Platform Options for Machinekit

Current and Future

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Machinekit meetup
Tormach Facility
Waunakee, WI

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Agenda

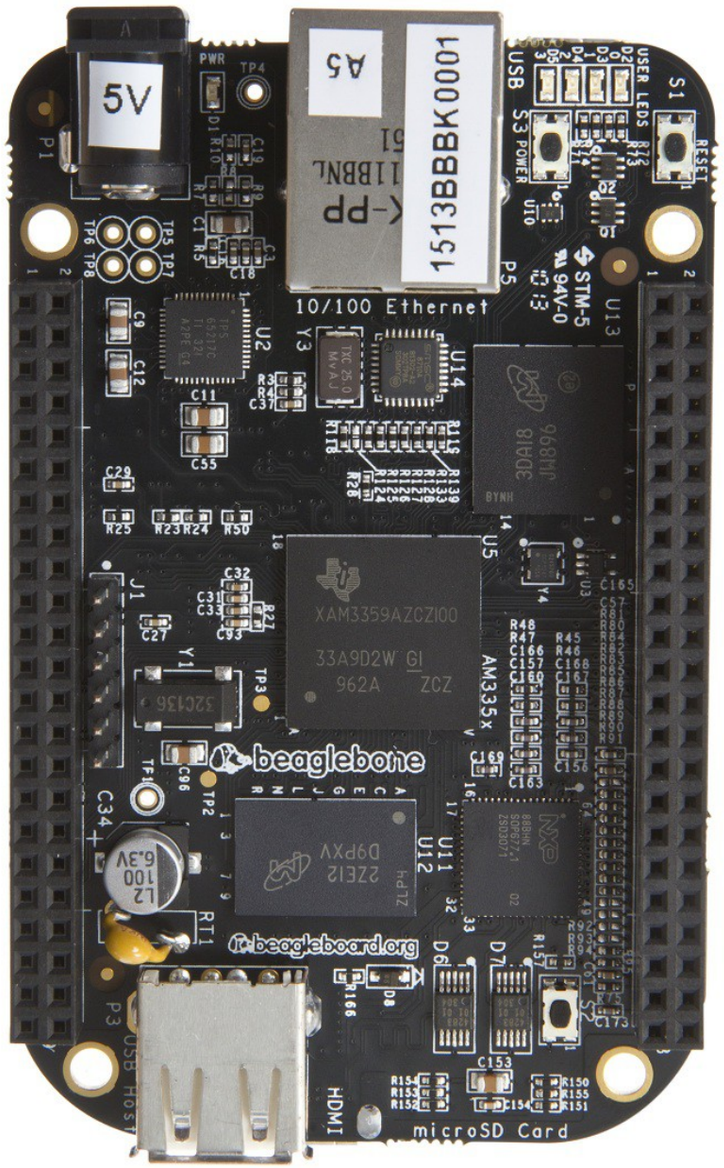
- Introduction
- Current platforms
- Smart Hardware I/O
- Future platforms
- Questions

Current Platforms – x86

- Standard x86 PC, 32 or 64 bit
- Software stepping via parallel port (disappearing)
- High performance, good graphics
- Hardware interfaces available (PCI/PCIe/EPP)
- Best choice for overall ease of application!

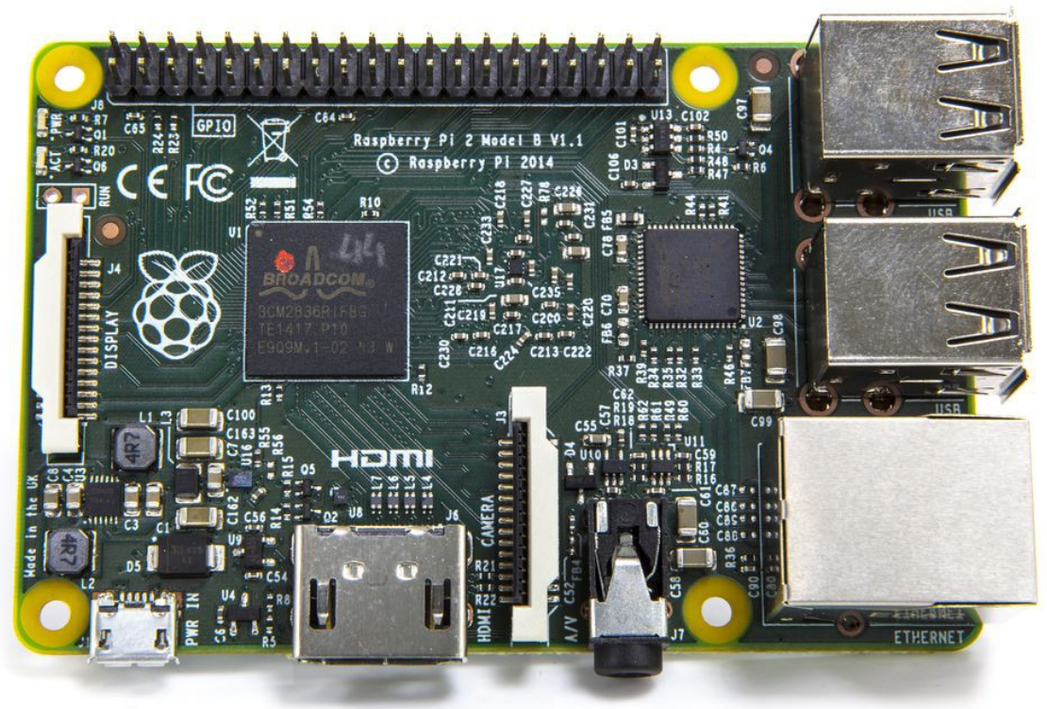
Current Platforms – ARM

- BeagleBone
- PRU to replace high-speed base thread
- Several “capes” available
- Industrial bus (CAN)
- HW Encoder and PWM support
- Poor graphics performance
- Open design with data sheets



