

LED Flame Lamp: Random or Cyclical Illumination?

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Introduction

Late in 2017 a handful of companies began selling LED flame lamps that do a great job of simulating an actual burning fire. The illumination is bright, has a color temperature of a warm orange flame, and the light produces negligible heat while running at under 5 watts of electric power. This light seems to be a great replacement for traditional gas lanterns, hurricane lamps, and oil lamps.

The simulated flame is unbelievably realistic in the flame light purchased by the author. No obvious pattern could be detected in the flickering LED flame by observing the light with the eye. Common sense suggested that being electronic-chip based, the pattern should repeat itself at regular intervals. What better way to determine if it repeats itself regularly or is completely random than to use PocketLab Voyager's Light Sensor?! This makes an interesting discovery investigation for your students!

The Author's Findings

Figure 1 shows 18 seconds of data from the Voyager Light Sensor that was running at 50 points/second. After a little examination of the Excel chart, constructed from the PocketLab app csv file, a pattern with a period of approximately 5 seconds was quickly revealed. Three cycles have been labeled in the graph.

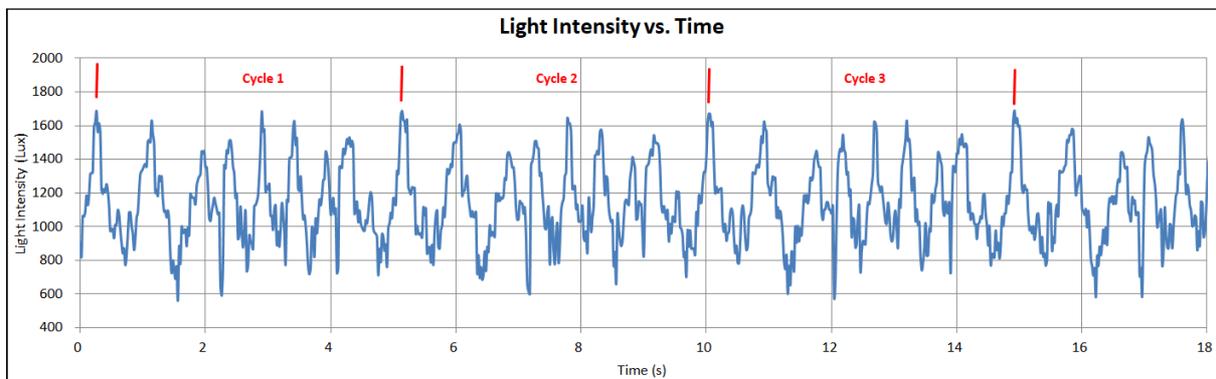


Figure 1

Figure 2 shows an Excel graph that was created by overlapping the three cycles, one on top of the other. The very close similarity in the overlapped cycles provides rather convincing evidence that the pattern repeats itself with a period of about 4.8 seconds. The author's intuition was correct—at least for the LED flame light that he purchased!

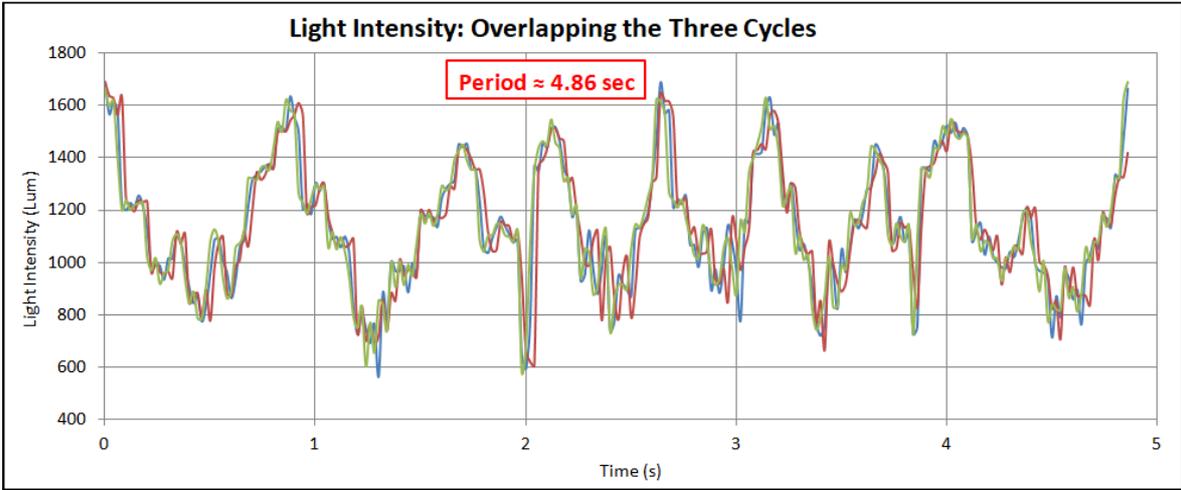


Figure 2

Figure 3 shows a snapshot from the combined data and video produced by the PocketLab app. The entire video also accompanies this lesson.

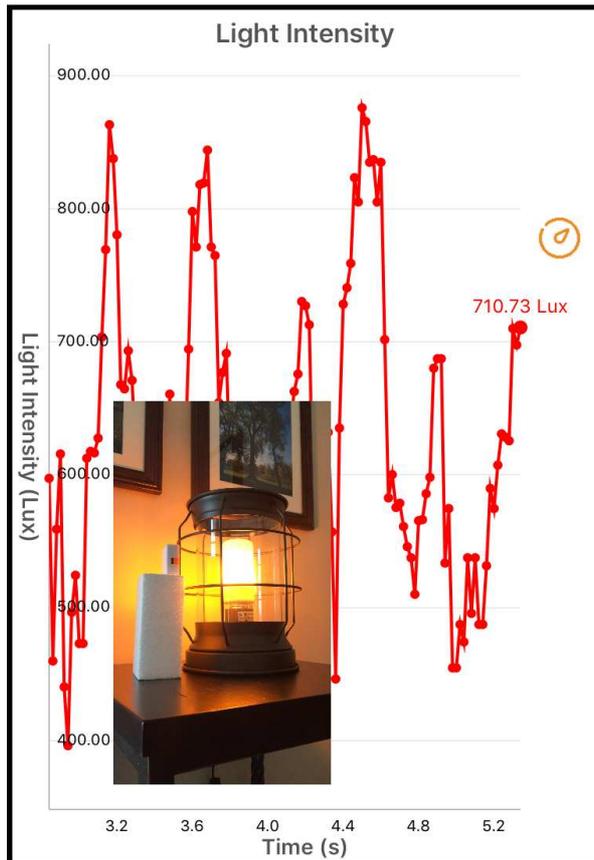


Figure 3

