Low-g Accelerometer

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Abstract:
A low-g accelerometer measures acceleration in one direction. We did tests to determine the precision, accuracy, and the resolution.

Purpose

The purpose of these experiments was to determine precision, accuracy, and other small things that may affect the data of an accelerometer for anyone using one at balloon fest. An accelerometer measures any acceleration put on it, for example; you can measure the acceleration of gravity or centripetal acceleration.

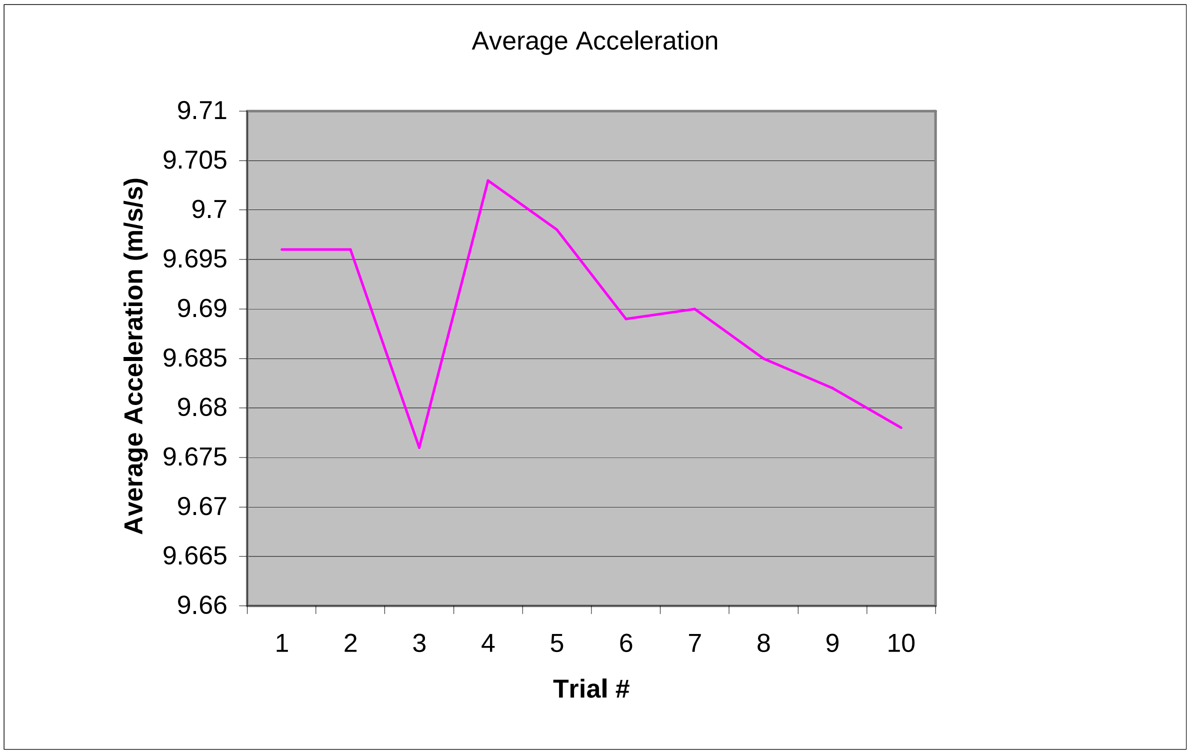
Maximum reading: 63.41m/s^2

Method

How we determined the resolution, precision, and accuracy we gathered data with the low-g accelerometer. We gathered data by using logger-pro and taking averages of the graphs obtained by the accelerometer. We set the accelerometer on its side so gravity would be what the device was measuring. We took averages of 15 second ten times and with this data, the graphs, and knowing the acceleration of gravity; 9.8m/s^2, we could determine the resolution, precision, and accuracy.

Data

Trial	Average Acceleration(m/s^2)
1	9.696
2	9.696
3	9.676
4	9.703
5	9.698
6	9.689
7	9.69
8	9.685
9	9.682
10	9.678



