We propose a novel mechanism of stabilizing skyrmions in a magnetic monolayer by placing the system on a conducting substrate (normal metal or graphene) which makes the spins interact via the long-range Ruderman-Kittel-Kasuya-Yosida (RKKY) exchange. It is shown that for a metallic substrate skyrmions can be stabilized by fine-tuning the Fermi surface parameters, while for a graphene substrate the stabilization occurs naturally in several geometries.