We study extremal curves associated with a functional which is linear in the curve's torsion. The functional in question is known to capture the properties of entanglement entropy for two-dimensional conformal field theories with chiral anomalies and has potential applications in elucidating the equilibrium shape of elastic linear structures. We derive the equations that determine the shape of its extremal curves in general ambient spaces in terms of geometric quantities. We show that the solutions to these shape equations correspond to a three-dimensional version of Mathisson's helical motions for the centers of mass of spinning probes. Thereafter, we focus on the case of maximally symmetric spaces, where solutions correspond to cylindrical helices and find that the Lancret ratio of these equals the relative speed between the Mathisson-Pirani and the Tulczyjew-Dixon observers. We construct all possible helical motions in three-dimensional manifolds with constant negative curvature. In particular, we discover a rich space of helices in AdS$_3$. Finally, we dive into the study of helical motions in interpolating solutions: we construct a "helical c-function" and address the issue of fake gaps in AdS$_3$/CFT$_2$.