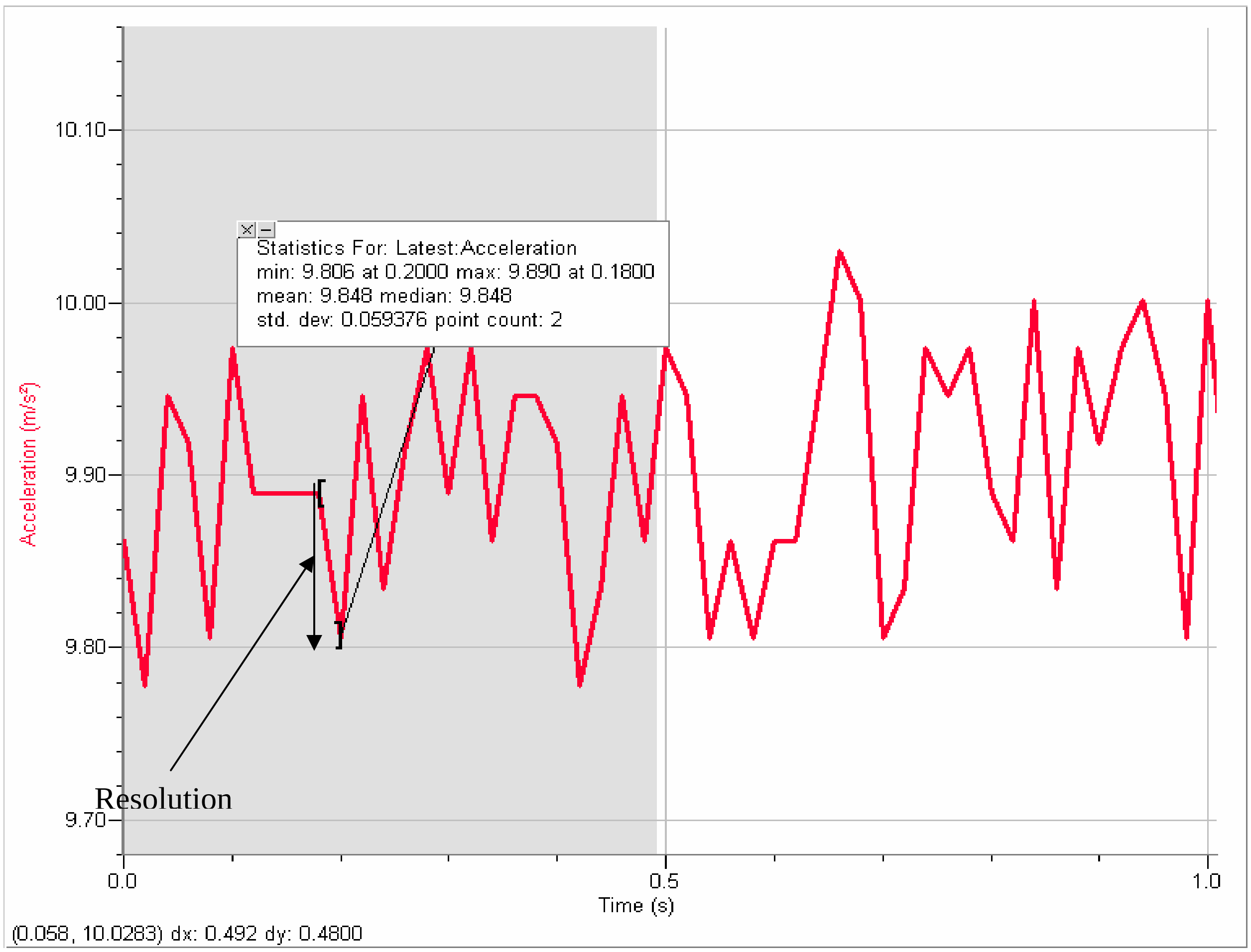
Precision

Definition: The smallest measurement marked reliably.

To calculate the precision of the accelerometer we set it so the acceleration due to gravity was what it detected. We held it still and took data for fifteen seconds using logger-pro. We took the mean data of each of the trials and took tent rials. We found the largest piece of data and found the least piece of data and found the difference between the two. Then, the half of that would be the precision which is 0.00135 m/s^2.

Accuracy

Since we already knew that the acceleration of gravity is 9.8 m/s^2, it seemed like a good thing to compare to evaluate the accuracy of the sensor. We pointed the sensor up, which measured the positive value of gravity. When you take the average of the shown data, you get 9.7085 m/s^2. When compared to the actual value of 9.8 m/s^2, we see that the sensor has an accuracy of about 1%.



Resolution

Resolution in the case of this accelerometer is the amount (in m/s^2) between each of the readings that it takes. After examining the graph above and taking the value of the difference between the two points, the resolution of the low-g sensor is 0.084 m/s^2.

Conclusion

In conclusion, our experiment showed us that the low-g accelerometer has a precision of $\pm 0.0135 m/s^2$. The accuracy of the sensor as compared to the acceleration of gravity is about 1%. The resolution of the sensor is about 0.084 m/s^2.