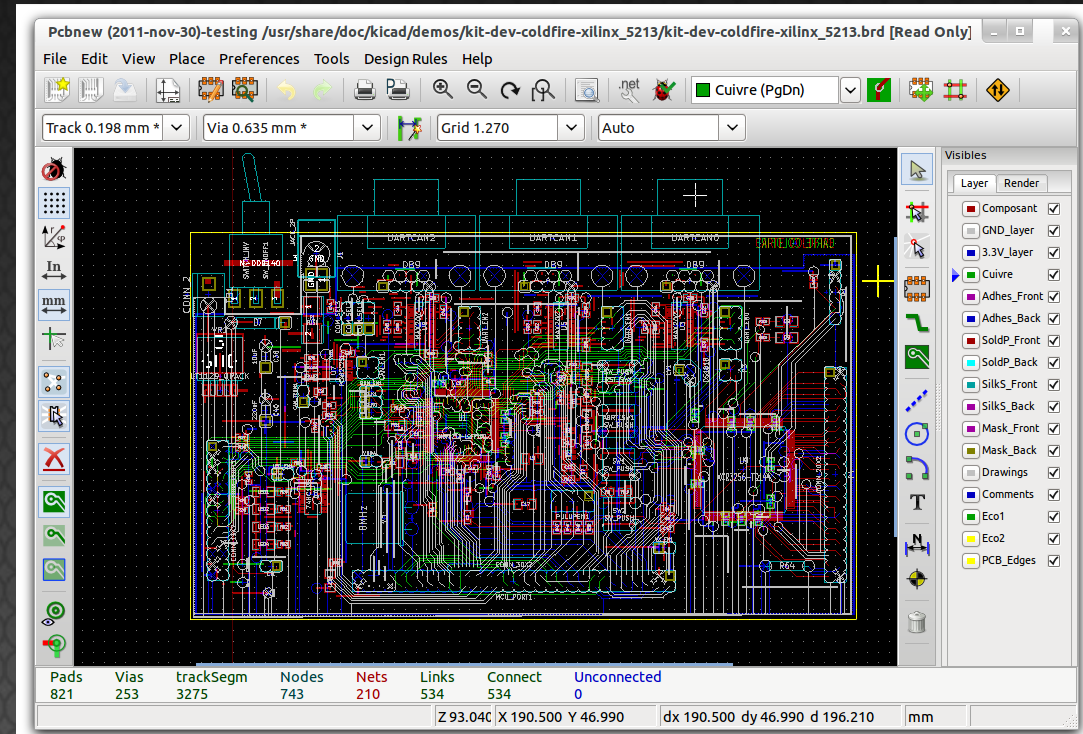
Needed

- Software

- PCB (KiCAD, gEDA, Eagle)
- CAD (FreeCAD, Blender)
- Cross Compile Toolchain
- Arduino IDE
- Fritzing

- Hardware

- Arduino
- Beagleboard / Pandaboard
- Raspberry Pi
- Cubieboard



Play Arduino in Fedora

- Install Arduino IDE
 - yum install arduino
- Add user to plugdev and dialout group
- All Done, Play now!



The screenshot shows the Arduino IDE window titled "Arduino - 0011 Alpha". The menu bar includes "File", "Edit", "Sketch", "Tools", and "Help". The toolbar contains icons for running, stopping, saving, opening, and uploading. The main editor displays the "Blink" sketch code, which is a standard Arduino program for blinking an LED. The code is as follows:

```
/*
 * Blink
 *
 * The basic Arduino example. Turns on an LED on for one second,
 * then off for one second, and so on... We use pin 13 because,
 * depending on your Arduino board, it has either a built-in LED
 * or a built-in resistor so that you need only an LED.
 *
 * http://www.arduino.cc/en/Tutorial/Blink
 */

int ledPin = 13;           // LED connected to digital pin 13

void setup()               // run once, when the sketch starts
{
  pinMode(ledPin, OUTPUT); // sets the digital pin as output
}

void loop()                // run over and over again
{
  digitalWrite(ledPin, HIGH); // sets the LED on
  delay(1000);                // waits for a second
  digitalWrite(ledPin, LOW);  // sets the LED off
  delay(1000);                // waits for a second
}
```

Below the code editor, a status bar indicates "Done compiling." and "Binary sketch size: 1098 bytes (of a 14336 byte maximum)". The page number "22" is visible in the bottom left corner of the IDE window.

