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Sparkfun Inventor's Kit with Arduino - 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.

Sparkfun Inventor's Kit: Teaching Physical Computing with Arduino - Curriculum Exchange

Target Grade Level:
>	6th - 12th grade

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Curriculum Links:
>	www.sparkfun.com/SIKguide (on-liine / web version)
>	www.sparkfun.com/SIKpdf (pdf / download)
>	http://bit.ly/SIKteacherguide (teacher guide / pacing suggestions)

The SparkFun Inventor's Kit (SIK) is a great way to get started with programming and hardware interaction with the Arduino programming language. The SIK includes everything you need to complete 16 circuits that will teach you how to read sensors, display information on an LCD, drive motors, and more. You don't need any previous programming or electronics experience to use this kit. This kit and the accompanying materials are used widely in schools from middle school to high school and beyond.

The full-color SIK Guidebook (included with the kit) contains step by step instructions of how to connect each circuit with the included parts. Full example code is provided and explained and even includes troubleshooting tips if something goes wrong. Using Arduino as our building platform, our curriculum walks students through 16 individual experiments.

In the first experiment, students start off with a simple circuit using a single LED and one I/O pin on the Arduino. Students learn to program and manipulate three different commands / functions in Arduino -- pinMode(), delay() and digitalWrite(). With these three commands, students can design and create unique blinking LED patterns from a beating heart to morse code.

The second experiment has students look at reading an INPUT. In this project, students read the voltage of a simple turn potentiometer. We use the potentiometer's reading with the blink example from the first experiment to manipulate the delay time. In this project, students learn to manipulate an input value, investigate the nature of a voltage divider circuit, and build interactivity into their project.

In the first three experiments, we focus on learning the structure and details of programming. The circuits are simple and involve no more than 3 - 4 components / wires. The scaffolded nature of the experiments allows us to gradually introduce students to concepts such as circuit building, programming, and building their own projects. The final project in the kit involves building a 4 button, 4 LED Simon game similar to the popular Milton Bradley version in toy stores. This project illustrates how students can integrate several simple circuits with code to make games and applications of their own.