All the possible security threats & risks either related to drone hardware or its control system are carefully listed along with the possible worst-case scenarios for each. All these risks are addressed during the design, selection of components, selection of software and modification of code. Moreover, all the possible security protocols shall be ensured in test flights to minimize any casualties.

Out of all these threats & risks, major ones are listed in CDR along with their severity and how we minimized them or aim to during test flights and final fly-off.

# Safety Steps in Aerodynamic Design:

# Safety Steps in Control & Computing System Design:

Since the drone is most vulnerable to any bugs or glitches in software, safer software is higher priority than performance optimized software for our Control & Computing System team. In this regard, the modifications in control loop will be used in test flight after being checked by faculty advisor and will be used in fly-off after multiple test flights without any glitch or unwanted output.

# Safety Steps in Propulsion Design:

Safer propulsion system implies safer flight. Motors & Propellers used in the drone are the highest quality ones available in market to ensure the safest propulsion system possible.

# Safety Steps in Spray System Design:

The spray tank is designed to minimized leakages in case of a crash. High quality pump is used to minimize failure probability. Pipes of good quality are used to ensure that there is no leakage of flowing pesticides.

|  |  |  |  |
| --- | --- | --- | --- |
| Probability | Severity | Risk | Mitigation |
| Improbable | Marginal | Pixhawk Processor Failure | Failsafe 32-bit co-processor |
| Remote | Minor | Control loop glitch | Frequent test-flights with deep analysis of flight data log |
| Improbable | Major | Losing connection between flight controller & flight computer | RTL or safe landing depending on GPS connection, distance from launch and remaining battery |
| Remote | Marginal | Motor Failure | Use state-of-the-art BLDC motors |
| Occasional | Major | Propeller Failure | Use Carbon Fiber Propellers |
| Remote | Major | Battery Failure | Small Failsafe battery for RTL or immediate Landing |
|  |  |  |  |
|  |  |  |  |