



The 3 Belt and Road Teenager Maker Camp & Teacher Workshop

AIRPLANE MODEL

**SEPTEMBER 24-30, 2019
GUANGXI · CHINA**

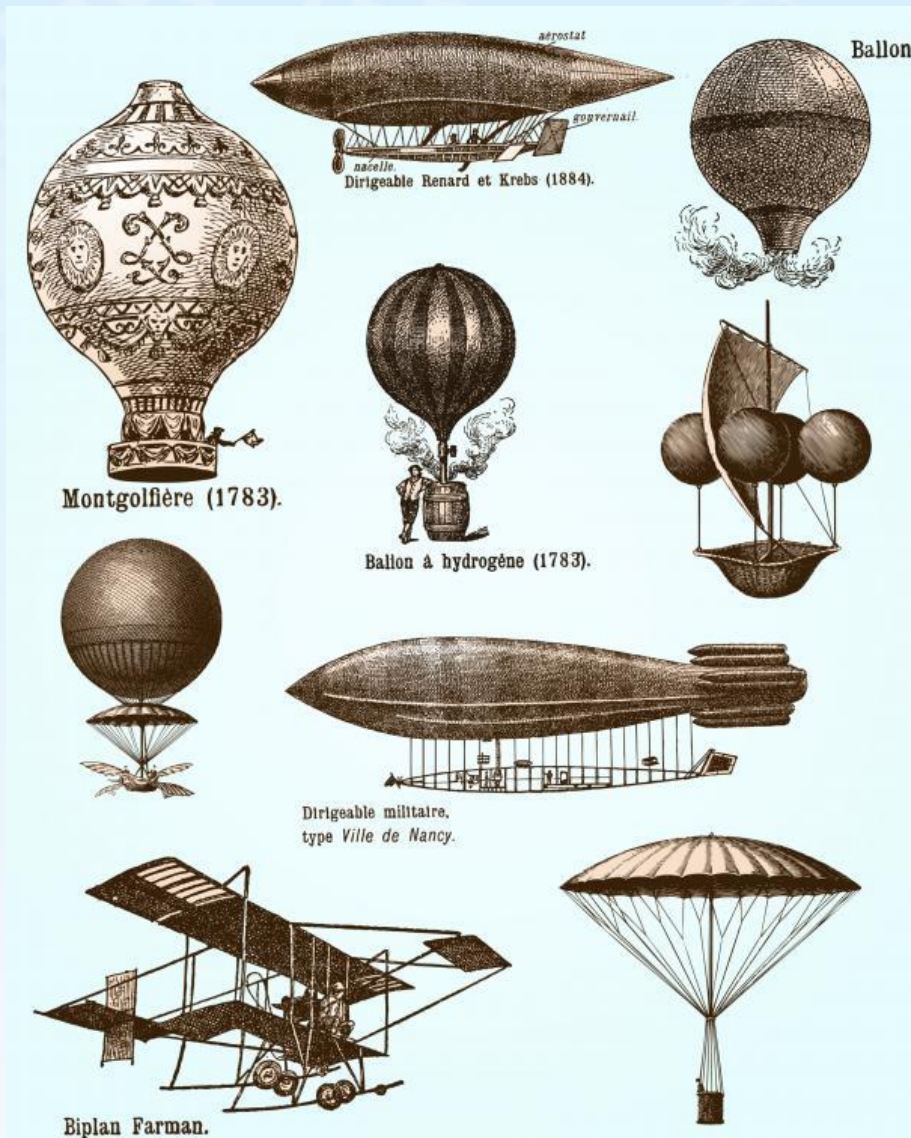


A Brief History of Human Aviation

Since ancient times, as long as humans see birds flying in the sky, they will germinate the desire to fly freely in the sky. But in ancient times, human beings could not realize this wish because of the limited level of science and technology at that time, so they had to place it in myths and legends. Mythologists also seem to feel that human flight is by no means an easy task, so in most ancient civilization legends, flying is the patent of God, and there are few stories about human flight. Among the myths of flying for few mortals, the tragedy of Icarus in ancient Greek mythology is one of the most well-known.

