How Sony Sped Up A Factory With These Tiny, $35 Computers

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AI, robotics and the digital transformation of European business.

Raspberry Pi's like this one have helped make Sony's manufacturing facility in Wales 30% more efficient, according to its general manager. Image via Sony

Open a box with a Raspberry Pi and it can seem like the rest of the computer is missing. Costing just $35, it's a stripped-down circuit board covered with metal pins and squares, just enough hardware to power games and surf the Web. Hobbyists and science teachers were its first enthusiastic customers six years ago, but now the humble Pi computers have a new fan base: manufacturers and businesses.

The Raspberry Pi Foundation's trading division, which has gifted £17 million ($22 million) towards promoting computer science in schools, has seen demand for its cheap device skew increasingly towards commercial users, *Forbes* has learned.

Hotel chains, garbage collectors and factories are using the device more commonly now, making up 50% of end customers, and in some cases the Pi is undercutting the industrial monitoring equipment sold by bigger companies.

In Europe, a network of hydrogen refuelling stations used to power hydrogen vehicles, are now having their temperature and filling levels monitored by Raspberry Pi's to help managers predict maintenance, while at another business the device is being used to listen to audio from elevators for any anomalies that suggest a fix is needed.

"It's made us more competitive." Kevin Edwards has installed around 60 Raspberry Pi's around Sony's manufacturing facility in Wales and says it became 30% more efficient. Image courtesy of Sony

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One municipality in Africa is using Pi's to monitor the level at which garbage bins are filled to decide when trucks should come by for collection, while a hotel chain was also preparing to deploy them in rooms, according to anecdotes shared by analysts from research firms Gartner and Forrester.

One factory manager says the machine is so cheap and effective that after a three-year trial it has helped make his automated machinery 30% more efficient, particularly in the speed of production.

"It's made us more competitive," says Kevin Edwards, who heads engineering at Sony's main manufacturing facility in Pencoed, Wales. In most cases, the Pi's are being used to monitor equipment.

The factory manufacturers hair-removal devices and $50,000 broadcast cameras for Sony, as well as the Raspberry Pi itself, and has installed 60 of the gadgets around its gleaming-white facility, each one about the size of a pack of cards.

Raspberry Pi founder Eben Upton initially expected to sell a few thousand stripped down computers. Around 25 million have now been sold. Image courtesy of Raspberry Pi Foundation

The Pi's clunky looks are part of its appeal as something you can add stuff to—or hack, in hobbyists' parlance. Edwards has mounted the gadgets onto machinery or walls and plugged them into the nearest power source.

Each tiny computer is equipped with extra sensors to monitor things like temperature, vibration, proximity and energy usage.

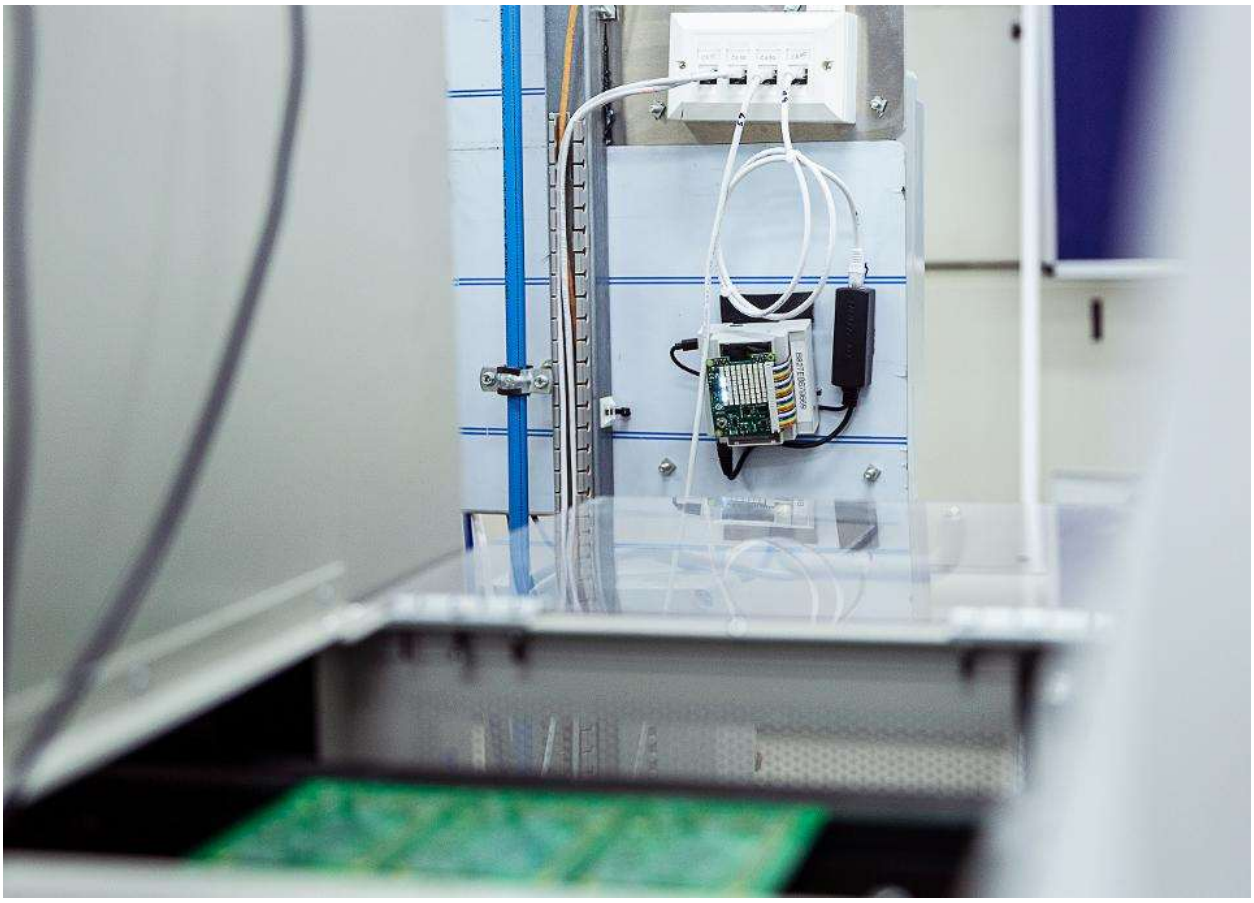
As it spies on a piece of automated equipment or robot, it then sends information to a database using a secure protocol that Edwards' team developed. Some of the Pi's have cameras that record a video feed of the machines which, for instance, gets processed by vision-recognition software to look for irregularities.

