

DOCUMENT

COURSE: Data Science, **ASSIGNMENT** 01

Orinthopert

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Ornithopter

The concept of ornithopters has fascinated inventors and designers for centuries, as they represent an attempt to mimic the natural flight of birds and other flying creatures. The machines can vary in form and size, but they are typically built to a scale similar to that of flying animals.

In some cases, ornithopters have been constructed large enough to carry human pilots. These crewed ornithopters can be powered either by engines, similar to conventional aircraft, or by the pilot's muscle power, which requires significant physical effort.. ?? [1]

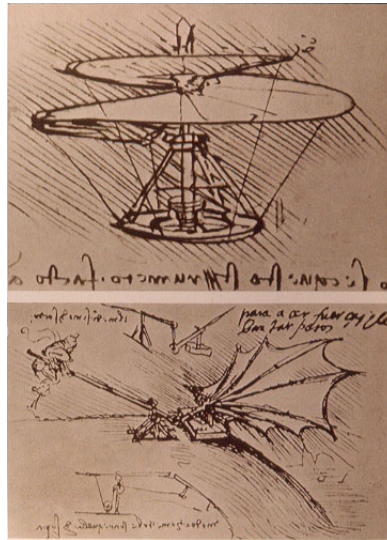


Figure 1: model of Ornithopter

1 Introduction

The idea of an ornithopter has been around for centuries. The earliest known ornithopter was designed by Archytas of Tarentum in the 4th century BC. Leonardo da Vinci also made many drawings and models of ornithopters in the 15th century.

However, ornithopters have proved to be difficult to build and fly. The flapping motion of the wings creates a lot of drag, which makes it hard for the ornithopter to stay in the air. Additionally, ornithopters are very sensitive to changes in weight and balance, which can make them difficult to control.

Despite these challenges, there have been a few successful ornithopter flights. In 1930, Frenchman George Cayley made a short flight in an ornithopter that was powered by a rubber band. In 1942, German engineer Adalbert Schmid made a manned flight in an ornithopter that was powered by a small gasoline engine.. [2]

1.1 History

Early crewed flight experiments may have been made with the intention of achieving flapping-wing flight, although it's more likely that only glides were actually made. They include the alleged ascents of the 9th-century poet Abbas Ibn Firnas and the 11th-century Catholic monk Eilmer of Malmesbury (both attested in the 12th and 17th centuries, respectively).[1] One of the first authors to consider a mechanical way of flight was Roger Bacon, who wrote in 1260. Leonardo da Vinci started researching bird flying in 1485. He understood that humans are too bulky and weak to fly with just wings attached to the arms. He drew a prototype of a contraption where the pilot sits down on a plank and operates two enormous membranous wings using hand levers, foot pedals,[2]

2 components used in ornithopter

Frame: The frame of an ornithopter provides the structure and support for the wings and other components. It is typically made of lightweight materials such as balsa wood or carbon fiber.

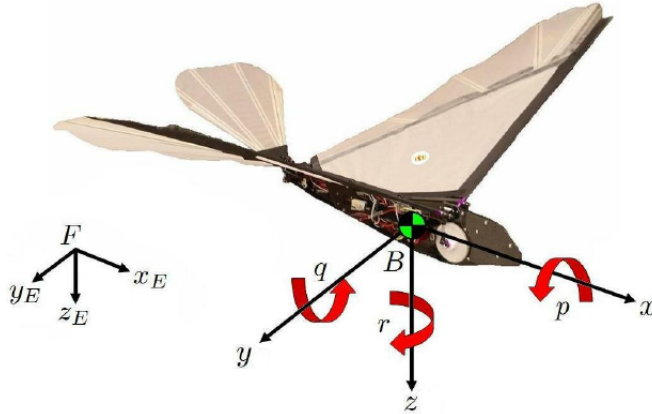


Figure 2: frame

Wings: The wings of an ornithopter are responsible for generating lift. They are typically made of a lightweight material such as fabric or plastic, and they are supported by a framework of spars and ribs.

