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In this talk, we give a survey of various results about the topology of oriented Grassmannian bundles related to the exceptional Lie group  $G_2$ . Some of these results are new. One often encounters these spaces when studying submanifolds of manifolds with calibrated geometries. As an application we deduce existence of certain special 3 and 4 dimensional submanifolds of  $G_2$  holonomy Riemannian manifolds with special properties. These are called Harvey-Lawson(HL) pairs. They appeared first in the work of Akbulut & Salur about  $G_2$  dualities. Another application is to the coassociative-free embeddings. We show that if there is a coassociative-free embedding of a 4-manifold into the Euclidean 7-space then the signature vanishes along with the Euler characteristic. The converse of this theorem is proved in the more general sense by İ.Ünal using h-principle techniques. We will talk about this direction if time permits. Joint work with S.Akbulut and İ.Ünal. (Received February 01, 2016)