We introduce a new topic which we deem *weaving frames*. Two frames \( \Phi := \{ \phi_i \}_{i \in \Lambda} \) and \( \Psi := \{ \psi_i \}_{i \in \Lambda} \) for a Hilbert space \( \mathbb{H} \) are *woven* if there are positive constants \( A \leq B \) so that for every subset \( \sigma \subset \Lambda \), the family \( \{ \phi_i \}_{i \in \sigma} \cup \{ \psi_i \}_{i \in \sigma^c} \) is a frame for \( \mathbb{H} \) with frame bounds \( A \) and \( B \). Woven frames have potential applications in wireless sensor networks that require distributed processing under different frames, and also in preprocessing of signals. Fundamental properties of woven frames are developed and key differences between weaving Riesz bases and weaving frames are considered. In particular, it is shown that a Riesz basis cannot be woven with a redundant frame. We also introduce an apparently weaker form of weaving but show that it is equivalent to weaving. We then extend the results of weaving Hilbert space frames to the Banach space setting by using approximate Schauder frames.