



Digital Sandbox (Arduino Programmers Kit) - Curriculum Exchange

Mr. Brian Huang, Sparkfun Electronics

Brian Huang is an Education Engineer for SparkFun Electronics, a cutting edge open-source hardware and electronics education company. Brian started his career in engineering with wireless transport technologies for ADC Telecommunications in Minneapolis, MN. While working at ADC, Brian volunteered at the Science Museum of Minnesota and quickly discovered a passion for teaching and working with students - especially in an environment that fostered and supported the "wow" factor associated with inquiry and discovery. In 2007, Brian left the world of engineering to pursue a career in education. For the past 5 years, Brian has taught various levels of high school physics, mathematics, applied technology, and robotics.

Brian joined Sparkfun Electronics to help integrate "tinkering," electronics, and computational thinking into the classroom. One of his goals is to help teachers to de-mystify how household consumer electronics work. With a few simple tools, classrooms can excite and encourage students to explore the possibilities of microcontrollers, electronics, and physical computing.

Brian Huang has a Bachelor's of Science in Electrical Engineering from the University of Illinois, Urbana-Champaign and a Masters in Education from the University of Colorado, Boulder.

Digital Sandbox: Computer Science and Arduino - Curriculum Exchange

Target Grade Level:

6th - 12th grade

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On-line Curriculum Links:

www.sparkfun.com/digitalsandbox (graphical programming version)

<https://learn.sparkfun.com/tutorials/digital-sandbox-arduino-companion> (text-based programming version)

www.sparkfun.com/hourofcode/ (virtual sandbox)

Teaching Arduino and microcontrollers in a traditional computer science course is both a blessing and a potential distraction. Requiring students to learn concepts around arrays, for loops, and recursion at the same time as breadboarding, wiring, and circuitry often times presents a challenge. To keep our focus on computer science and the programming algorithms, we developed an open-source Arduino compatible platform called the Digital Sandbox that is pre-wired with several peripheral Inputs and Output devices. We have a set of activities and experiments for students to explore in both a virtual (on-line) environment as well as a physical hands-on environment.

Each activity is scaffolded by introducing only one or two new concepts. We layer the activities so that students are introduced gradually to concepts around computer science and programming. The Digital Sandbox has 5 LEDs pre-wired, an integrated RGB (Red, Green, Blue) LED, and multiple sensors to allow students to interact with hardware by writing their own control software. The complete curriculum and activities are available online in two formats -- one which is designed using ArduBlock, a graphical programming environment and, one using the traditional text-based Arduino programming environment. These links are provided above.

In addition, we are excited to share an alternative, free, online simulation environment of the same board. This virtual simulation allows all students to learn Arduino programming and computer science concepts without any need of hardware. We developed this as an option for the code.org Hour of Code this year. It is available at: www.sparkfun.com/hourofcode/

This board is just now being introduced into classrooms at both the middle and high school level. We are currently studying length of our activities and the development of extension activities around the Digital Sandbox for technology, STEM (Science, Technology, Engineering, Mathematics), and computer science classes.