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Applications of embedded full gamma spectrum decomposition

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A self-contained gamma radiation spectrometer with embedded and automated temperature stabilization and full spectral analysis is presented. It consists of a crystal and PMT setup that is read-out using fast ADC and FPGA technology. The maximum dead-time has been established at 1.14 us and the energy resolution at 662 keV is 7%. Full spectral analysis has been implemented for naturally occurring radioisotopes of Potassium, Thorium, Uranium, Radon and their progeny. Further developments, including pile-up correction, neutron detection and miniaturization will be discussed. This technology allows the production of sensor nodes that can be used in many applications. Special attention will be given in to sensor nodes for measurements in hard to reach environments. Environmental monitoring in remote regions of Canada will be discussed as an example as well as precision farming, nuclear reactor monitoring and mining.

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