Currently, I introduce my students to programming microcontrollers using circuit.io's virtual circuit simulator. While there are many benefits to using virtual simulators, I would like to start using Adafruit's Circuit Playground boards for many reasons. First and foremost, this past year circuit.io's virtual circuit simulator has been unreliable. I need something I can depend on. Second, the Circuit Playground boards come with a variety of sensors which is something you just cannot teach students to use with circuit.io's virtual simulator. Using a real microcontroller attached to real sensors lends itself to learning several more programming concepts. Third, programming real hardware is more engaging. It's not often that students have an opportunity to program something that reacts to sound, to temperature, and/or to being touched.

I would also like to use a portion of these funds to purchase a couple Kindles. As of now, I have 14 Kindle Fires in my classroom which I use to teach programming using MIT's App Inventor. Unfortunately, that's not half my class, which means several groups of three need to share a single Kindle. While my students have been pretty good about sharing, having enough for every pair of students would certainly increase engagement and interest.

The Circuit Playground boards and Kindle Fires I plan to purchase with this grant would have a significant impact on my classroom for years to come. The Circuit Playground boards will likely last several years and will allow me to extend my unit on microcontrollers by several weeks. They will also allow me to go into greater depth by allowing me to teach students about sensors and by increasing interest. Another nice feature of the Circuit Playground boards is the ability to quickly connect them with other components using alligator clips or conductive thread. The latter connection method means I can also introduce eTextiles. I have found that incorporating an activity that involves sewing is a significant draw for many girls and even a few boys.This will allow me to pique the interest of another group of students that typically is not too interested in programming.

As for the Kindles, the bang for the buck is very high. I use them with every one of my classes to teach programming concepts. I use them to teach basic concepts, game development, and robotics (we use them as remote controls via WiFi and Bluetooth). I often lend them to my colleagues as well so that their students can conduct research, and take online quizzes. Furthermore, I have found Kindle Fires to be well suited for middles school as they are fairly sturdy and have a long battery life.

I work hard to get the best bang for the buck for every dollar I spend on behalf of my students. I am also a big believer in transparency. For this reason, an account of how I've spent previous grants is available on my web page (http://akrobotnerd.com). I also make the various video tutorials and other resources that I create for the projects I develop freely available on my web page. If awarded this grant, I plan to create several video tutorials that I will use both in my classroom and with other educators at various professional development venues.

Currently, money is tight and there is not a lot left over in the budget for an elective class like mine. As end-of-the-year spending approaches, I do not expect to receive any funding for my

program from my school as other departments simply need the money more. Nevertheless, my students deserve the funds. They work hard and have learned a lot. It is only fair that I do my part to help provide a more interesting and engaging curriculum.