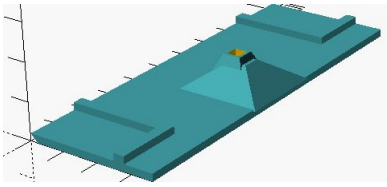
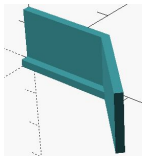
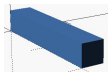
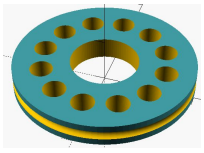
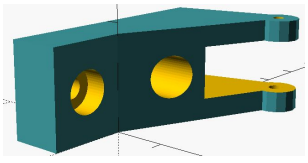
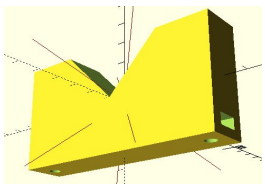
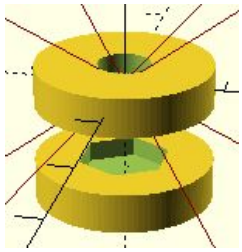
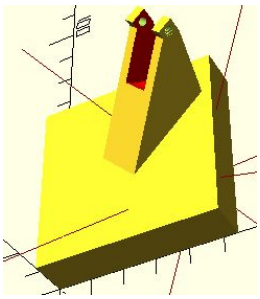
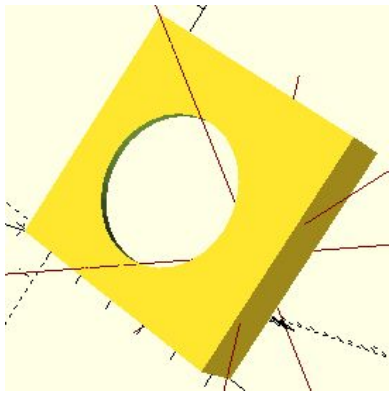
Linear air track

This equipment is designed to perform experiments of kinematics, dynamics and mechanical energy conservation, minimizing the effect of friction.

BOM

Count	Metals	
1	Rectangular aluminium tube 2 meters long	
1	MDF 30cm x 30cm (1” thick)	
1	Bearing (aprox 8 mm external diameter)	
1	M3 x 20 mm screw	
1	M3 hex nut	
	3D printed parts	
2	basecompleta (carro.scad)	
4	pestania (carro.scad)	 1
2	vastago (carro.scad)	
1	polea (UgroovePulley.scad)	
1	soporte (soporte polea.scad)	

2	pie (pie.scad)	
4	apoyo inferior y apoyo superior (pie.scad)	
1	Tapaypolea (tapa y soporte.scad)	
1	Tapasoplador (tapa y soporte.scad)	
	Tools	
1	cup drill bit 30 mm (it depends on the blower outlet)	
1	Metal drill bit 1 - 1.5 mm	
1	blower machine	

Building instructions

Track

Cut a 10 cm piece of the rectangular aluminum tube that is going to be used to build the carts. On 2 adjacent faces of the aluminum tube draw two lines parallel to the edge all along the tube. The first line should be separated 1 cm from the edge and the second one 2 cm from the edge (Fig. 1).

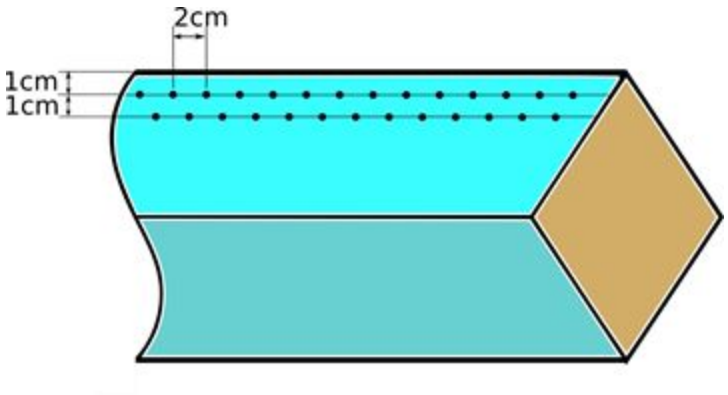


Fig 1. Tube drilling scheme

Perform holes of 1 - 1.5 mm with the metal drill bit in a way that the holes are separated 2 cm among them. In the second line make sure the holes are displaced 1 cm with respect to those on the upper row.

Track caps

Print the tapaypolea and tapasoplador (tapas.scad) and put each on one side of the track.

