

# Design & Analysis of Ornithopter

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**Abstract:** This project will present the design of a Flapping wing UAV which is inspired by various bird mechanisms and its action during flight. In this project, the real actions will be tried to convert into a perfect mechanism to get a stable flight maneuvering. The design will be made CATIA V5 with all the parameters according to the bird selected. And then the hexahedral mesh analysis had done and with the help of ANSYS- Fluent we had done CFD Analysis at a different angle of attack. To understand the working principle of ornithopters, various surveys were made on the natural flyers with flapping wings and their ability to produce lift and thrust. The crank mechanism is chosen to make the micro air vehicle (MAV) for spy work without being identified. This mechanism is one of the most complex ones, as its flow condition changes along with its wing motion. The mechanism is analyzed at two different speeds: 3 & 6 m/s. To analyze the aerodynamic characteristics, the lift and drag forces are measured at a different angle of attack using ANSYS software. The results are compared at various times with different working conditions to get the most suitable and reliable conditions. So, copying from the flying behavior of it is possible to gain all the abilities like the bird. And then after the analysis, we can able to analyze the lift & drag forces over the wings. They will consider factors such as wing geometry, wing flexibility, power source, control mechanisms, and structural integrity. The design process will involve the use of computer-aided design (CAD) software, allowing students to create detailed 3D models of their ornithopters. Once the design phase is complete, the project moves on to the analysis stage. It will employ computational fluid dynamics (CFD) simulations to evaluate the aerodynamic performance of their ornithopter designs. This analysis will enable them to optimize wing shape, wing kinematics, and other parameters to achieve efficient flight.

**Keywords:** Ornithopter, CAD Software, CFD Analysis, Wing Geometry.

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