The Aviation Workshop

This workshop aims to give student a basic understanding of fluid and flight dynamics as well as demonstrations of the practical applications of the concepts learned. Having the stuents team up and build something from on their own applying what they have been taught is optional.. Also, complex math has been omited for a better understanding.

Concepts that will be taught:

- Basic fluid dynamics – pressure differences, burnuli's effect and how air flows around different surfaces using air flow diagrams and experiments – burnulli's principle
- Basic flight dynamics – How changes to construction of a basic glider can affect it's flight and principles behind lift.
- Principles behind servos – why we use servos, how they work
- Air flow diagrams
- Electronic speed control and pulse with modulation and relation to motors
- Control surfaces - what they are used for and how they are controled

All these concepts are explained in detail in 'Basic Concepts'

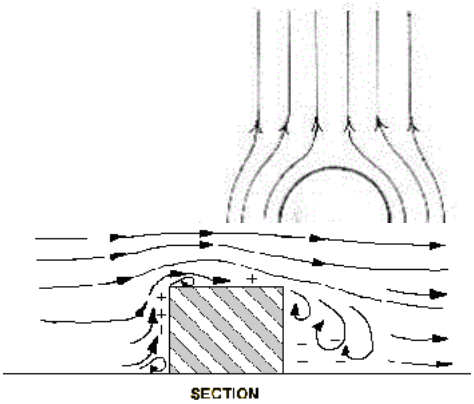
The following experiments will help students in building a better understanding of the concepts taught above by showing how they can be applied to daily life in an intuitive way; also making them seem more interesting to help students become more interested in flight and maybe even science and engineering.

Experiments:

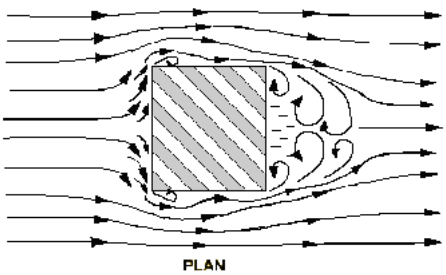
// matirials for all experiment are all available at the physics lab accept for the candle in the first experiment.

1. Blowing out a candle behind a curved surface vs a cuboid.

This experiment demonstrates how fluids move along different surfaces. Air flow diagrams will be included to help students visualise how the air is moving.



Compared to the air flow for a box with 90 degree edges: Here the cube causes the laminar stream of air to become

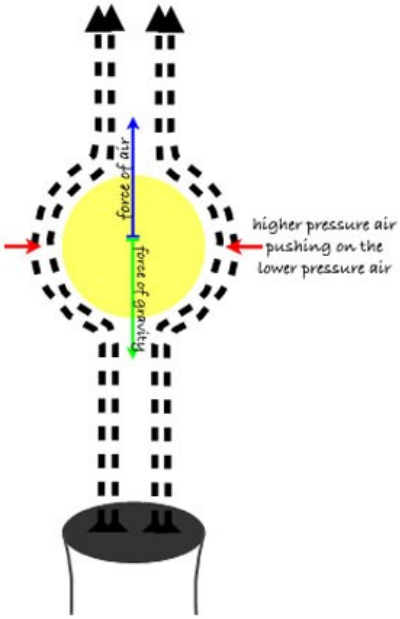


turbulent which healvily increases drag and prevents the stream of air from reaching the other side of the cube.
So for if a cube was in between the stream of air and the candle, the candle would not be blown out.

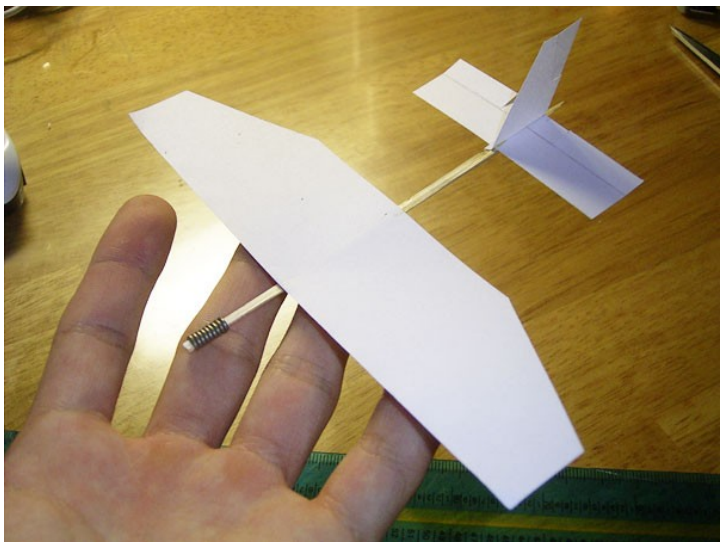
2. Suspending a table tennis ball in mid air with a stream of air.

This demonstrates burnoli's principle which is that moving air creates an area of low pressure.

These two diagrams illustrate visualy how the experiment would look.The stream of air generated by the eg. Hair dryer or vacuume cleaner, moves along the ball as demonstrated in the previous experiment creating an area of low pressure arund the whole ball, now the high pressure from the atmosphere pushes on the ball preventing it from moving along the hororzontal plane and the imulse from the stream pushes the ball up and is canclled out by the force of gravity suspending it in mid air.



4. This will be modification of a glider's structure to show how it effects it's flight changes can be made to the wingspan, thickness, center of gravity and shape.



Building:

In this section of the workshop, students will be asked to make plans for a basic glider according to the matirials provided which will then be aproved of by one of the members of the club after which the students will build a real life modle of the plans.

*students will be put into teams
*each team will be provided with a set of matirials needed for constructing basic gluiders powered by elastic potential energy or a throw.
*The teams will then watch a demonstration of the crafting of a simple glider.
*They will then make their own blueprints based of the demonstration and the matirials available.
* Each teams blueprints will then be approved of by one of the members of the club to assure that it can be built with the available matirials and will be able to fly.
*Teams will then build each of their modles with the matirials provided
*Finally, each teams gliders will be brought to and tested at the basketball court of the school
*The team with the best glider will be awarded a cirtificate recognising their effort and coorperation.

The demonstration glider:
//the plans and template for the glider have not yet been worked on. Planning will begin once there has been confirmation that the project may be exicuted.

This demonstration will show the students the following:

- How to trace and cut different shapes of the foam
- How to mold and deform the shape of the foam
- Methods of attatching the wing to the stick
- How to test where the center of mass of the glider is
- How to change the center of mass
- Reccommended places to keep the center of mass and reasons why
- Different ways to launch the plane by throwing or using a rubberband

Matirials needed:
Thin deprone sheets (2-3mm)
Balsa wood sticks (2mm diameter)
Blue tac
Paperclips
Rubberbands (1.5in)
Scissors
Pencils
Masking tape

//The quantity and price of each matirial is cheap but has not been sepsified. This will be done as soon as the club has recieved confrrmation of the project and a better estemate of the number of students involved.

Learning for the students:

Students will learn the following from the practicle work:

- How to practicaly apply concepts learned
- They will develop better motor skills
- Learn to coorperate in a team

The members of the club will also benifit from this as they will develop a better understanding of concepts taught and better teaching skills.