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Typically, multidimensional data has been analyzed using tensor products of 1-dimensional wavelets; however, these methods do not yield any information about directional components or trends. A number of new representations have sprung up in an attempt to solve this problem, including shearlets, for which nice algorithms and theory exist. Shearlets are used to analyze 2-dimensional data sets, but there is a need to develop higher dimensional tools for various applications, like in biomedical imaging. Inspired by the work of Cordero, DeMari, Nowak, and Tabacco, we exploit the representation theory of the extended metaplectic group in order to construct isotropic and anisotropic analogs of the shearlet transform over $L^2(\mathbb{R}^d)$ for $d \geq 2$. (Received September 22, 2009)