Customer story

Pimoroni PicoSystem:
Ready availability, impressive performance, and excellent support make RP2040 a winning choice

Raspberry Pi solution	RP2040
Size of business	Small to medium
Industry	Hobbyist electronics

Sheffield (UK)-based Pimoroni is a hobbyist store where electronics enthusiasts find the full complement of Raspberry Pi products and associated accessories, as well as add-on boards and hardware to augment the Raspberry Pi project-building experience. The 40-strong Pimoroni team is staffed by techies who love coming up with new ways to make use of coding as much as they love enthusing others about the possibilities of DIY computing. Their products are designed and manufactured in-house and stocked by more than 100 distributors worldwide.

The company was founded in 2012 by digital designer Paul Beech and Jonathan Williamson, a "precision junkie" and ninja coder. Having designed the PiBow – a custom case for the then recently-launched Raspberry Pi – using just a laser cutter and a kettle, it proved so successful they decided to create a business as a "purveyor of maker goods" to serve the emerging DIY electronics and computing market. The single board computer remains Pimoroni's biggest seller, although it also stocks other boards as well as wearable computing hardware.

The challenge

"Pimoroni's success is down to the rapid development of products for engineers, makers and educators," says director and co-founder Paul Beech. Many of their products come about as a direct result of requests from customers, and they have built up a deserved reputation for developing and stocking the right products at a fair price point and with consistent availability.

When supplies of a key component in one of their gaming products began to run low, Pimoroni decided to find a more cost-effective replacement. "We had the dual challenge of an existing product which used a chip with high cost and poor availability." They were concerned about being unable to continue a product line, while rising prices for those they could secure led to poor market competitiveness. "The key part we had problems with had a list price around $5. During shortages, this leapt to over $20 and availability was still poor," says Paul.

The solution

As a Raspberry Pi Approved Reseller, Pimoroni was aware of plans for a brand-new microcontroller, RP2040. They decided to press ahead with developing a handheld gaming console in the maker/consumer space based upon it.

Pimoroni built "an entire gaming API" around RP2040, using its unique PIO (programmable input/output) features "to achieve great display and audio performance with small MCU overheads". Far from having to compromise on the capabilities of their reimagined mini gaming board, "we're running the full gamut of hardware, such as audio output, displays, accelerometers, LiPO/battery circuits and various sensors," he says. There's now a community-supported ecosystem around Pimoroni's API.

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Why Raspberry Pi?

Paul says RP2040 gave much of the same experience as the component they'd had trouble sourcing, at a fraction of the cost. They were also swayed by its ready availability and technical capabilities, as well as the excellent documentation and examples that accompany it.
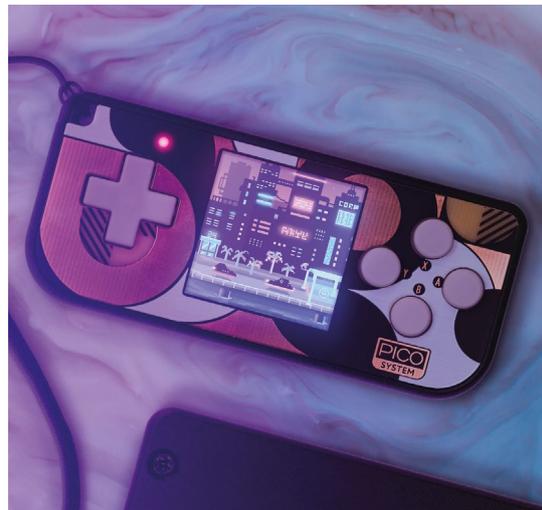
Raspberry Pi's documentation and community made it easy to just get on with development, says Paul. If any really obscure issues appeared, Pimoroni knew Raspberry Pi's engineers would be there to help, but so far, there hasn't been a need, he notes. "RP2040 offers exceptional capabilities for the price and much better availability alongside stellar documentation that makes rapid development a low-stress proposition."

The results

The PicoSystem gaming console – described by Pimoroni as "a tiny, complete gaming handheld made from layers of step-milled PCBs and love" – launched alongside RP2040 itself in January 2021. It's been enthusiastically received by gamers, some of whom have gone as far as to develop mini games for it on the indie platform itch.io.

"We've been low-key waiting for Eben and Raspberry Pi to do something with microcontrollers for years, and we're not disappointed in RP2040 and the support around it. As soon as we got word, we went full-on to make the best of what we do, but for this new microcontroller," Paul explains on the Pimoroni blog. "The documentation and examples for RP2040 were a real step up, not just for Raspberry Pi, but for the microcontroller industry. It felt more in touch with modern software and firmware development," he notes.

A year on, Paul says the manufacturing yields for RP2040 have been better than for the original part which it replaced. "This is a dual function of a simpler, yet capable, design and an easier part to work with. This is despite our routine use of RP2040 at twice its official clock speed. We now use RP2040 in around 80% of our products that have a microcontroller, as there is very little rationale for using any other part."

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