Axions represent one of the leading candidates for dark matter and continue to play an increasingly prominent role in contemporary particle physics. In this talk I will examine two ways to hunt for axion dark matter. The first explores the possibility of detecting dark matter axions via radio measurements of neutron stars. This search strategy hunts for radio line signals produced by axions falling into the magnetospheres of neutron stars which resonantly convert into photons. The second part of the talk focuses on a new strategy for designing axion dark matter detectors in the lab. In a nutshell we will examine whether a computer can design the next generation of axion dark matter detectors. Here I present a technique for designing an optimal detector by iteratively searching detector designs using gradient descent.