Current Platforms – ARM

- Raspberry Pi 1 & 2
- Good GPU performance
- Limited interfaces to motors
- Poor SW step generation
- “Black box” CPU



Smart Hardware I/O

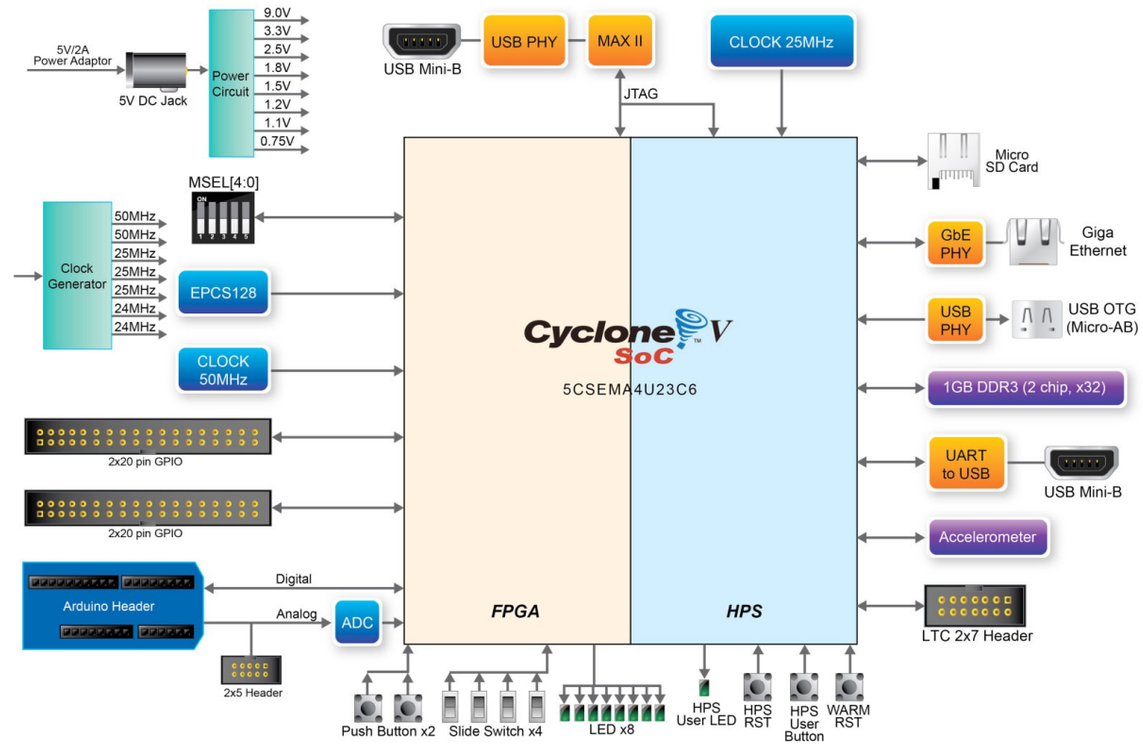
- Mesanet, Pico Systems, Others?
- Offloads step/dir, pwm, encoders, etc.
- Connects via EPP, PCI/PCIe, Ethernet
- Assorted choices available depending on system needs (steppers, servos, analog I/O, etc)
- Highest performance option!
- Reasonable costs

Future Platforms

- Multi-core
  - X86 – Don't count Intel out!
    - Desperate for tablet / phone market share
  - ARM: big.LITTLE
  - Multiple flavors (Cortex A+M, DSP, etc)
- CPU + FPGA (Altera SoC, Xilinx Zynq)
- Expansion buses (PCIe) on SBCs
- Fieldbus systems (Ethernet, CAN, etc)

Altera SoC: DE0-Nano-SoC / Atlas

- $99!
- Dual-core ARM with FPGA
- 0.1” pin-headers
- 1 GB DDR3
- Gigabit Ethernet
- Arduino headers
- No display



Other SoC Options

- Xilinx Zynq
  - Parallela board $99, but awkward I/O
  - Zynq chip specifications similar to Altera SoC

- Many other Xilinx and Altera boards are expensive, have limited or difficult to access I/O (custom high-density connectors)

- Once one board is supported, others in the same family (Altera or Xilinx) should be easy to port

- SoC platforms have been out long enough support is hitting mainline for Linux, u-Boot, etc.

BeagleBoard X15 – Lots of CPUs

- Lots of cores:
  - 2x 1.5 GHz Cortex-A15
  - 2x 700 MHz C66 FP-DSP
  - 2x Dual Cortex-M4
  - 4x 200 PRU
- 2GB DDR3 DRAM
- 2x Gigabit Ethernet
- Multiple GPUs and video co-processor
- eSATA
- Expansion connectors w/PCIe

References

- Mesanet hardware boards:
  http://store.mesanet.com/index.php?route=product/category&path=83

- Pico Systems hardware boards:
  http://pico-systems.com/osc2.5/catalog/index.php

- Altera SoC support site:
  http://rocketboards.org/foswiki/view/Main/WebHome

- Terasic DE0-Nano-SoC
  http://www.terasic.com.tw/cgi-bin/page/archive.pl?Language=English&No=941

- BeagleBoard x15
  http://beagleboard.org/x15

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