

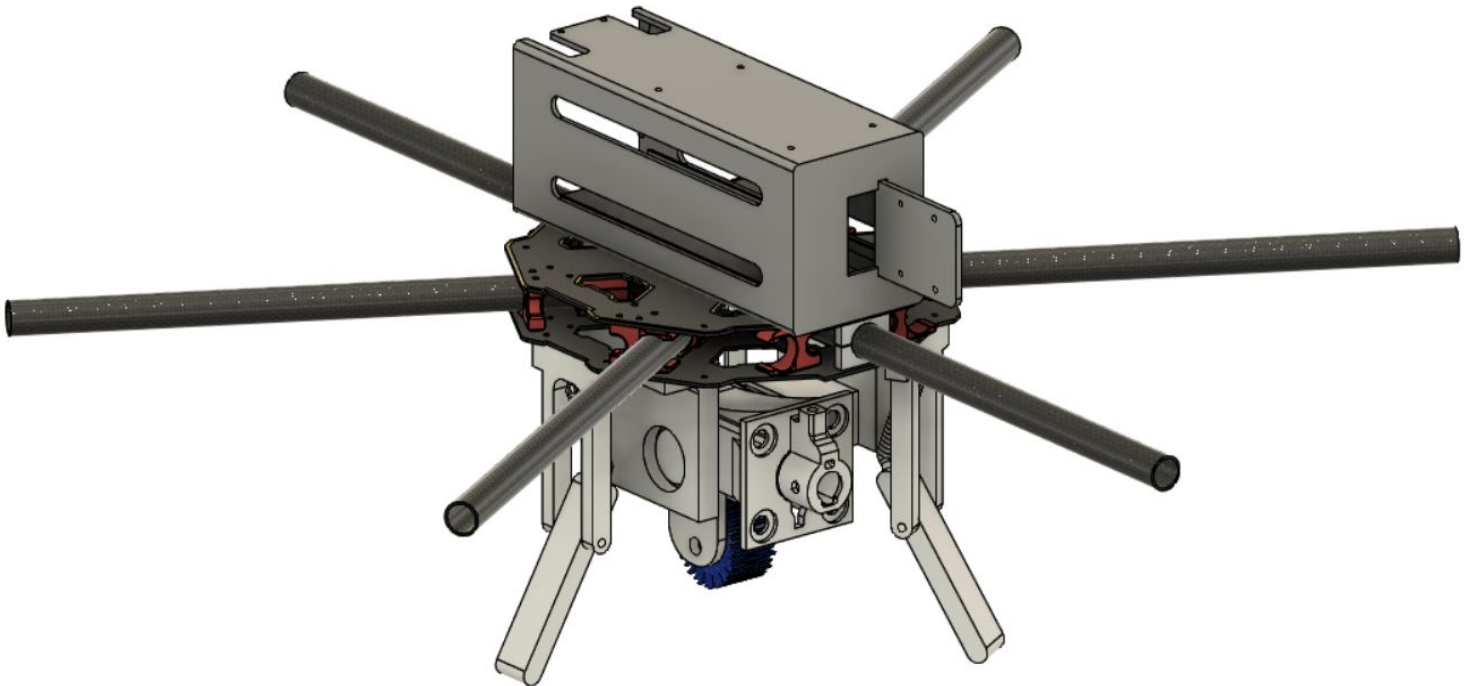
Rooftop Inspection Drone

Proposal Document - S Tarun Prasad

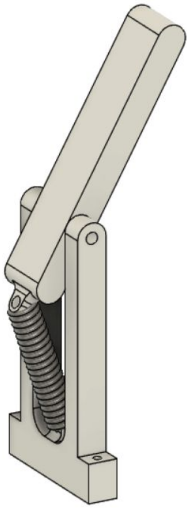
Problem Statement:

Rooftop Inspection requires the drone to have an ideal soft landing as any toppling in this scenario is undesired post-contact. Small holes can be expected on the surface and the landing gear design needs to take account of this issue. The inspection surface often requires prior cleaning for ideal sensor data. If cleaning is adopted, there is a requirement of the probe contact point to lie at the epicentre of the cleaned region.

Solution:

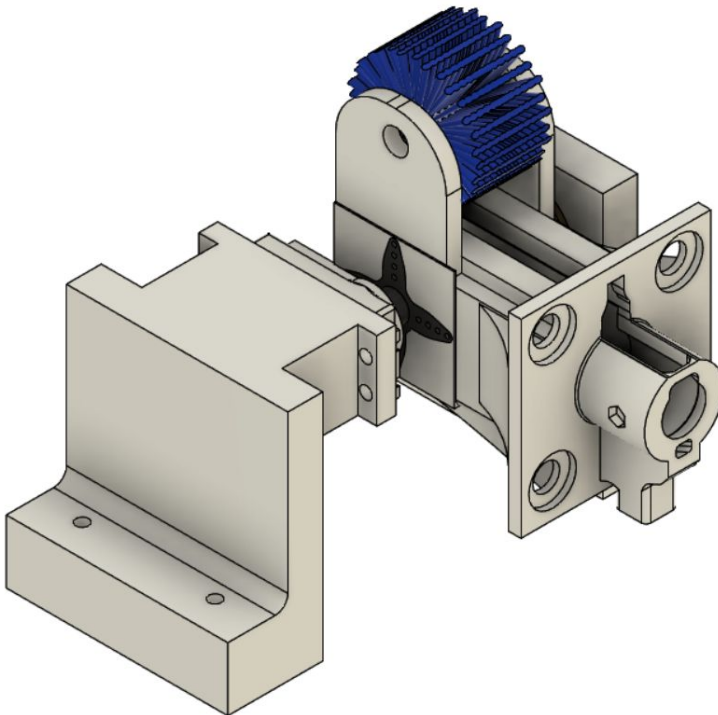


The current design developed comprises of a cleaning apparatus, probe contact method and landing gear. The cleaning apparatus and probe contact method have been integrated into a single inspection mechanism to satisfy the requirement of cleaning and inspection spot overlap. A more detailed description of the sub-assemblies can be found below.



Landing Gear:

The landing gear is a three-body assembly designed to offer the drone compliant landings. Its parameters ensure that the landing gear will always make the first contact before the inspection assembly. Once it gains contact the revolute joint gets actuated passively opposed by the spring implemented for compliance. A stopper mechanism has to be implemented to limit the range of the angle of the revolute joint. It is coupled to the bottom plate of the drone via two small fasteners each. The drone is equipped with three land gears to ensure optimum stability while landing.



Inspection Assembly:

The inspection assembly is equipped with the probe setup and the cleaning brush housed in a single 3D printed part. This part is mounted on a Towerpro MG995 Servo for accurate positioning of the inspection assembly post landing. The servo motor is housed in another 3D printed part which is directly coupled to the bottom plate of the drone via 2 small fasteners. The other end of the middle part housing the brush and the probe setup is supported by a

W 61705 bearing housed in another supporting 3D printed part coupled to the base plate via 2 small fasteners. The actuator for the brush is yet to be implemented and as of now rests on a free revolute joint. The assembly will be maintained at a slight angle before landing and the servo will be actuated post-landing to contact the revolving brush with the surface. Once the brush cleans the surface the servo is further actuated until the probe makes contact with the cleaned surface. Once the data is obtained the servo is reversed to withdraw the inspection assembly.