

Problems and Possibility of "Science and Human Life"

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Science and Human Life was established in the revision of the government guidelines for teaching, the number of students who learn *Science and Human Life* is about 400000, and is much larger than the number of students who learn *Basic Earth Science*. Contents of earth science field that are covered by the *Science and Human Life* is about one fifth of the whole, but they should not be ignored for earth science education, because one in three high school students takes this subject. In addition, this subject deals with the relationship between humans and nature, the benefits received from nature, and natural disasters in particular. However, the contents of this subject can not be said to be enough. In order for the students to master the skill necessary to make our society sustainable, it is necessary to further review the contents of this subject.

Keywords: high school earth science education, textbook demand, Science and Human Life, general subject of science

A reconstruction of "Film Case Seismometer" employing "Arduino" and "Processing"

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We reconstruct so called "Film Case Seismometer (Okamoto,1999)" for class room use. The legacy system had developed about two decades ago and was a full seismograph involving a moving magnet sensor and a PC recording system as a simplified mimic of a modern digitalized seismograph and a logger system. While the sensor was simplified and easy constructed enough, however the recording system was somewhat complicated and employ a specific program language on the limited PC. Therefore, the system was not so far contributed and/or demonstrated at mid-school's class rooms. In this regard, now we try to fully model-change the old system to an innovative style using "Arduino" (one chip micro-computer including both I/O and A/D converter devices) and "Processing" (Java based language for easy programing). The main aspects are as follows,

1) The sensor consists a rounded coil on a acrylic pipe and a strong Neodymium bar magnet hanging with a series rubber band from a main pillar hook. The Neodymium magnet can supply a sufficient signal and an appropriate damping by induced current with a surrounded metal pipe.

2) The recording system and software are improved more simplified and can applicable on any PC or even tablet.

3) The micro-tip used for I/O and A/D converting is "Arduino Uno" (Italian made and a cheap cost, 30 USD), which is easily controlled by a simple software written in Processing language and exchanges signals via USB port.

4) Processing language is used for A/D driving and logging, which is running on any operation system such as Windows, Mac, Linux and even Android.

5) The additional hardware for natural earthquake observation is a circuit employing OP amps for signal boost, which is divert from our legacy system.

6) All system is constructed in a transparent acrylic box for recognizing mechanism at a glance.

7) The wave signal is displayed on PC or tablet at real time with second time-marks and also save to PC as a graphic mode or digital mode at each moment.

8) The logging and displaying capacity can be extended to three channels easily.

Keywords: seismograph, Arduino, Processing, education, USB