Perching Landing Gear Research

The nature of this research is to prototype different types of perching landing gears for drones. Using natural mechanisms found in animals, our team created two bio-inspired designs of perching landing gears for unmanned aerial vehicles (UAV's). These designs were able to demonstrate the feasibility of landing-gear systems that enable bird-sized UAV's to perch and take-off from branch-like structures.

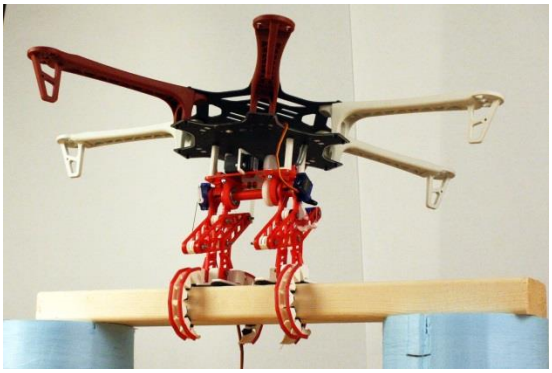

Figure 1. Picture of perching landing gear in its compressed state.

The first concept, seen in Figure 1, takes inspiration from the anatomy of birds and their ability to use their tendons to grasp a branch to perch while sleeping. The design is a gravity-activated, under actuated, cable-driven, grasping-foot mechanism. Composed of two four-bar linkages and four gripping digits, the design causes the linkages to collapse when compressed, causing the digits to curl around the branch. This allows the mechanism to grip and balance on a structure.

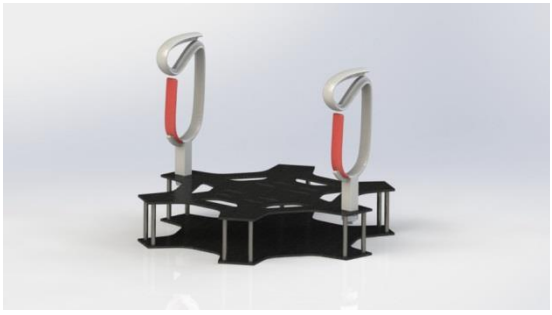

Figure 2. CAD render of hanging landing gear.

The second concept, seen in Figure 2, is inspired by roosting bats. Using a dual extrusion 3D printer, we created a hooking mechanism that enables UAV's to suspend itself from wire or small-diameter branches. This design allows balance of structural stiffness with flexibility to create a mechanism that can be used for a variety of situations. The use of a 3D printer also allows for ease of manufacturing and fabrication.