Project Report: Flapping Wing MAV Tail Control

Introduction:

The Flapping Wing Micro Air Vehicle (MAV) Tail Control Project aimed to enhance the stability and control of flapping wing MAVs through tail design. Flapping wing MAVs simulate bird and insect flight, requiring efficient tail mechanisms for stability and maneuverability.

Design and Modeling:

Three tail designs were created: Ornithopter Tail, Inverted-T Tail with Stabilizer, and Inverted-T Tail without Stabilizer. Components were modeled in SOLIDWORKS, 3D printed, and connected to servo motors for controlled motion. Push rods transmitted motion to rotating components.

Prototyping and Setup:

Prototypes were successfully assembled with MAV bodies. Servos were situated in specially designed holders for motion control. The Arduino-based system allowed joystick-driven tail movement. Tail shapes were determined based on aspect ratio and fork ratio calculations.

Fabrication and Testing:

Parts were 3D printed and assembled in-house. The MAV's dynamic motion with different tail designs was achieved, allowing evaluation of their performance. Servo holders, tail mounts, and connections were refined for optimal functionality.

Conclusion:

The project successfully developed and integrated three tail designs for flapping wing MAVs. The joystick-controlled system offered precise control over tail motion. Empirical analysis guided tail optimization for stability. The project's outcomes contribute to future MAV research and design.

By: Manas Gudi
Contact: gudi.1@iitj.ac.in