

opensource physics projects for home and school

real science on a budget

Dr Ian Robinson : starfishprime.co.uk

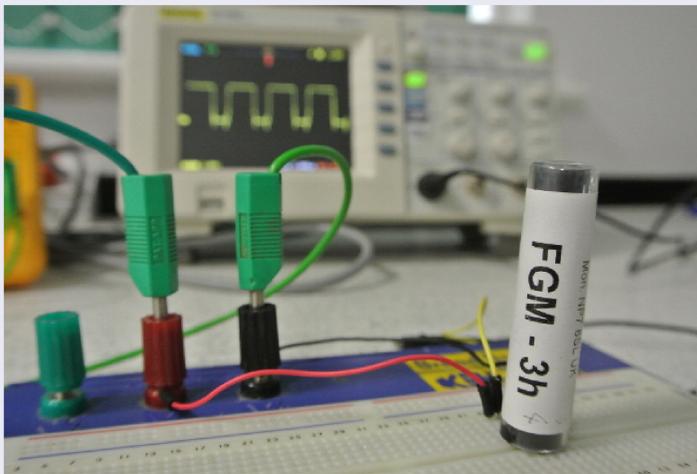
A National Geophysics Network

I am developing a series of geophysics sensing projects, infrasound, lightning and solar activity. These monitor in real-time, outputting data to the web via small embedded computers such as raspberry Pis or Arduinos. They can share data with international networks giving opportunities for national & international collaboration. Rather than provide a pre-built, polished design my intent is for an initial design that can be simply built and tested in a school. This could easily lead to students testing and making improvements or simply gathering and analysing data, i.e. the software layer is the only fixed component. These projects are all accessible from 11-18 and some could be started in upper primary school. They can potentially greatly enhance the CV of students applying to university, apprenticeship or employment. In addition they should generate streams of good publicity and encourage the uptake of 16-18 physics. A Sixth Form or 11-18 school wanting to increase uptake in A-Level or increase recruitment from local schools could do far worse than aggressively promote some real, cutting edge science activities. Passing exams is important, for an institution as are pass rates. However few take physics as a whim or 'light' option in the way they may pick easier subjects. Science and especially physics students tend to be passionate about their subjects and may see exams as a necessary chore. There is a considerable place for enthusiasm and an attempt to undertake real science - neither are facilitated by simply programming kids to pass exams. Good for students and good for recruitment.

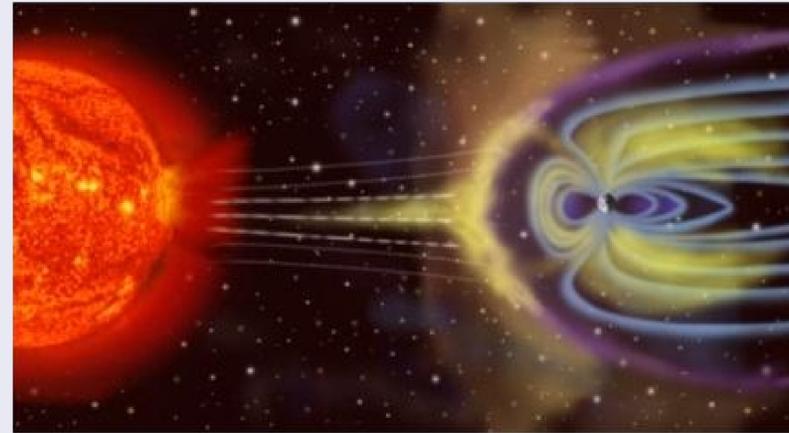


Why Geophysics?

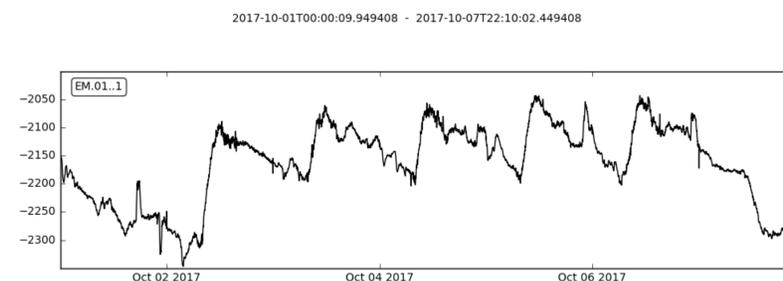
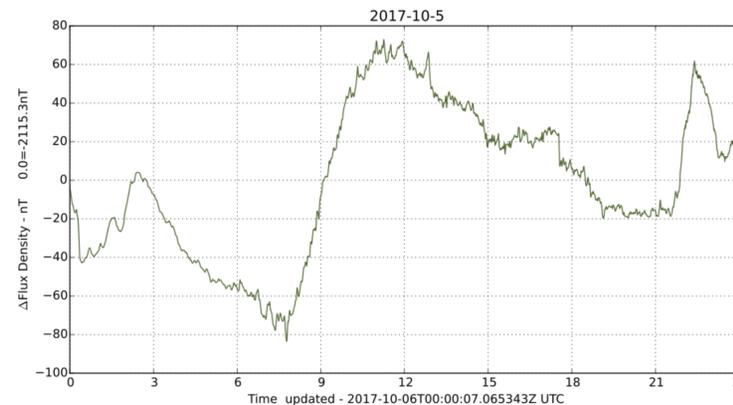
In the U.K. few school students consider a career in geology or geophysics despite the excellent career prospects. Research quality projects in geophysics may be built using low-cost sensors and data-logging kit giving students access to real scientific data. Using existing opensource pre-coded analysis software introduces students to technical programming and signal analysis techniques.