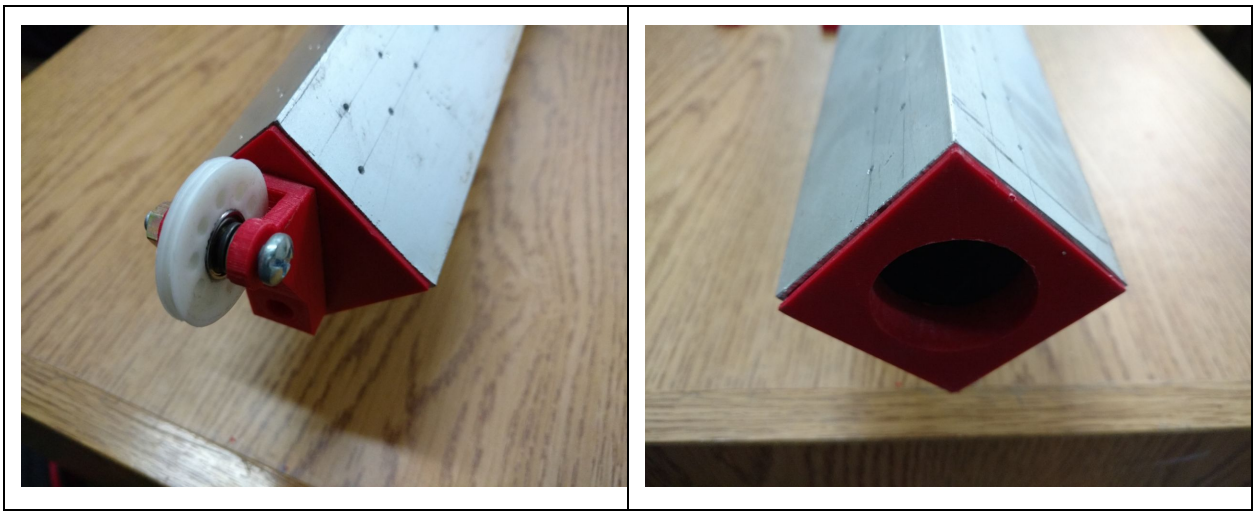


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Fig 2. Blower and pulley cap

Track holder

Print 2 pie (holder) and 4 supports (pie.scad) and with the M5 screws and the nuts make two adjustable legs as in Fig 2.

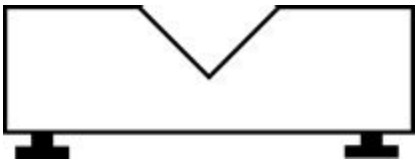

Fig. 3: track holder scheme.

Carts

In order to build the carts, cut 2 L shape aluminum pieces of 3,5 cm from the 10 cm long piece of aluminium tube (Fig. 4).

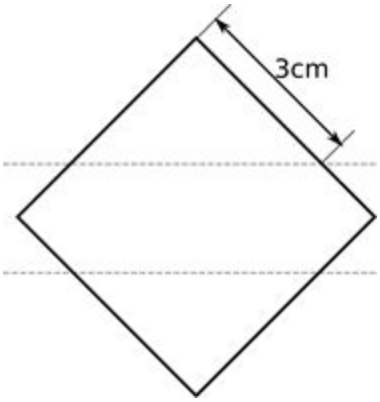

Fig. 4: cross section of the 10 cm piece of aluminium tube

On top of the L shape pieces glue the 3D printed parts of the cart (3 parts of carro.scad) as in Fig. 5

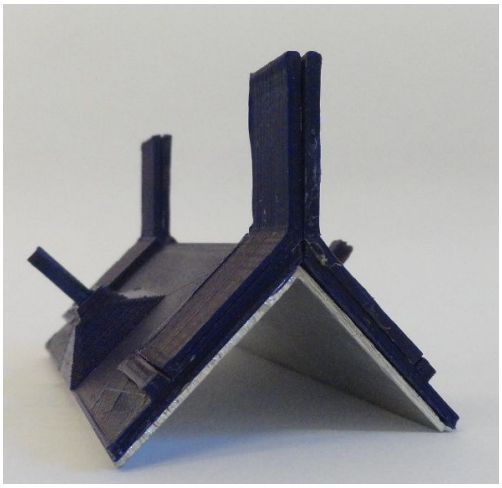
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Figure 5. Cart

Pulley

The pulley (UGroovePulley.scad) has been design to hold an 8 mm diameter ball bearing (can be scavenged from CPU or power supply cooler fan). The ball bearing must fit into the pulley and then it must be placed into the cap with the pulley holder (tapaypolea) with the M3 screw as the axle. Make sure that the pulley is just above the edge of the track (Figure 6).

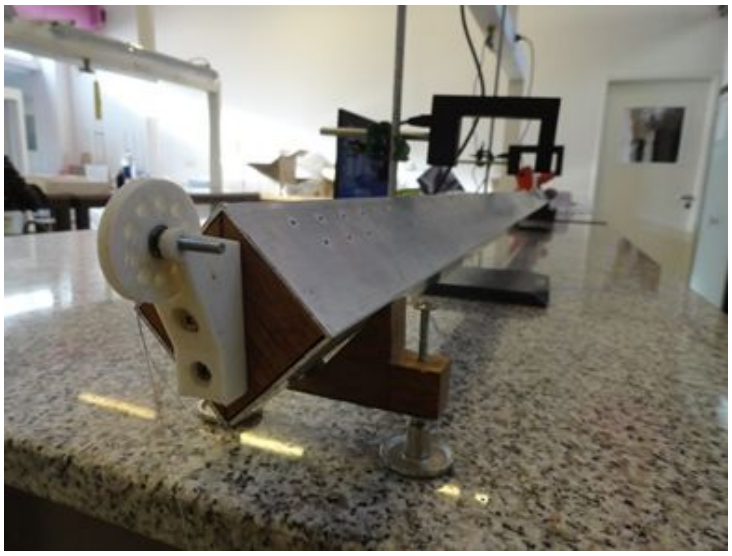

Figure 6. Pulley cap

Datalogger and photogates

This version of the air track is based on a local proprietary platform (INGKA http://www.ingka.com.ar/) to register the cart speed. This system can be replaced with an open source datalogger and photogate as the one of LabFD