ENGINEERING TURN SIGNALS

Your mission is to create a program that mimics how turn signals function on a vehicle.

Turn signals require electrical power to illuminate the turn signal light bulbs. When the turn signal lever is activated in either direction, a circuit is completed that allows power to flow to the front and rear turn signal lights on the selected side. When the signal lights are turned on, they are not illuminated constantly. They flash in a rhythmic pattern to draw the attention of other motorists and indicate your intention. When you complete your turn and turn the steering wheel back to center, a cam on the steering column catches on the turn signal lever and cancels the turn signal operation.

Materials and Equipment

- Data collection system
- //code.Node cart

Safety

Follow your normal classroom procedures.

Procedure

Part 1 - Turn Signal Basics

Let’s get started with the basics by programming the 5x5 LED array to illuminate a right turning arrow when you push Button 1 and a left turning arrow when you push Button 2. Don’t forget that you will be the driver. This matters when looking at orientation.

1. Select Sensor Data in SPARKvue.
2. Place the //code.Node into the //code.Node cart and connect to your device.

3. Select only Tilt Angle – x and Tilt Angle – y under //code.Node Motion Sensor and make sure your //code.Node Buttons are also enabled. Disable all other sensors.

4. Recreate the following code:

5. Click start. Place the //code.Node cart in front of you with the front of the vehicle facing forward. This is your point of view as the driver. Button 1 should be on your right-hand side and Button 2 should be on your left-hand side.

6. Push Button 1 and you should see a right facing arrow. Push Button 2 and you should see a left facing arrow.
Part 2 - Flashing Turn Signals

1. Now that you have created your initial program, expand on your code so that the arrows will now flash like they would on a real vehicle before it makes a turn.

2. Test your new program. If done correctly, your turn signal should flash 5 times than stop for each button you push.

Part 3 - It's all in the tilt.

When you make your turn, the vehicle senses the movement from the steering wheel and then will disengage the blinker once your turn is complete. Using the Tilt measurement on your //code.Node, you can tell the program when to turn off your blinker.

1. Go to the graph view on your program. Since you chose Tilt Angle – x and – y, you should see these two graphs.

2. With your device still connected, click Start. Holding your cart as a driver view, tilt the cart to the right and to the left a few times then tilt the cart forwards and backwards a few times.

3. Looking at your data, which tilt would you use in your program to trigger your turn signal to turn off, or disengage once you made a left or right-hand turn depending on which Button you pushed?

4. Based on your findings, expand on your program so that after you turn on a blinker, it will disengage, or turn off when you tilt your cart to the left or right.
5. You may need to do some debugging to get this final program to work. If done correctly, after you press Button 1 or 2, your turn signal should blink until you turn, or tilt, your vehicle to the degree mark you indicated.

Questions and Analysis

1. How were you able to get the arrow to flash 5 times in Part 2?

2. What tilt and angle did you utilize in Part 3? Explain your choice.

3. Did you face any challenges that required you to debug your program before it was finalized? Explain.