

**Motion and Accelerometer**

**Middle School Science Module**

**Academic Standard Addressed:**  Plan an investigation to provide evidence that the change in an object’s motion depends on the sum of the forces on the object and the mass of the object.

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| **Lesson 1****Learning Targets:**The student will be able to use observational data from a simple accelerometer to identify and distinguish between constant velocity and accelerated motion.The student will be able to predict how an accelerometer will react to different types of motion. | The first lesson opens with a discussion of car airbags and electronic stability control (ESC) and how these devices increase car safety. Both airbags and ESC require a method for the car’s computer to sense how the car is moving.  See: <https://www.youtube.com/watch?v=Z8KjsjrIGqI>Students are then introduced to a simple “fishing bobber” accelerometer. Teams of students will test how the accelerometer reacts to different types of motion. They will use the data they collect to determine how the accelerometer reacts to different situations. | C:\Users\Sandra\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Outlook\HTE7WI3Z\IMG_4380.JPG |
| **Lesson 2****Learning Targets:**The student can use a sequence of accelerometer data and describe the series of motions that it represents.The student can predict how an accelerometer will react to a sequence of motions. | The electronics in a car airbag or ESC system must be able to use the raw data from an accelerometer and use it to interpret if a car is moving in a dangerous way. Students will model this by attaching a simple wireless video camera to an accelerometer. Different teams will move the accelerometer around the building with other teams reconstructing the motion from the recorded data. Teams will also be given routes so they can compare their predictions of how the accelerometer will react to actual data. | C:\Users\Sandra\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Outlook\HTE7WI3Z\IMG_4183.JPG |
| **Lesson 3****Learning Targets:**The student can use a sequence of accelerometer data and describe the series of motions that it represents.The student can predict how an accelerometer will react to a sequence of motions. | The lesson will expand on the targets from lesson 2. The accelerometer and wireless camera will be attached to the visiting OnTrack car. Student teams will make and test predictions on how the accelerometer will react to different routes taken by the OnTrack car.Guest will share information about how the OnTrack were refurbished and about NCM motorsports. They will also share about the many STEM careers connected within the automotive sector. | C:\Users\Sandra\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Outlook\HTE7WI3Z\IMG_4438.JPG |

*I cannot thank you enough for your work on this lesson, your willingness to come to our school (rain or shine ), and the opportunity to be a part of the initiative. Today will be a day that my students will remember for the rest of their lives! Today will be the day one student will become inspired and pursue a career he or she may not have known otherwise! I am thankful for this opportunity for my kids and it would not have been possible without you! They have enjoyed it so much! So, from the bottom of my heart. THANK YOU!*

**Partners**

Bowling Green Area Chamber of Commerce

Holley Performance Products

LIFT

NCM Motorsports

South Central Kentucky Community Technical College

Warren County Area Technology Center WKU SKyTeach

**3 Middle Schools, 6 Teachers, and 809 Students were impacted!**