

Presenter Name: \_\_\_\_\_

Location: 260

Subject (Circle All That Apply): Science **Technology** Engineering Arts Mathematics

Grade Level (Circle All That Apply): **Middle School** **High School** **Collegiate**

Topic Title: \_\_SparkFun Inventor’s Kit\_Project 2

### Lesson Focus and Goals

**SUBJECT OBJECTIVE:**

1. Understand the use of LEDs, buttons, and buzzers using the SparkFun kit.

**JHSL OBJECTIVE:**

1. Work with students to get them a hands on experience with embedded electronics.
2. Expose students to critical thinking skills in the STEM field.

### Texas Essential Knowledge and Skills (TEKS)

**Principles of Technology**; c.6.A & c.6.B. **AC/DC Electronics**; c.4.A, c.4.C, c.4.D, c.9.A, c.9.C, c.10.A, c.10.C & c.11.C. **Solid State Electronics**; c.4.C & c.6.B. **Engineering Design and Presentation I**; c.7.A, c.7.B, c.7.C, c.8.A & c.8.B. **Engineering Design and Presentation II**; c.8.B. **Engineering Design and Problem Solving**; c.5.A, c.5.B, c.5.C, c.5.D, c.5.F, c.5.G & c.5.K. **Practicum in Science, Technology, Engineering, and Mathematics**; c.2.A, c.2.C & c.5.A. **Extended Practicum in Science, Technology, Engineering, and Mathematics**; c.3.A, c.3.C, c.6.A, c.6.B & c.6.C. **Fundamentals of Computer Science**; c.4.C, c.4.F, c.4.J & c.5.F. **Computer Science I**; c.1.A, c.1.B, c.2.A, c.2.D, c.2.H, c.4.A, c.4.B, c.4.C, c.4.G, c.4.H, c.4.I, c.4.J, c.4.U, c.4.V, c.6.C, c.6.F, c.6.H, c.6.I, c.6.P, c.6.Q &c.6.R. **Computer Science II**; c.1.A, c.1.F, c.1.H, c.2.A, c.2.D, c.3.B, c.3.C, c.3.H, c.4.A, c.4.C, c.4.E, c.4.F, c.4.N, c.4.T, c.4.U, c.4.V, c.4.BB, c.4.CC, c.4.MM, c.6.A, c.6.B, c.6.F. **Game Programming and Design**; c.6.C.

### Structure/Activity

1. **Halliburton Introduction Talk** (*approx. 5 minutes, only if not have been completed before with students*)  
Even though Halliburton is an oil and gas industry, Halliburton is also very invested in the next generation of STEM Workforce. The Javelina Halliburton STEM Labs provide the opportunities to enhance high level critical thinking and problem-solving skills associated with sciences, technology, engineering, math and geosciences (STEM) to talented, first-generation, at-risk and underserved high school and undergraduate students. Halliburton provides meaningful engagement and resources for students that want to explore the engineering field.
2. **SparkKit Introduction** (*approx. 5 minutes, only if not have been completed before with students*)

Brief explanation as to what the SparkFun Inventor's Kit is and explain what pieces come with the kit and overall what it may be used and practiced for. They will also mount the breadboard and red board onto the mount that will be used in all projects.

3. **Project 2 Introduction** (*approx. 5 minutes*)

Students will be introduced to the second project of the SparkFun kit. They will know what pieces to use and what they will be building along the process of going through the steps of project 2.

4. **Level 1a** (*approx. 15 minutes*)

Students will be asked to make a simple circuit which will have them create a buzzer. Students will see that we use LEDs and Potentiometers from the last project, but will learn about new concepts like the buzzer, and also the reset button on the red board. Students will be guided on how to wire everything correctly. The coding portion will have them learn about arrays and other functions that are used to create the buzz sound via the Arduino IDE.

5. **Level 1b** (*approx. 20 minutes*)

Students will use almost the same circuit from level 1a, however will be introduced to including buttons into the circuit. Students will be introduced to concepts like the binary number system in the code, and also find out how digital inputs work, alongside pull-up resistors. The coding portion will have the students, again, find out how the binary number system interacts with digital inputs, and will see how pressing a button will buzz the buzzer with a certain frequency. Students should be encouraged to implement the 4<sup>th</sup> buzzer, or can wait for the next circuit.

6. **Level 1c** (*approx. 20 minutes*)

Students will be essentially using both circuits or just the previous one in level 2c. This circuit is the Simon Says circuit. All this circuit adds on to the previous one is the blue button and LED. Students should be precise on where they wire the jumper cables, LEDs and, resistors via the SparkFun manual. The coding portion will introduce students to for loops, certain commands like millis(), and also custom functions. Students are encouraged to play the game they created after for some fun.

## Learning Objective

### Content Review

*Students should know that...*

- Any circuit can be dangerous.
- Circuits are complex.
- There are many components to a mini-computer and not everything will be used.

*Students have been asked...*

1. N/A

### New Content

*Students will know...*

*Students will be able to...*

- Measure elapsed time.

- What the RedBoard is and what component we will use on it and for what.
- How software and hardware can interact with each other.
- Concepts and tools like LEDs, Resistors, Arrays, Binary, Digital Inputs, Pull-up Resistors, For-Loops, and potentiometers.

- Understand code and what each method does pertaining to the components being used by the computer.
- Understand concepts like Arrays, Binary, Digital Inputs, Pull-up Resistors, For-Loops and implement them into code.
- Have an idea of the trial-and-error programmers use in the real world.
- How to make tones with a buzzer.
- How to read a button using digital inputs.
- Create a Simon Says game.

### **Assessment**

Students will be asked to complete a quick evaluation after the workshop so we can continue to improve our services.

#### **Sources of Information:**

1.