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Microcontrollers for data logging in Environmental Physics

R.Giles Harrison and Christopher.D Westbrook
University of Reading, Meteorology, Reading, United Kingdom (r.g.harrison@reading.ac.uk)

Methods for obtaining reliable environmental measurements are central in developing a quantitative understanding of the natural world [1]. In the environmental sciences, data is usually obtained through planned experimental work, by collaborators in large field experiments or merely from others downloaded through the internet. Careful appreciation of the provenance and reliability of measurements has traditionally been a central aspect of physics education, and a similar physics-centred approach to measurements has been embedded in the new Environmental Physics BSc programme at the University of Reading [2]. Through the use of practical classes, students are educated in using small programmable microcontroller devices to obtain environmental data. The classes are based around exploring the open source Arduino, to which a range of analogue and digital sensors are connected and evaluated. A simplified prototyping system has been developed to help emphasise the measurement aspects over the electronics considerations. The practical classes work towards deployment of a miniature data logger based on the Arduino's microcontroller but optimised for low power, from which the environmental measurements are compared with co-located standard data obtained at the Reading University Atmospheric Observatory.
[1] R.G. Harrison, Meteorological Measurements and Instrumentation, Wiley, 2014. (http://eu.wiley.com/WileyCDA/WileyTitle/productCd-1118745809.html)
[2] Environmental Physics BSc (https://www.reading.ac.uk/ready-to-study/study/subject-area/environment-ug/bsc-environmental-physics.aspx)