

# Are embedded buildsystems still needed?

Yes

No

Maybe

# This is like a BoF

Please interrupt when you have questions / remarks / etc!

Slides can be found at <http://tinyurl.com/koenelce13>

# How I got suckered into embedded linux



# Early 2000s - PDAs

Small amount of RAM: 32MiB or 64MiB

Tiny flash: 16MiB or 32MiB

Might have MMC or CF slots

# Which groups need a buildsystem?

- **Users: No**
  - They use the firmware image
  - Maybe use package feeds
- **Developers: Yes**
  - No SDK available
  - No on-target toolchain available
  - No working external toolchain available
- **Distro developers: Yes**
  - Familiar/OpenZaurus/OpenSimpad/etc completely built with OE

# Buildsystems

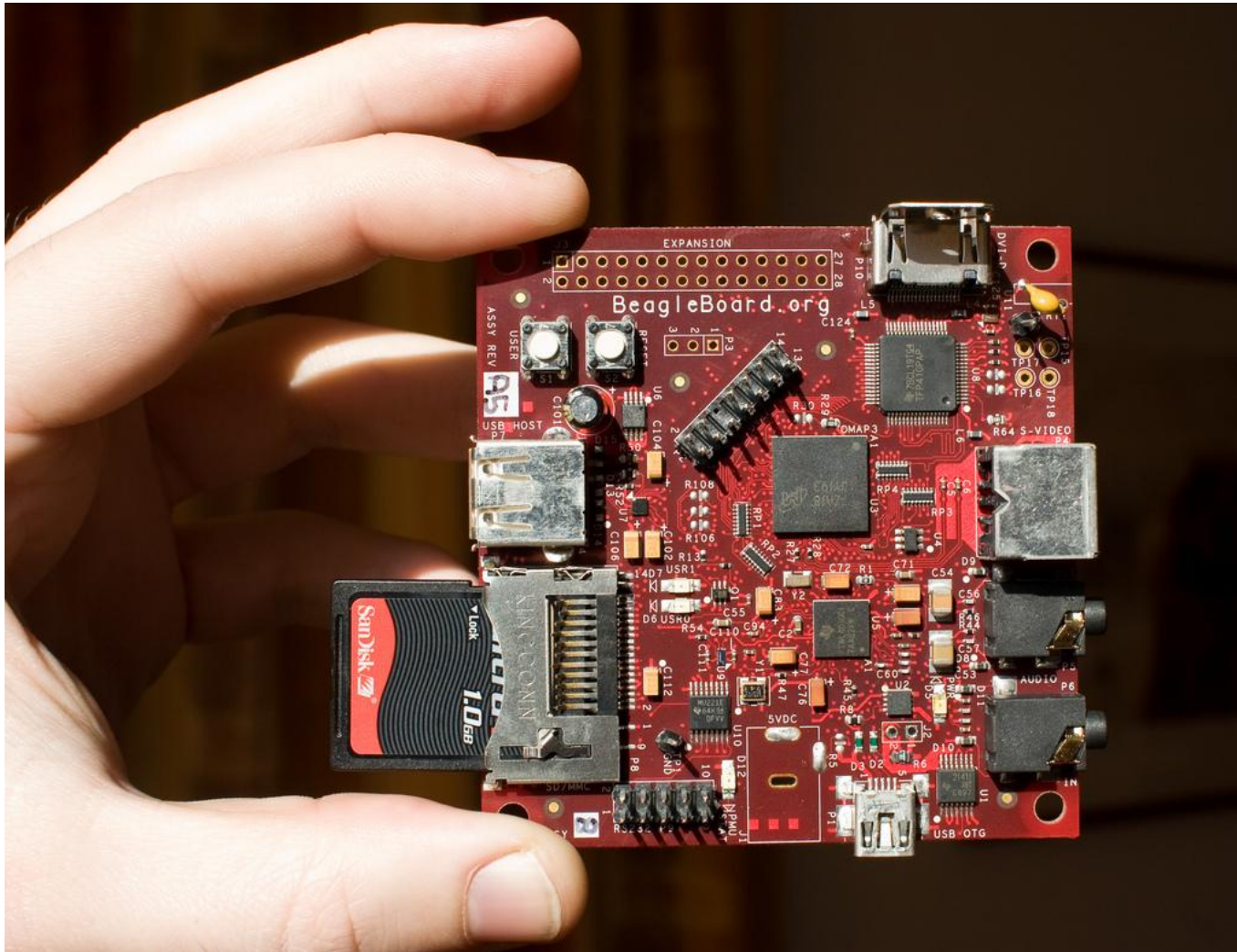
- iPAQ cluster at handhelds.org:
  - DUAL PCMCIA sleeve for networking and harddisk
  - ssh access on request
  - unmaintained after ~2002
  - doesn't actually run any handhelds.org distro
- Buildroot
  - doesn't scale for lots of different targets
  - Package management virtually non-existent
- OpenEmbedded
  - “Can you send me your working config?”

# Everyone happy?

- Close cooperation between app developers (GPE/Opie) and distro people
- Close cooperation between distro people and buildsystem people
- In a lot of cases one person does all 3 of those things.

**Very tight integration with very little distro specific 'enhancements'.**

# Late 2000s - Development boards





# Late 2000s - Development boards

Reasonable amount of ram ( $\geq 128\text{MB}$ )

SD card storage

Ethernet!!!