ARM MCU or Bare Development

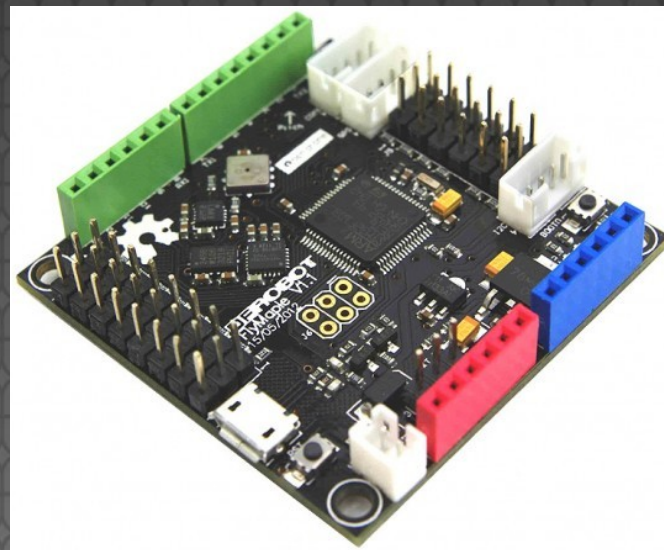
- Suggestions
 - ARM Cross Compile Toolchain (linaro)
 - JTAG/SWD Debugger (OpenJTAG)
 - OpenOCD
 - Leaflabs Maple (STM32 Boards, MCU)
 - Oscilloscope (Xoscope)
 - Qemu

Demo: Flymaple



Flymaple, A flight controller with 10 DOF IMU, based on STM32F103. It forks from “Leaflabs Maple”, use same Maple IDE, and supported Arduino pin-out and API.

- Install Maple IDE – Download it from Leaflab.com
- Or install toolchain manually
http://www.open-drone.org/develop_flymaple_in_unix_toolchain
- All done, and Play!



Embedded Linux

- Kernel Limitation for closed platform (R Pi)
- Please focus:
 - Yocto Project – Hosts by Linux Foundation
 - Tizen Project – Hosts by Linux Foundation
 - Open Embedded
 - OpenWRT – router os
 - OLPC Tablet
 - Fedora for ARM / Ubuntu for ARM / OpenSUSE for ARM

Fedora ARM

- Includes support for Beagleboard-xM, Dreamplug, Guruplug, Highbank, iMX, Pandaboard, Sheevaplug, Trimslice, Versatile Express(QEMU) and more!
- IRC: #fedora-arm @ Freenode
- Maillist: arm@lists.fedoraproject.org
- Cubieboard Fedora ARM distribution
- Raspberry Pi Fedora Remix

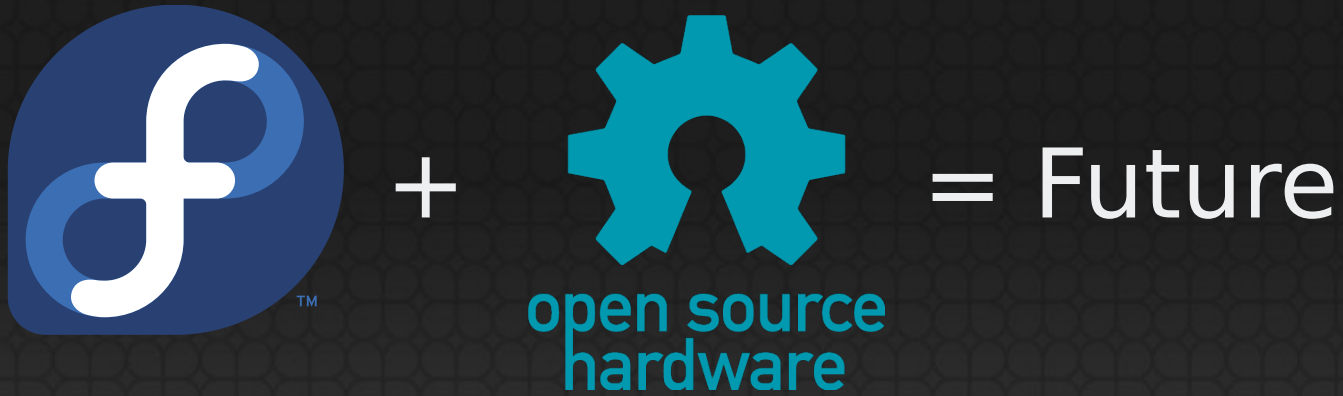
Plans and Future

Plans

- Fedora 19 will support 3D-Printing!
 - https://fedoraproject.org/wiki/Features/3D_Printing
- Fedora 18 could run Cura 12.12, more test is needed.
 - <http://daid.github.com/Cura/>
- OpenDrone will package Flymaple SDK in RPM
- OpenDrone will release Quadcopter

Open Source Hardware Future

- License is needed – now shared FOSS licenses
GPL, MIT, Apache and Creative Commons
- Embedded Devices supporting more widely
(Linux, Mac OS X and Win)
- MCU Development easier than before
- More Commercial Applications – from DIYer to
Business
- Back to “MIT Hacker Age”...



Questions?



Contact:
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Happy Hacking!
Happy Chinese
New Year!