Presenter Name: _____ Location: 253

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

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

Topic Title: Spheros Modules 3 & 4

## Lesson Focus and Goals

| SUBJECT OBJECTIVE: | JHSL OBJECTIVE: |
|---|---|
| 1. Be able to learn coding through block coding by utilizing the spheros; going through various levels and learning the basics when it comes to programming. | 1. Work with students to get them a hands on experience with blocking coding and showing its practicality for the real world.<br>2. Expose students to critical thinking skills in the STEM field. |

## Texas Essential Knowledge and Skills (TEKS)

**Principles of Applied Engineering**; c.2.B, c.7.B & c.10.A. **Principles of Technology**; c.4.A. **Solid State Electronics**; c.3.A, c.3.B & c.3.C. **Robotics I**; c.3A, c.3.B, c.6.A, c.6.D, c.10.A & c.10.C. **Robotics II**; c.6.A & c.6.D. **Engineering Design and Presentation I**; c.7.A, c.7.B & c.7.D. **Engineering Design and Presentation II**; c.3.C & c.3.D. **Engineering Design and Problem Solving**; c.5.C, c.5.D, c.5.F, c.5.G & c.5.K. **Practicum in Science, Technology, Engineering, and Mathematics**; c.5.A. **Extended Practicum in Science, Technology, Engineering, and Mathematics**; c.3.A, c.3.B, c.3.C & c.6.A. **Fundamentals of Computer Science**; c.4.F & c.4.J. **Computer Science I**; c.2.D, c.4.A, c.4.C, c.4.G, c.4.H, c.4.J, c.4.K, c.4.O, c.4.P, c.4.U, c.4.V, c.4.W, c.6.C, c.6.F, c.6.P & c.6.Q.

## 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. **Project Introduction** (*approx. 10 minutes)*
   A brief introduction will be given to the participants about what the spheros is and the language it uses in its code. Students will then be asked to set up the spheros application in order to proceed with the following lessons. The lessons themselves

will require a smart device, preferably a tablet, so that way they may connect with the spheros. They may or may not be asked to create an account with spheros, however, the process should not take so long either. Students will then be directed on how to connect their device with the spheros.

3. **Module 3** (*approx. 15 minutes)*
   Students will create a 'Spinning Top' with the spheros in this module. Students will be introduced to terms like gyroscope and LED, and also how and what axes the spheros will be spinning on in the process. Students will create a program for the spheros where, if spun clockwise, the LED is red. If spun in the other direction, the LED will be green. Conditional statements and sensor data will be used in this module.

4. **Module 4** (*approx. 15 minutes)*
   Students will integrate everything they have learned to create a 'Hot Potato' game. This game will function similarly to the 'Toss Game', however, will include the loop until statement, and also variables, as well as the concept of random within bounds. Students will also be asked to make 'Pseudocode' prior to making this program, as it will help design complex programs like this one.

## Learning Objective

***Content Review***

| *Students should know that…* | *Students have been asked…* |
|---|---|
| ● Coding may be complicated<br>● Coding is a process of trial and error.<br>● What refactoring and debugging are. | 1. What is a gyroscope?<br>2. How does spheros know it's spinning?<br>3. What is an LED? What does it stand for?<br>4. Why are variables necessary? |

***New Content***

| *Students will know…* | *Students will be able to…* |
|---|---|
| ● How and when to use conditional statements in code.<br>● What an LED is.<br>● Terms like 'absolute value' and 'normalization'.<br>● What variables are. | ● Creating and executing block codes.<br>● Practice refactoring and debugging.<br>● Use the gyroscope feature to calculate rotational velocity by using normalization and absolute value. |

| | |
|---|---|
| • Differences between various loops. | • Create pseudocode. |

## 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.