Kite, formerly known as paper kite, was invented by the Chinese about 2000 years ago. It was one of the earliest aircrafts that weighed more than air. Skylight, also known as Kongming Lamp, is an aircraft that uses low-density hot air to lift off. It is regarded as the rudiment of today's hot air balloon. It is said that the sky lamp was invented by Zhuge Liang in the Three Kingdoms Period and was used for military purposes. In the Five Dynasties, skylights were widely used not only in military affairs, but also in festivals to set off the festive atmosphere. Perhaps people will imagine themselves flying into the sky with the stars as they watch the sky lamp flying in their hands rise into the night sky.

In Europe, the earliest study of flight can be traced back to the mechanical pigeon made by Alhitas in ancient Greece, and the flight attempt to imitate birds lasted until the 17th century. The industrial revolution in the 18th century promoted the development of science and technology, and laid the foundation for human beings to achieve real flight. The development of the textile industry in the mid-18th century brought about lighter and stronger fabrics, and some people in Europe began to try to make large hot-air balloons. On June 5, 1783, the first successful public lift-off performance of a hot-air balloon made of linen was performed by the French Mengfei brothers.

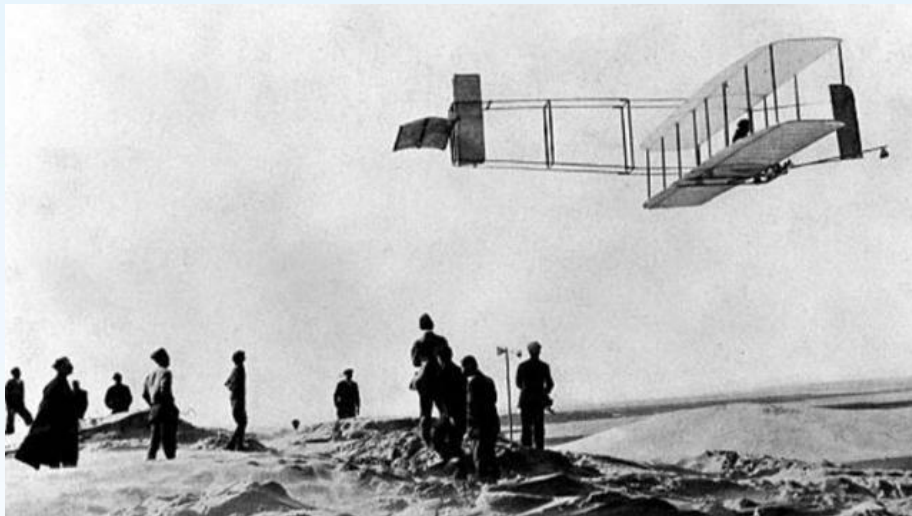


Although the principle of kites has enabled humans to make long-term gliding aircraft capable of carrying human beings, due to the problems of energy and power machinery, it was not until the end of the 19th century that modern fixed-wing aircraft loaded with sustained power appeared. There is still controversy over who invented the world's first fixed-wing aircraft, but the more



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common view is that it was invented by the Wright brothers of the US. The Wright brothers tested the lift design and flight control system of the wings by kites and gliders, and trained a lot of gliders before adding power to train pilots. After discovering that previous research data may be wrong, they built wind tunnels and carried out numerous tests on more than 200 different airfoils over a thousand times. Through the above technology accumulation, the two brothers discovered the principle of increasing lift force, designed the airplane control mode of balancing, pitching and turning, and found the method of maintaining lateral stability, thus basically solved the problem of aircraft maneuverability and stability, and laid a theoretical foundation for the airplane flight principle. On December 17, 1903, they successfully test-flew the self-developed Pilot I in the town of Little Eagle on the West Coast of the United States. This flight was recognized by the International Federation of Aviation (FAI) as "the first controlled sustained power flight of an aircraft heavier than air". So, yes, it's just a hundred years since we first successfully tested a fixed plane. Nowadays, large-scale jet airliners have become an indispensable means of transportation in our daily life.