"It allows us to avoid having to have a person painstakingly watch over a machine," says Edwards. "This is how we stop people walking around with clipboards."

Sony is now replicating his experiment in three other factories in Asia, including two in Japan and one in Malaysia, which will also install between 50 and 60 Raspberry Pi's to monitor equipment there.

Monitoring machinery as Edwards has done is the crux of a technology trend that was in vogue for a while, called the Industrial Internet of Things. This referred to using sensors and wireless connectivity to monitor machinery and weed out efficiencies by, for instance, predicting when a robotic arm needed maintenance before it broke down.

"The challenge is return on investment," says Dan Bieler, an analyst with Gartner who has tracked developments with Internet of Things and noticed a reluctance to invest in such technology. **"**We've seen a search for cheaper alternatives."



A Raspberry Pi monitors equipment in the Sony factory. Image courtesy of Sony

He's heard of several divisional managers or middle managers at industrial plants who are experimenting with the Raspberry Pi, often buying the equipment with their personal credit cards.

The goal is capturing the same kinds of efficiencies promised by bigger, more-expensive IoT companies like Siemens or factory-automation specialist Omron.

The Pi costs five to ten times *less* than similar equipment from larger firms says factory-manager Edwards, who declined to name any of these companies.

"You need to experiment and fail to drive meaningful innovation," says Bieler of Gartner. "If you fail at $100,000 it's painful. If you fail and you've spent $1,000, it's a different type of failure."

That could actually be good for companies like Siemens, he adds. When someone like Edwards experiments with the Raspberry Pi, it's showing evidence of a market for the Internet of Things technology in industry, which hasn't yet flourished in the way technologists have hoped.

Eben Upton didn't expect any of this when he started the Raspberry Pi Foundation six years ago, or that he'd sell 25 million devices. Having first expected a trickle of initial orders from robotics enthusiasts, his tiny staff was overwhelmed on the day they first went on sale. More than 100,000 people woke up at 6 a.m. U.K.-time to order one.

"We thought we were going to sell one thousand," he says from his headquarters in Cambridge. "It was just hell." Since that day, Raspberry Pi has brought in about £25 million in licensing revenue, of which £17 million ($22 million) has gone to its charitable arm.

The trading arm makes money by selling blueprints of the Pi for a few dollars each to two primary manufacturers. The business model is similar to ARM's, which designs the tiny processors that are found in most smartphones.

The Pi's manufacturers then shop them online, alongside other resellers who are often mom-and-pop businesses, says Upton.

One such business in Cambridge saw its founder max out a credit card to buy £2,000 worth of Raspberry Pi computers to sell. Last year the business brought in revenues of £10 million, says Upton.

Upton estimates that the total revenue generated by his business and others selling the physical devices is $200 million.

"The whole thing has grown organically," he says. As a licensing business it's hard to tell exactly who the Pi's end users are, but Upton confirms he's been hearing about industrial use cases. Further evidence: The gadgets' sales throughout the year are becoming more stable, instead of just spiking at Christmas time.

There's an added benefit for Upton. In making the Sony factory more efficient, it's made producing the computers there easier to budget too, he says. "We build in the U.K. not because it's nice but because it's cheap."

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I cover developments in AI, robotics, chatbots, digital assistants and emerging tech in Europe. I've spent close to a decade profiling the hackers and dreamers who are b...