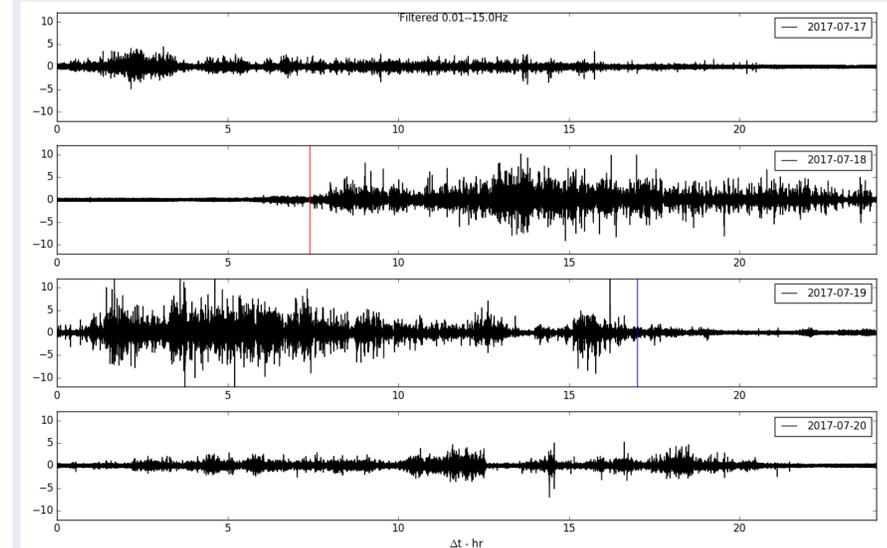
Aurora Monitor



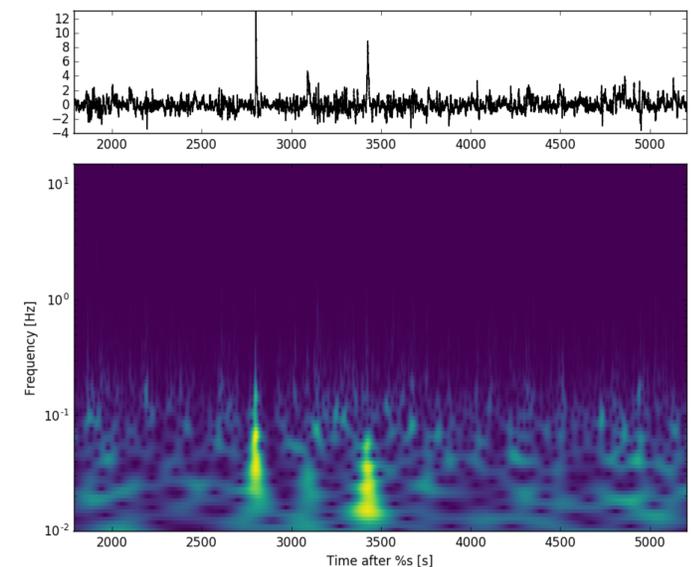
This project has provoked considerable interest in students with space science, programming and the possibility of spotting aurora. It has been developed over 2 years and works. It has been simplified to minimise cost and allow for easy upgrading and further development. Veroboard and through hole-components allow the hardware to be assembled by primary age students. Whilst aimed at younger students this could form the basis of an undergraduate project. It is a device of unusual sensitivity and capable of further refinement, particularly regarding analysis of the data which is saved in the geophysical .mseed format. For less than £100 a school can have an ongoing *real science* project delivering data 24/7 and displaying data on their website.



Infrasound Monitor



I have been working on a new geophysics project for the past few months a compact infrasound monitor based on a digital, i2c enabled differential pressure sensor. As a taster I feel this is a beauty. Very open-ended with lots of opportunities for students of all levels - primary to postgrad - to redesign and test replacement components. This is also real science, in a little studied area. Well suited to networking in small or large areas.



Details

