

# LAB 01 - MOTION 1

FOR THE LAB REPORT 1 DO NOT FOLLOW THE STANDARD OUTLINE. JUST ANSWER ALL THE QUESTIONS BELOW:

- LAB FORMAT -

## 2 PART 1

### 2.1 Programming SWS

*Question 1:* What is the speed of sound? Can you think of why it might vary from day to day?

*Question 2:* Change the trigger rate to 120 HZ. What is now the maximum measurable distance? Can you think of why the maximum distance depends on the trigger rate?

### 2.2 Measuring position

*Question 3:* Do you think the number of digits to the right of the decimal point is sufficient? If not, increase the number to a reasonable value (open the display set up window) and *justify that value*.

### 2.3 Checking on SWS

*Calculation 1:* Use the speed of sound and the round trip pulse time to calculate the position. Compare your calculated value to the SWS calculated value as given in one of the digits displays. How does these values compare to what you get with a meter stick (percent error)? Conduct the same calculation and analysis for two other distances.

### 2.4 Measuring Velocity

*Question 4:* Change the input of the display to velocity and take another run, seeing what happens as you move your notebook in various ways. What does a minus sign mean in the display?

## 3 PART 2

### NO PRINTING REQUIRED

#### 3.1 Library Experiment P01

*Question 5:* How close should you be to the motion sensor at the beginning? How far away should you move? How long should your motion last?

*Calculation 2:* Calculate the slope of the given pattern.

*Calculation 3:* Using the Statistics Menu option, give the slope of your plot. Compare that value to the slope of the given pattern (percent error).

*Question 6:* Describe your motion?

#### 3.1 Library Experiment P02

*Question 7:* Make a very rough sketch of the position versus time for the first 3 seconds only of the graph velocity versus time.

*Question 8:* With respect to the motion of the notebook, does it matter how

far you are from the motion sensor when you take the data, assuming that you are always within the operating range of the sensor? Discuss.

*Question 9:* Which direction (positive or negative) should you go at the beginning? What is the maximum speed (positive or negative) you must achieve? How long should your motion last (consider the first 3 seconds only of the motion on the graph)?

*Question 10:* Explain the motion up to the first 3 seconds (Example: 'Constant speed for 2 seconds followed by no motion for 3 seconds, etc...')