**RASPBERRY PIS, ARDUINOS, MAKEY MAKEYS AND OTHER SMALL COMPUTING DEVICES**

**WHAT DOES IT DO?**

**Raspberry Pis and Arduinos**

Raspberry Pi is a series of credit-card-sized, single-board computers. Many operating systems can be run on it, including Linux, \*BSD, Windows, and Plan 9, but it is generally most practical to use Raspberry Pi OS, a Linux distribution. Arduino is a similar line of products, though they don’t officially support as many operating systems as Raspberry Pis do.  
  
Raspberry Pi’s and Arduinos can have a vast number of uses, including video game emulation, home theaters, network-level ad blockers, security cameras, motion sensors, alarm clocks, robotics, garage door openers, and much, much more. A full list of all possible uses of these devices is too much to type.  
  
A big advantage of using and configuring such devices for whatever it is you want to do instead of, for example, buying a set of security cameras that run on a cloud service, or buying a smart TV with built-in home theater software, is that Raspberry Pis and Arduinos are highly configurable.  
  
Let’s take security cameras for example. Buying a set of security cameras that run on the company’s cloud service, from which you would probably have to install a proprietary application to view and download your own footage, could limit you to just that. In some cases, their cameras might contain proprietary firmware which prevents computers and hard drives being hooked up to it and used at your own freedom so that you are forced to use their services. While it is possible to buy a video camera and physically hook it up to your PC, that means wires throughout your house and less portability. With a Raspberry Pi hooked up directly to the camera, footage can be streamed from the Raspberry Pi to your home computer, using absolutely whatever software you want.  
  
Another example is home theaters. Many smart TVs come with a software suite that allows the user to conveniently switch between streaming services, news websites/articles, social media sites, etc. This, however, can also be done using a regular non-smart TV and a Raspberry Pi, for significantly less money. Aside from it being cheaper, it also allows for more configurability. Using a micro-computer installed with any software of your choosing, you are able to decide all the way down to the operating system what you would like your home-made smart TV to do. The issue of privacy also arises here. Smart TV’s most often use proprietary, closed-source software, meaning the source code is not available to the public. This means that the software you’re using could be doing anything with your usage data and personal information without you knowing about it. In fact, Vizio, an electronics company which sells smart TVs, was involved in two class-action lawsuits over their smart TV’s spying on it’s users in 2015.  
  
The main reason Raspberry Pis and Arduinos are so configurable is because they are open source and very well documented, which is another advantage of these devices. This means that any user is permitted to use, view, edit, and redistribute the software freely. It also means that the world is made aware if said software spies on it’s users. Even if you don’t know how to read the source code, or it’s too much to want to read through, if the software is popular enough, odds are you will know, from the community that uses it or from other sources, if it has any malicious intent.  
  
The third big advantage of Raspberry Pis and Arduinos is the cost. As written in the example on smart TVs, these devices can be much cheaper than pre-built, pre-configured alternatives. The one disadvantage though, is that they are not easy to use for people who don’t know their way around computers. A user of a Raspberry Pi or an Arduino should be at least a little bit tech-savvy and willing to learn and spend time on it, but that’s not to say that only computer experts can use them.  
  
**Makey Makeys**

Makey Makey is an invention kit used for connecting and assigning everyday objects to computer keys. Alligator clips are hooked up to an object (for a bizarre example, a banana), and the other end of the cable is connected to a circuit board via USB. The toy uses closed loop electrical signals to send the computer either a keyboard stroke or a mouse-click signal, depending on the user’s choice. So the banana can then be physically pressed to send the chosen keystroke/mouse-click to the computer.  
  
Aside from using a banana as a keystroke, Makey Makey’s can actually be useful for a variety of things. For example, a doormat could be hooked up to a Makey Makey which, when someone steps on it, tells a computer (think Raspberry Pi) to start a video using a security camera and stream it on your monitor inside. Or you could hook each of the stairs of a staircase up to a Makey Makey to tell a computer to make a sound through speakers each time a stair is stepped on. Your baby tumbled down the stairs while you were asleep? No problem, the ‘bruh’ sound effect just echoed throughout the house loudly like 12 times, which wakes you up to go and help the baby.  
  
**WHAT IS THE LIKELY IMPACT?**

With more development for open-source projects concerning Raspberry Pis and Arduinos, these devices could serve as an alternative to products like Amazon Echo or Google Home; for some, they already do. It would solve or lessen the issues of privacy and freedom. Having people familiarize themselves with such technologies could also introduce them to or help them get acquainted with using computers and, for some, perhaps even programming.  
  
If IT were taught in all schools to all students, even from a young age, this would help educate everyone on how to use technology more safely and responsibly, e.g., knowing who they’re giving their information to and how to ensure the accounts of the services they use are protected in the most secure way they can, but it would also promote technological progress and societal freedom. Information technology is inevitably only going to become more prevalent in our lives. Small, cheap devices like the Raspberry Pi are a great way to get people more involved in this world of technology. This puts the power of digital making into the hands of people all over the world, and the more people there are who get involved in it, the less we as individuals and as a society have to rely on huge companies (Apple, Google, Amazon, to name a few) to do things for us. This is always a good thing.   
  
Raspberry Pis, Arduinos, and Makey Makeys can be seen as education devices. They are there to help it’s users become more immersed in the workings of computers and what they can be used for. Raspberry Pi OS even comes shipped with Scratch, a visual programming language to teach very young children how to program.  
  
**HOW WILL THIS AFFECT YOU?**

I don’t yet own any of these devices, but I would like to. I am already well-acquainted with Linux operating systems and am currently learning how to program. Being as passionate in information technology as I am, owning something as simple as a Raspberry Pi would change my life. No longer will I have to buy over-priced, single-purposed, non-programmable humidistats and thermostats to monitor and control the humidity and temperature of my indoor garden, nor will I have to spend time guessing and scratching my head at certain symptoms undertaken by my plants and why; I can use a Raspberry Pi to monitor and graph the conditions of my greenhouse to more accurately diagnose problems.

I plan to move out of my apartment some day and into a house with a yard so I could grow my plants outside, at which point I won’t really need a Raspberry Pi for said purposes as much. However, I could still use a Makey Makey to alarm me when a pest enters the garden, using some sort of wire surrounding the perimeter. I could also use a surveillance camera hooked up to a Raspberry Pi to show me exactly what pests have tried to enter my garden. While I’m at it, I may as well hook up a Raspberry Pi to moisture meters planted in the soil and watering mechanisms to auto-water my plants when needed. The possibilities are endless.