# Which groups need a buildsystem?

- **Users: No**
  - They use the SD card image
  - Use package feeds
- **Developers: Maybe**
  - Flaky SDK available
  - Flaky on-target toolchain available
  - Flaky external toolchain available
- **Distro developers: Yes**
  - Angstrom completely built with OE

# Buildsystems

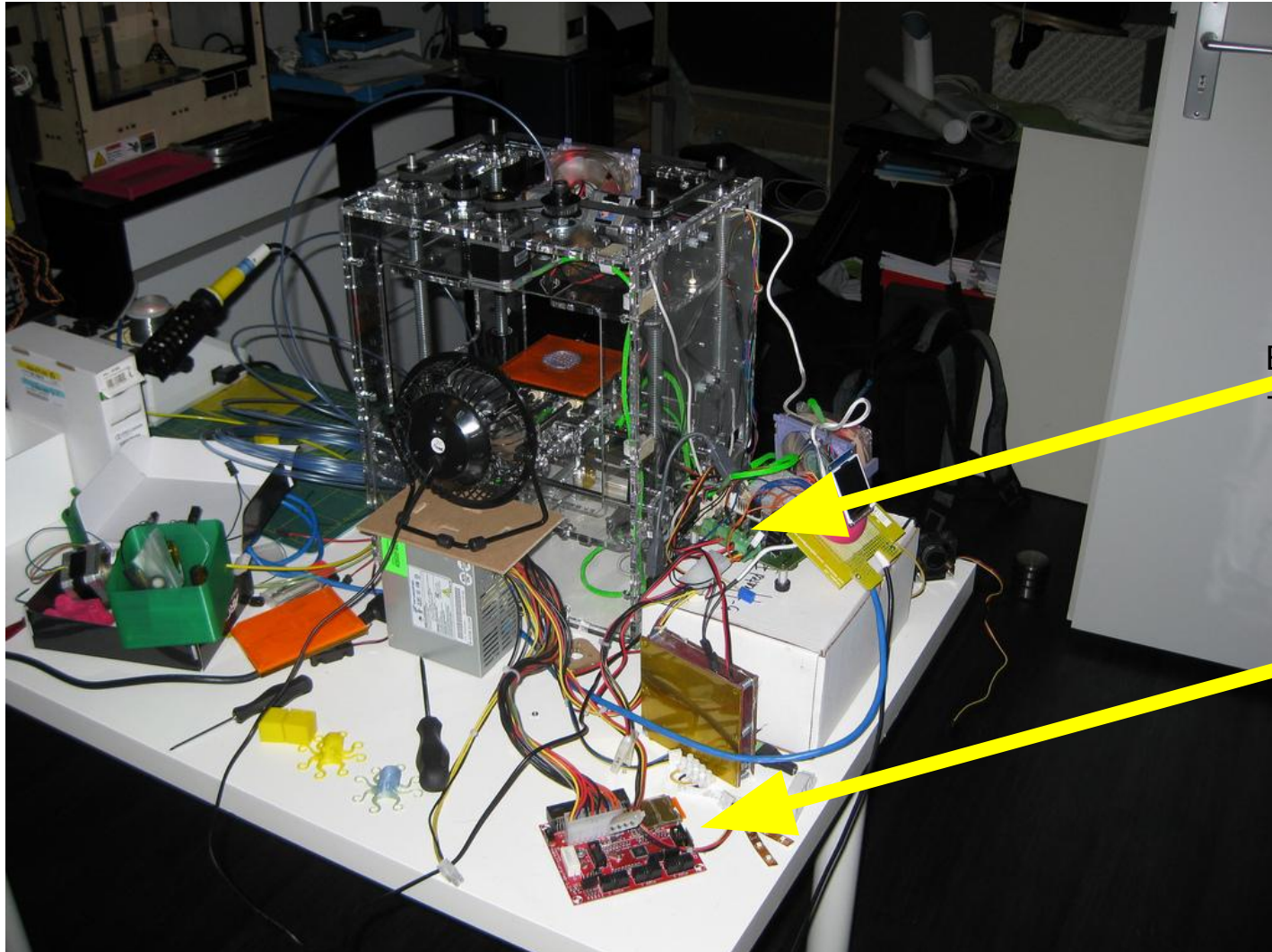
- OpenEmbedded
  - Angstrom config works, >90% of the distro configs don't work
- Gentoo-prefix
  - works **very** well
  - virtually unknown
- Other systems
  - lack ARM EABI support
  - lack cortex-A8 support
  - focussed on native builds

# Everyone happy?

- No cooperation between app developers (GNOME/KDE/XFCE) and distro people
- Cooperation between distro people and buildsystem people
- Users expect RHEL type stability with gentoo style optimizations and debians wealth of prebuilt packages.

**Everyone is very unhappy about the software, but OMG BLINKING LEDS!!!”**

# Early 2010s - Arduino and r-pi



Beaglebone  
+ BeBoPr cape

Sanguino  
derivative

# **Early 2010s - Arduino and r-pi**

Users bitbang everything with an arduino :(

# Which groups need a buildsystem?

- **Users: No**
  - They use the SD card image
  - They use python/nodejs/etc with PIP/npm/CPAN
  - Copy/paste instructions from blogs
  - Arduino IDE
- **Developers: No**
  - On-target toolchain available
  - They use python/nodejs/etc with PIP/npm/CPAN
- **Distro developers: Maybe**
  - Angstrom completely built with OE
  - Every other distro does ethical^H^H^H native builds





# Quotes

- “I disabled USB in the kernel to make it boot faster. Users than want USB can easily reconfigure and rebuild the kernel because it’s using the yocto kernel tooling”
- “We don’t support X11 because we’re embedded and not bloated” - Buildsystem team in 2006
- “We support X11!!!” - Same team in 2011

# Quotes

- “DT is external to the kernel, so I don’t really want to push the DT for my board upstream”
- “Should I switch from using OE to using Yocto?”
- “OE is a single script that only supports one thing” - Wolfgang Denx a few years earlier





# **AVR32**

Hardware is not suited for native builds

# Aarch64

No hardware available