**Raspberry Pi, Arduino and other small computing devices**

Raspberry Pi and Arduino dominate the maker scene. Their low cost and ease of access have sped up a wide range of projects worldwide, making them accessible regardless of location, allowing for true world-class innovation. It is easy to get confused and group the two purely from a visual standpoint -but they are very different.

A Raspberry Pi is a single-board computer developed by the Raspberry Pi Foundation in the United Kingdom in 2012. Originally, the board was developed as a way to make computer development and education a lot more accessible through its low cost. Being the first of its kind, it evolved to be a lot more. A user only needs a mouse, keyboard and screen to emulate a traditional desktop experience. With its size being a little bit bigger than a credit card, it has found its way into a lot of projects, both professional and hobbyist. Raspberry Pi runs on Linux, a free and open-source desktop operating system. There is also an even smaller iteration of the board named Raspberry Pi Zero that is about half the size and can be bought in Australia for under $20. The board is also upgraded every few years, keeping it competitive with the latest specifications. The Raspberry Pi 4, released in 2019 features an upgraded processor, USB C, dual 4K monitor support and up to 8GB of ram.

Something that makes the Raspberry Pi so desirable, other than its price and size, is the ease of access to the computer’s input/output ports (I/O). The board has two lines of header pins, called GPIO pins (general purpose input/output ports). These pins allow for development and experimentation through coding and programming.

Arduino, roughly the same size as a Raspberry Pi, has a very different use case. Whereas the Raspberry Pi runs as a small low-cost desktop alternative, Arduino does not. Arduino is a single-board microcontroller that is completely open-source which has allowed for its many iterations.   
With a selection of inputs and outputs, an Arduino board allows the user to write code via the Arduino software to complete a range of tasks. The board has become an invaluable part of the expanding Internet of Things (IoT), letting users connect and automate a wide range of monotonous tasks for convenience and accessibility.

The future progression of wireless technology such as 5G, alongside developing countries such as India, becoming more online will allow for even more devices connected to the IoT. This will push the rapid adoption of the Raspberry Pi and Arduino, expanding the use case beyond what we can currently imagine.

In 1965 Gordon E. Moore, the co-founder of Intel, famously made a statement that today is referred to as Moore's Law. The statement by Moore was “the number of transistors on a microchip doubles every two years, though the cost of computers is halved” *(Moore's Law Explained, 2020).* This means that these devices, as well as all devices, will only get more efficient as time progresses. However, experts predict that this Law will no longer be applicable in 2025. That allows for five more years of rapid development in the specifications and applications of single-board devices like Raspberry Pi and Arduino.

The impact both boards will make on the world differs, although both leading to mostly positive results for humanity.  
As the Raspberry Pi is inexpensive in comparison to competitors of similar specifications, it serves as an entry point for people who couldn’t afford a computer. A recent example of this: the device saw an uptake in demand as a cheap, computer alternative to work and study at home due to COVID-19. “The number of unique IP addresses accessing the Raspbian Raspberry Pi OS's mirror system passed 90,000 on several days in March, up from a peak of around 58,000 in March 2019” (Tung, 2020).   
COVID-19 also created a lot of obstacles in the modern healthcare system following the limited supply of devices like ventilators. In Colombia, medical technicians have started testing an open-source design from robotics engineer Marco Mascorro. Mascorro shared the code and components on code-sharing site GitHub. The design includes a Raspberry Pi and an Arduino, both easy to source, “the Colombian team said the design was important for their South American country because parts for traditional models could be hard to obtain.” *(Raspberry Pi ventilator to be tested in Colombia, 2020)*  
Overwhelmingly, Raspberry Pi and Arduino are set to benefit people in lower-income, developing countries as well as the online open-source community. Rather than big companies holding the market share on, for example, ventilators as mentioned above, individuals can research online to make their own devices. This will also break down the Apple and Google ecosystem, through education people will be a lot more competent with technology and can find solutions to their problems leading to a shift in the sector.

In daily life, I (Natalie), am an avid user of Raspberry Pi and Arduino, owning multiple variations of both boards. My use and development of projects with the two have taught me a lot about the back end of technology, electronics theory and manufacturing. A Raspberry Pi led to the development of my own game console, and Arduino led to the development of a home-built desktop-sized computer numerical control mill. I assume they would have the same impact on other people who use them. The development of computer-controlled devices being accessible to almost anyone on the planet and beyond (a Raspberry Pi was sent to space).   
As mentioned earlier, the Raspberry Pi was originally developed as a way to teach people, especially young school children, how to use and manipulate technology. As each generation begins schooling, the devices (including Arduino), will only be faster and more powerful, expanding each groups knowledge and understanding of these technologies. Currently, most people have very tech illiterate parents, some who even struggle to understand how to use the world wide web and require assistance from their children. Perhaps the next generation of kids will be helping their parents understand quantum computing.

Overall, Raspberry Pi and Arduino’s continued evolution will only make everything so much more connected, leading to all of us relying on connected systems and technology even more than we do today.

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