What are we going to learn in this course?

What we will learn and experience in the following courses are

- Basic Principles of Fixed-Wing Aircraft
 - How to Make Fixed-wing Aircraft with Good Balance
- At the end of the course, we designed a fixed-wing aircraft by learning aerodynamic knowledge.

Activity 1: Watch the Flight Show

Let's go outdoors and watch some wonderful performances by experienced remote control model aircraft operators.

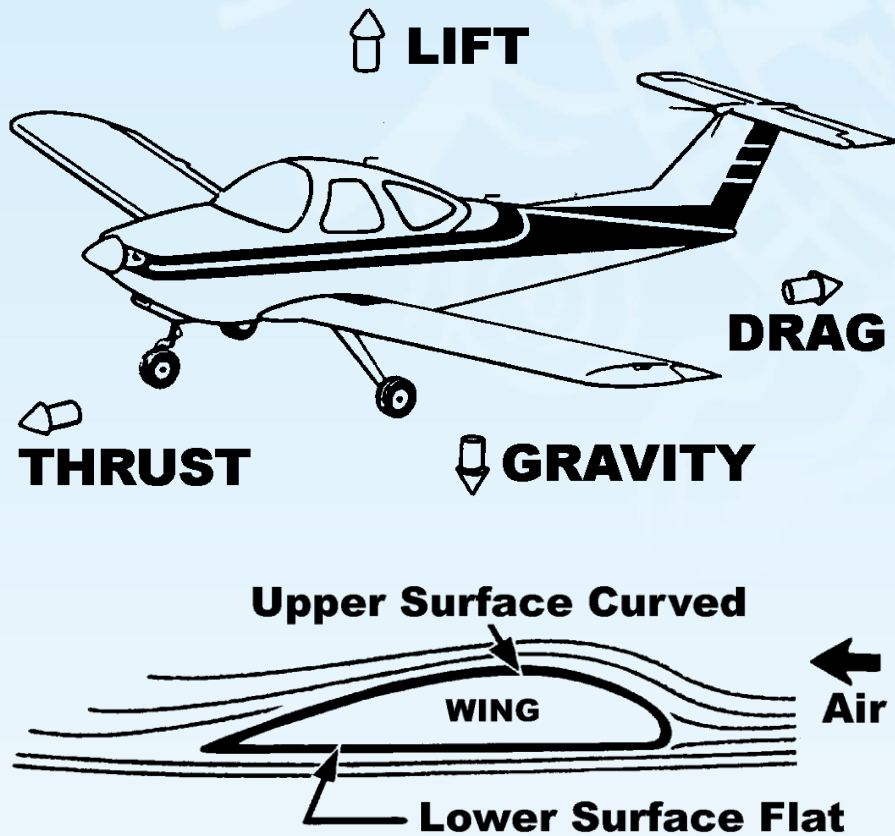
Discussion:

What do you think made the plane fly? Power of propeller or buoyancy of air? Why?

Activity 2: Brief History of Human Flight and Basic

Principles of Aircraft

Please listen to the teacher's explanation to understand how we humans fly to the sky. Some of the basic knowledge about the structure, center of gravity and aerodynamics of the aircraft is essential for the subsequent production process.



