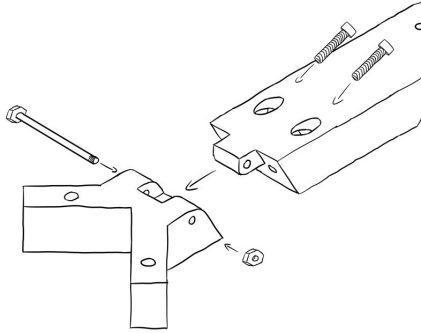


Initial Design Concepts

	Concept Sketch	Pros	Cons
Hinge with Internal Screw Lock		Sturdy Design Simple Design	Time consuming Requires a tool to lock/unlock
Simple Hinge with Magnetic Lock System		Easy assembly	Locking mechanism may not be strong enough to stay in place during flight.
Hinge with Top Sliding Lock		Easy to move arm part upwards	Extra part makes for harder assembly Less sturdy when locked down
Hinge with Side Sliding Lock		Light weight. Quick to lift arm.	No way to secure the arm in a folded position. Needs revision to the sliding pin to ensure it doesn't fall out.

Design Matrix

Design Objective	Hinge with internal screw lock	Simple hinge with magnetic lock system	Hinge with top sliding lock	Hinge with side sliding lock	Final Design: Spring-Loaded Slider Hinge
Easy to fold arm up /10	3	9	8	8	10
Quick to fold arm up /10	3	9	8	8	10
Sturdy when arm locked down /10	10	4	5	2	10
Easy to assemble and/or replace parts /10	8	5	3	5	7
Low risk of parts breaking during flight/use of drone /10	10	4	6	5	9
Total	34	31	30	28	46

Design matrix indicating how each design meets the objectives, as well as a total rating to determine which design best meets the design requirements. The first four designs were original submissions, the last and final design is a culmination of designs 1 and 3. The structural stability and sturdiness of design 1 was combined with the sliding mechanism used in design 3 to create a near perfect spring-loaded design with a total score of 46/50.

Hinge Selection Reasoning

The hinge mechanism we decided to choose is the “Spring-Loaded Slider Hinge”. When we came up with our initial 4 designs, each design had pros and cons. As we analyzed each design, we were able to come up with a criteria for what we wanted our hinge mechanism to accomplish. The mechanism must be strong/sturdy so the arms do not unlock during flight. We also wanted the mechanism to be simple and not include screws or fasteners so when you want to charge the drone you can quickly put the arms up and move them back down when done. Each of our initial designs allowed for one of these criteria, but none had both. From this we came up with the Spring Slider Hinge, we took the slider idea from design C and redesigned it to be inside the arm instead of an external piece. Then we added compression springs that would keep the arms in a locked position until the user would slide back the slider and move the arm in one of its 2 locked positions (folded down or up). This design allows for the hinge mechanism to easily and quickly fold the arm when needed without compromising the strength/sturdiness of the drone.

Images of Final Design: Spring-Loaded Slider Hinge

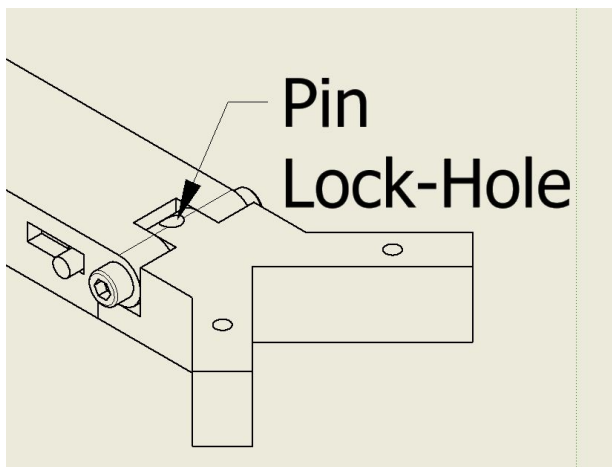


Figure 1. Isometric View (top).

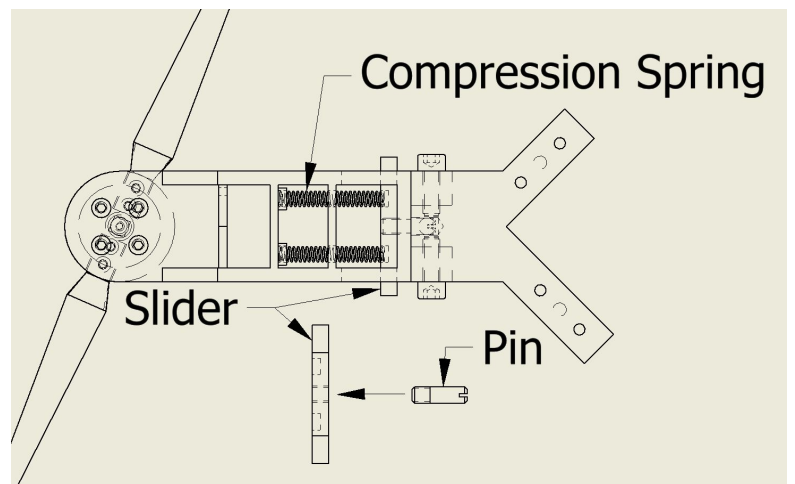


Figure 2. Bottom View of Drone Arm, with additional Pin and Slider views. Pin Lock-Hole (similar to one seen in Figure 1) for locking arm in down position shown with hidden lines.