

Can Open-Source Modules Move into the Mainstream?

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Platforms like Arduino, Raspberry Pi, and BeagleBone (see the figure) are ubiquitous in the maker movement (see “Arduino, Raspberry Pi or BeagleBone?” on electronicdesign.com). The question is whether these platforms can be used in production products. The answer is often yes, depending upon specific application requirements.

Each of these platforms has a large and growing community that encompasses both vendors and developers. The plethora of peripheral expansion boards is key to their success, and many silicon vendors target new products at these platforms. This greatly simplifies deployment while making the product available to a wider audience.

Likewise, microcontroller and microprocessor vendors can deliver boards compatible with these peripherals. Freescale's Freedom boards are compatible with the Arduino platform. Digilent's chipKit Max32 can use Arduino shields (expansion boards), but runs a Microchip 32-bit MIPS-based PIC32 (see “PIC32 Arduino Modules” on electronicdesign.com). The challenge for vendors is determining which platform to select.

There can be challenges for designers especially when it comes to rugged requirements. Most platforms have moved to form factors that allow board stacks to be bolted together. Designers need to take a closer look at boards to make sure they meet interface requirements (such as isolation) that are common on production platforms like PC/104, but often overlooked in the products that target the maker community, where cost or time-to-market is often more critical.


CUSTOMIZING DESIGNS

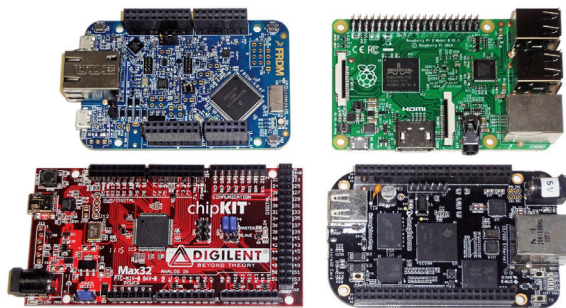
Many of the platforms are based on open-source hardware. This allows a designer to easily move to a custom solution that can do a number of things, from making a design harder to clone, to providing a more compact solution, to reducing cost. It also means a company can replicate a board if the source becomes unavailable or too expensive.

The challenge facing many developers is the inherent difficulty in moving to a custom solution. There are many design firms that can help turn prototypes into products, but costs can vary. On the plus side, the resulting solution usually provides advantages, such as lower per-unit cost and a more compact footprint.

Still, converting a design to a custom solution can take time and money. There are companies looking into lowering these barriers. Newark/element14 can now deliver customized versions of the Raspberry Pi. This might include chores like removing unneeded interfaces and connectors.

Gumstix's Geppetto can generate custom boards for a fixed \$2000 setup fee. The web-based design tool even shows the per-board cost as the board is laid out. It can be used to create boards compatible with popular platforms like the BeagleBone, as well as support COM modules like the Gumstix Overo and select microcontrollers like STMicroelectronics' STM32F427 Cortex-M4.

Geppetto differs from other custom approaches because it limits the devices and connectors that can be included on a board. On the other hand, designers only need to layout a board from the component level. The system will only build a board that has met all component requirements. 



The Freescale Freedom board (top left) and Digilent chipKit Max32 (bottom left) may look different, but they share the basic Arduino pinouts for expansion. The Raspberry Pi 2 (top right) and BeagleBone Black (bottom right) have their own community.