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Finite frame theory has become a powerful tool for many applications of mathematics. In this paper we introduce a new area of research in frame theory: Integer frames. These are frames having all integer coordinates with respect to a fixed orthonormal basis for a Hilbert space. Integer frames have potential to mitigate quantization errors and transmission losses as well as speeding up computation times. This paper gives the first systematic study of this important class of finite Hilbert space frames. (Received July 24, 2013)