Drone Space Frame Design

Client: Rapid Manufacturing Lab - IIT Bombay

Objective:

- The aim was to design a drone for medical emergency services capable of carrying a 90 kg payload. The drone needed a modular structure for easy assembly and transport, enabling rapid deployment in emergencies.

Approach:

- Initially designed a cost-effective space frame using readily available mild steel to validate the concept, acknowledging payload reduction due to higher weight.
- After successful prototype validation, planned a transition to an aluminum frame for the final structure to optimize weight savings while maintaining structural integrity.

Solution:

- Designed a modular space frame housing 8 motors, controls, and battery packs, capable of flying with a 90 kg payload.
- Performed FEA simulations on multiple design iterations to maximize the strength-to-weight ratio, achieving a 12% improvement.
- Developed custom fabrication fixtures to ensure accurate welding, achieving ±1 mm fabrication tolerance.
- Designed drone arms with bolted joints for quick assembly/disassembly, making the system highly portable and cost-effective.

My Role (Freelancing Project):

- Conceptualized the design, created CAD models, and prepared GD&T drawings in coordination with a professor at IIT Bombay.
- Performed structural FEA simulations for optimization.
- Designed fabrication fixtures for precise welding assembly.
- Coordinated vendor manufacturing and delivered the final product to IIT Bombay.

- **Drone at the Expo:**

- **Drone Structure FEA to increase the strength-to-weight ratio:**