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Photogate sensor for compound physical pendulum experiments

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Instructional instruments play an important role in support students'learning through the active learning approach. This research proposes a compound physical pendulum experiment using a photogate sensor. The sensor was set up to determine the frequency of an object vibrating back and forth using the application of an Arduino board. The designed sensor can measure the frequency in a range of 0.001-1000 Hz, which can be simply used for demonstration the harmonic motion in physics laboratories. Here, the compound physical pendulum used consists of a disk of radius 4.80 cm and mass 420.00 g, fixed at the end of a rod of mass 125.00 g and length 53.00 cm. The experimental result shows a strong agreement with the theoretical calculation of the physical pendulum equation with only 2% difference. The low-cost photogate sensor made of an Arduino microcontroller can be one beneficial option for physics small to large classrooms.

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