Activity 3: Rubber powered aircraft

Activity materials:

- Rubber powered aircraft kit
- Cutter, sandpaper

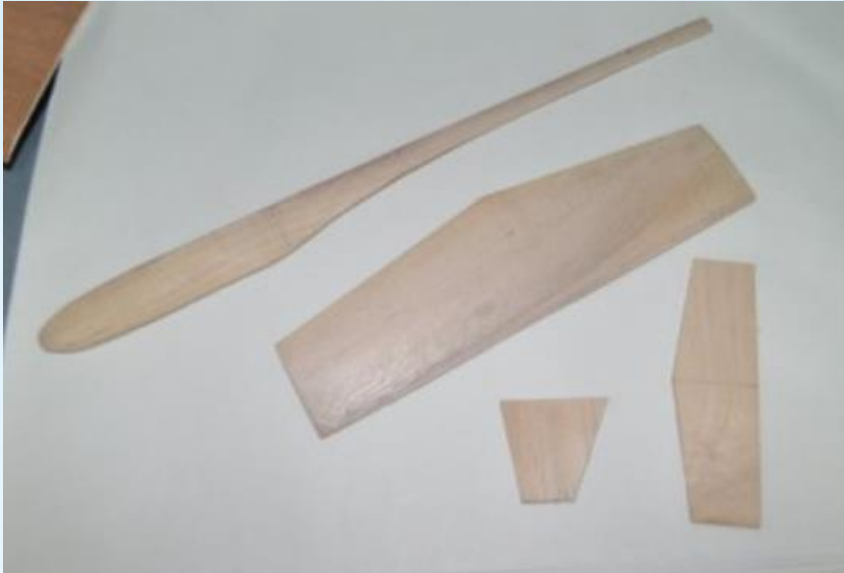
Technological process:

1. Assemble the aircraft step by step
2. Adjust the aircraft indoors until it can fly straight forward.
3. Try outdoors to see who can fly farther.

