

Criterion A: Planning

The Scenario

Last year in HL Physics I noticed that when trying to gather data about a swinging pendulum. We had some limitations in terms of what data we were able to collect, and the accuracy of the device used. At the end of last year I started a project to create a device that would solve these problems. This failed because of my time commitment to it. I thought, since I was still passionate about it, I would bring the project back to life and try to create a deliverable product.

I talked to the physics teacher at my school. Through a brief interview (greater detail can be found in the appendix) I found the teacher wants to have an improved way of observing the characteristics of a swinging pendulum. Right now, the teacher uses a photogate sensor that determines the amount of time the pendulum takes to complete a cycle. The device used is not always very accurate, and gives a limited amount of information.

The Rationale for Solution

My product that I will create will be an arduino-based stand-alone device that will read the orbital period of a pendulum using a sensor, then record that data and allow it to be transferred to a PC. As of right now, I am working on determining what type of sensor I want to use in order to get the best results; this will involve some research. Additionally I am working to figure out what additional calculations the client and I want to perform. The device will need to be portable, so I am going to work with a student to develop a 3D-printable case for the device.

I am going to be using an Arduino because it is good at performing a single task, can easily be programmed, there are lots of resources for it, and can easily be battery powered and portable. For the language/software used, I will be using C++ as my programming language as that is the native language supported by an Arduino.

Success Criteria

- Must be able to retrieve raw data from the device
- Must be portable, i.e. not tethered by a power cable
- Device should perform some additional calculations for the user