Flapping mechanism: The flapping mechanism is responsible for flapping the wings. It can be powered by a variety of sources, such as rubber bands, motors, or even human power.

Control system: The control system allows the pilot to control the ornithopter in flight. It typically includes a joystick or other input device, and it is used to control the flapping mechanism, the rudder, and the ailerons.

Other components: Other components that may be included in an ornithopter include a landing gear, a cockpit, and a power source. The specific components used in an ornithopter will depend on the design and complexity of the ornithopter. However, the components listed above are some of the most common components found in ornithopters.

Here are some additional tips for choosing components for your ornithopter:

Lightweight materials: The components of your ornithopter should be as lightweight as possible. This will help to reduce the weight of the ornithopter and make it easier to fly.

Strong materials: The components of your ornithopter should also be strong enough to withstand the forces of flight. This is especially important for the wings and the flapping mechanism.

Durable materials: The components of your ornithopter should be durable enough to withstand wear and tear. This is especially important if you plan on flying your ornithopter frequently.

3 Working principal

An ornithopter operates on a similar premise to a bird. Lift is produced by the up-and-down flapping of the wings. The ornithopter is propelled forward by thrust produced by the flapping motion.

An ornithopter's wings are often constructed from a lightweight material, like cloth or plastic. They are held up by a framework made of ribs and spars. There are many ways to power the flapping mechanism, including motors, rubber bands, and even human power.

An ornithopter's control system enables the pilot to manage the rudder, ailerons, and flapping mechanism. The ornithopter's roll and direction are controlled by the ailerons and rudder, respectively.

Although the ornithopter's operating system is quite straightforward, it is challenging to use.



Figure 3:

4 application

Military: Ornithopters could be used for aerial reconnaissance or for delivering small payloads. They could also be used to transport troops or supplies into difficult-to-reach areas.

Surveillance: Ornithopters could be used to monitor areas that are difficult to access by other means. They could be used to track wildlife, to inspect infrastructure, or to gather intelligence.

Search and rescue: Ornithopters could be used to search for survivors in disaster areas. They could also be used to rescue people from difficult-to-reach locations. **Delivery:** Ornithopters could be used to deliver small packages to remote locations. They could also be used to deliver medical supplies or food to disaster areas.



Figure 4:

5 Advantage and Disadvantage

Advantages-

[1]Efficiency: Ornithopters are very efficient in terms of energy use. They can fly for long periods of time on a small amount of power. [2]Maneuverability: Ornithopters are very maneuverable in flight. They can make sharp turns and change direction quickly. [3]Quietness: Ornithopters are very quiet in flight. This makes them ideal for surveillance or search and rescue applications. [4]Low-speed flight: Ornithopters can fly at very low speeds. This makes them ideal for operations in confined spaces or near obstacles.

disadvantages-

[1]Complexity: Ornithopters are more complex to build and operate than other types of aircraft. [2]Susceptibility to wind: Ornithopters are more susceptible to wind than other types of aircraft. This can make them difficult to control in windy conditions. [3]Limited payload capacity: Ornithopters have a limited payload capacity. This means that they cannot carry as much weight as other types of aircraft.

6 conclusion

Wing flapping is the method of flight used by ornithopters. Although they have been around for millennia, their practical application has not yet expanded widely. This is as a result of a number of difficulties, such as the challenging control of an ornithopter while in flight, the high power needs, and the constrained range and payload capacity.

Ornithopters are still a topic of interest, and it's likely that someday, they'll have useful uses. Ornithopters might become more dependable and effective as technology advances. As a result, they might be a good choice for many uses, including military reconnaissance, surveillance, search and rescue, and deliveries.

References

- [1] “Mathis lichtenberger.” <https://www.chatpdf.com/>, 2023. Accessed on August 5, 2023.
- [2] P. MacCready and H. Edgerton, “Ornithopters: A manual of mechanical flight,” *Pacific Life Foundation- Smithsonian*, pp. 1–16, 2003.