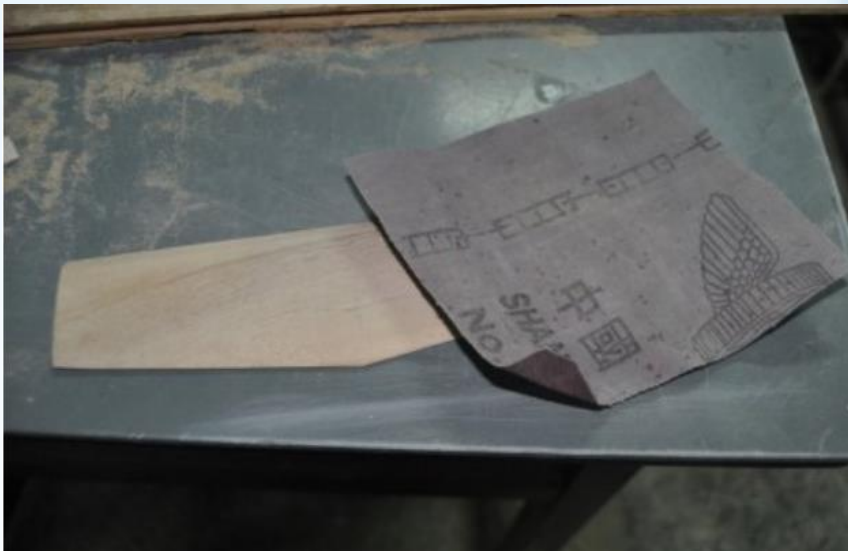


Activity 4: Ejection Plane

1. Cutting wood



2. Sand the boards until they have a smooth surface



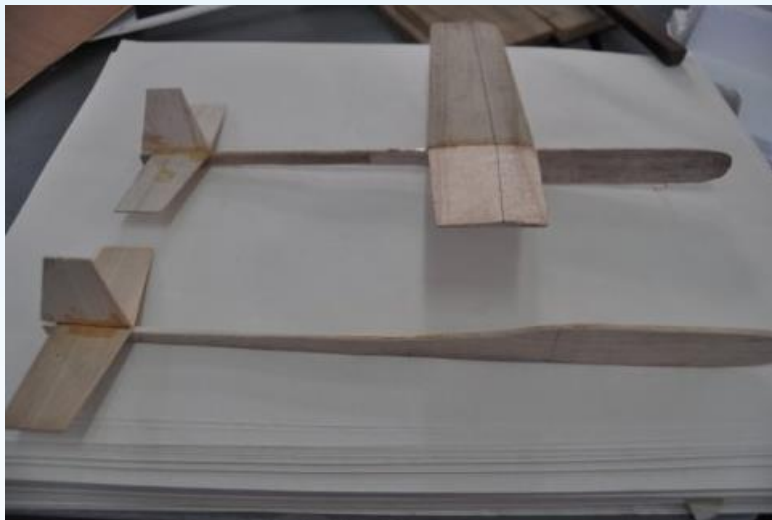


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3. Carefully cut the middle of the wing but not cut it into two parts, and you could see the light through the board and then fold it in half.



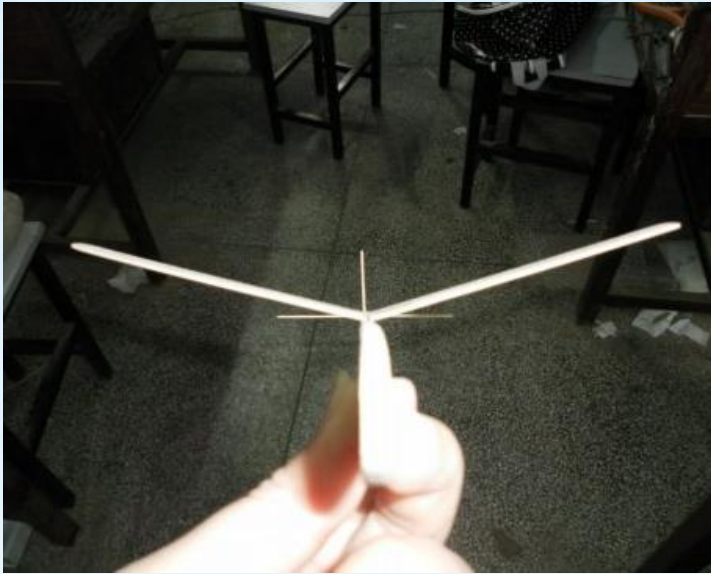
4. Glue the parts of the plane together



5 .Check that the parts of the aircraft are glued together in a straight line and



symmetrical.



6. After build the prototype, test it and adjust it.

STEM Project: Making a Fixed-Wing Aircraft

Try to build a fixed-wing aircraft powered by rubber with your team.

Requirement:

1. Use only rubber as power source (because of time, it takes a lot of time to use electric power)
2. Use only limited materials
3. No limitation on size and size
4. Use only your and your partner's hands to trigger
5. Make unique decoration on the surface of the fuselage.

Optional materials:

- Wing foam 2 pieces.
- Ten light woods
- Cotton rope 10 meters



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- Standard rubber 1, propeller 1, launcher 1
- Cutting knife, glue, colour pen, white paper, tape
- Goggles, gloves

Tip: Before designing the shape you envision, communicate with your teacher to avoid some important structural problems that will eventually prevent you from flying.

Evaluative Dimension	
Scientificity	The process of project design and making should be scientific and reliable.
Creativity	In one or more aspects of project design and making, etc. the team should show strong creativity.
Teamwork	Task allocation should be clear and cooperation should be in order.
Practicability	Projects should be of use in reality.
Expression	1.The presentation should be clear and brief; 2.Understanding the basic scientific principles related to the project; 3.The extent to which work is carried out independently; 4. Answering questions clearly and briefly.



Project Sheet

(Only one sheet needed for each group)

Name of your group	
Member of your group	
Design Chart (Including the overall modeling picture, and the design of each part)	



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<p>Materials List</p>	
<p>Personnel division (List the division of work for each person in your group. Note that one of them needs to act as a spokesperson to speak on behalf of your group.)</p>	