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_____

Lesson Focus and Goals

SUBJECT OBJECTIVE:	JHSL OBJECTIVE:
1. Understand LEDs, resistors, potentiometers, and photoresistors.	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. **Spark Kit 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 1 Introduction** (*approx. 5 minutes)*
   Students will be introduced to the first 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 1.

4. **Level 1a** (*approx. 15 minutes*)
   Students will be asked to make a simple circuit which will have them blink an LED. Students learn about concepts such as LEDs, Polarity, Resistors, and Ohm's Law. Students will be guided on how to wire everything correctly. The coding portion will have them change the frequency at which the LED light will blink 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 the potentiometer dial into the circuit. Students will be introduced to concepts such as analog and digital inputs, as well as voltage dividers. The coding portion will have the students make it so when the dial is turned, the intensity of the LED will change. Students will also see how this affects the Arduino Serial Monitor.

6. **Level 1c** (*approx. 20 minutes*)
   Students will use almost the same circuit from level 1a, however will be introduced to including the photoresistor instrument into the circuit. Students will be introduced to concepts such as analog to digital conversion (ATD), and dwell into the concept of voltage dividers. The coding portion will have students look at the code which, depending on the light in a room, will either make the LED turn off or not.
7. **Level 1d** (*approx. 20 minutes*)
   Students will be creating a circuit that combines all three previous circuits into one, which is a night light. Students will be introduced to new concepts like RGB LEDs and Pulse-Width Modulation. The coding portion will have students look at the code which will involve the functions of both the potentiometer and photometer. Turning the dial on the potentiometer will determine what output of color the LED will display.

Learning Objective

Content Review

Students should know that…	*Students have been asked…*
● Any circuit can be dangerous. ● Circuits are complex.	1. N/A

● There are many components to a mini-computer and not everything will be used.	
New Content	
Students will know… ● 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, Polarity, Resistors, and Ohm's Law, ATD conversion, voltage dividers, potentiometers and photometers.	*Students will be able to…* • Complete a simple LED circuit. • Understand code and what each method does pertaining to the components being used by the computer. • Understand concepts like Ohm's Law, Polarity ATD conversion and other ideas that are used in the electrical world. • Have an idea of the trial-and-error programmers use in the real world.
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.