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 (transcript of interview found in the appendix) I found that 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. The device will need to be portable, so I must make sure that the device isn't reliant on a wall outlet.

The basic structure of the device should consist of the following:

- Arduino Mega 2560
- Sensor to detect pendulum
- Buttons to interface with the device
- Screen to display information
- Battery power that makes it portable
- Indicator LEDs

I am going to be using an Arduino Mega because it is good at performing a single task, can easily be programmed, there are lots of online resources for it, can easily be battery powered and portable, and has many digital pins. For the language/software used, I will be using the Arduino version of C/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