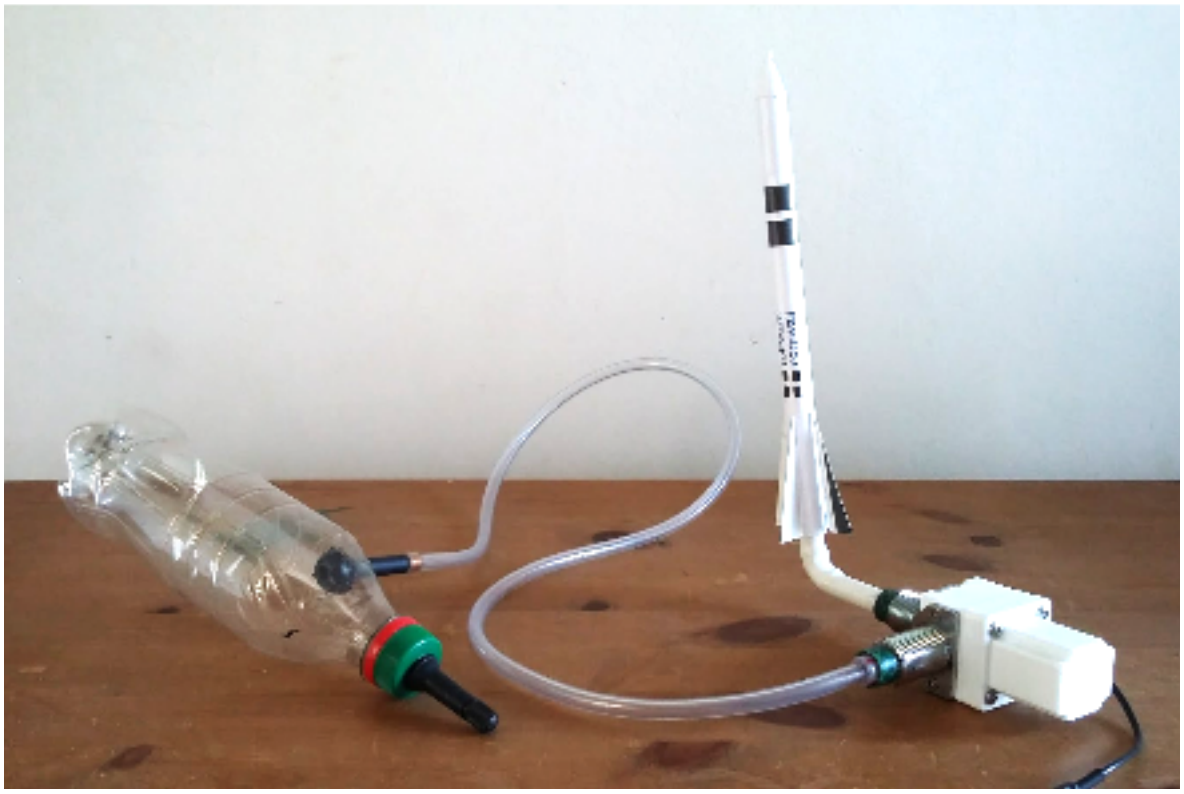
Rocket Launcher Build

The compressed air rocket launcher is comprised of various components:



- Electronically operated 5v valve.
- Solid pipework.
- Hose.
- Car tyre air valve.
- 500ml Fizzy drink/soda bottle.
- Bicycle pump.
- Paper rocket.
- Launch computer Microbit or Raspberry Pi.

There is not an exact build of materials. Components will depend on what is available locally. I also used small offcuts from green garden hose to reduce the pipe diameter. Visible in the above picture.

The Valve

The rocket launcher is built around an electronically activated valve used for garden sprinkler systems. The valve runs from a 5v supply and switches from open to closed by reversing the voltage. The valve shown is similar to the one used but not the same and has not been tried. The system utilises an L293D H-Bridge for controlling the current switch. This is the same as using the L293D for motors.

Wiring the L293D is best explained on the website from Tutsplus.

https://business.tutsplus.com/tutorials/controlling-dc-motors-using-python-with-a-raspberry-pi--cms-20051

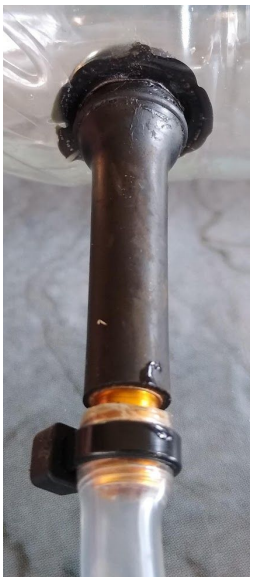
Which way the valve needs to be wired is trial and error. One way opens the other closes.

Solid Pipework

Your local hardware store for some pipes that can be made to fit the valve. With not too large a diameter. The larger the internal diameter the more compressed air will be needed to launch. I utilised others pieces of garden hose and electrical tape to bring the diameter down. A really tight fit is needed. The internal end of the pipe was also heated and spread open to increase the diameter so that the compressed air does not force the pipe out during launch.
A right angle bend was also made by heating the pipe with a heat gun. Then gently bending it with some sand inside to stop the bend from collapsing.

Hose

Sourced from a caravan/camping shop. Originally for water or gas. Quite flexible but can withstand the pressure. Also the inner diameter was small enough to screw onto the car valve and then held in place with a cable tie.



Car Tyre Valves

Sourced from a local garage for free. Just ask! One valve has the inside pulled out so that it is just a tube. These are fitted to the bottle side and cap. The one with the valve is attached to the bicycle pump the other to the launcher valve via the hose.

Fizzy Drinks Bottle

Must be a fizzy drinks bottle. A small 500ml, not a large 1.5l or 2l. Only enough air to fill the pipe inside the rocket is needed. The bottles are capable of withstanding high pressures from the drink. The paper rocket launches with only 15 ~ 20 PSI.
Cut a hole in the lid to fit one tyre valve and one in the side for the other. Seal the valves in place with wetsuit neoprene repair. Something easy to find in Cornwall!
The seals do not need to be perfect. As long as the air is held under pressure long enough to launch that is all that is needed.

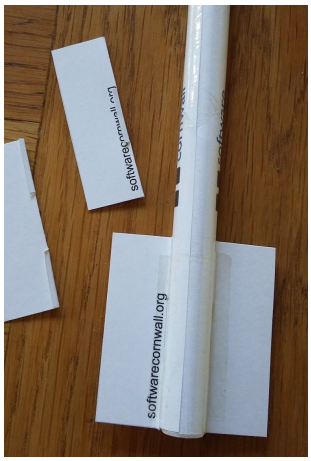
Bicycle Pump

Stirrup pump is best. Higher pressures can be made quicker and with less effort. The pressure gauge built in also makes for more accurate flights.

Paper Rocket

Made from A4 paper stock rolled over a spare piece of the launcher pipe. A conical paper top and cardstock fins. Colour in or design to your own requirements.
Use the template as a start for your own design. It will be based around your own launch tubing anyway.
Roll the paper around a piece of spare tube tightly. Just before gluing the edge down (glue stick is easiest) relax the grip of the paper on the tube so that it can just move freely along the tube. But only just.
Cut the semicircle cone top out. Fold it around as indicated and then cut down to size to the middle line. It is much easier to make a big cone and cut down than make a small one to the correct size. Glue to the top so that there is absolutely no way for any air to get out. PVA glue is good for this.
Print the fins and score the edge that needs to be folded with a blunt craft knife. Cut them out and fold the edges. Glue them to the tube (with PVA). Once all is dry trim the fins to the preferred shape.

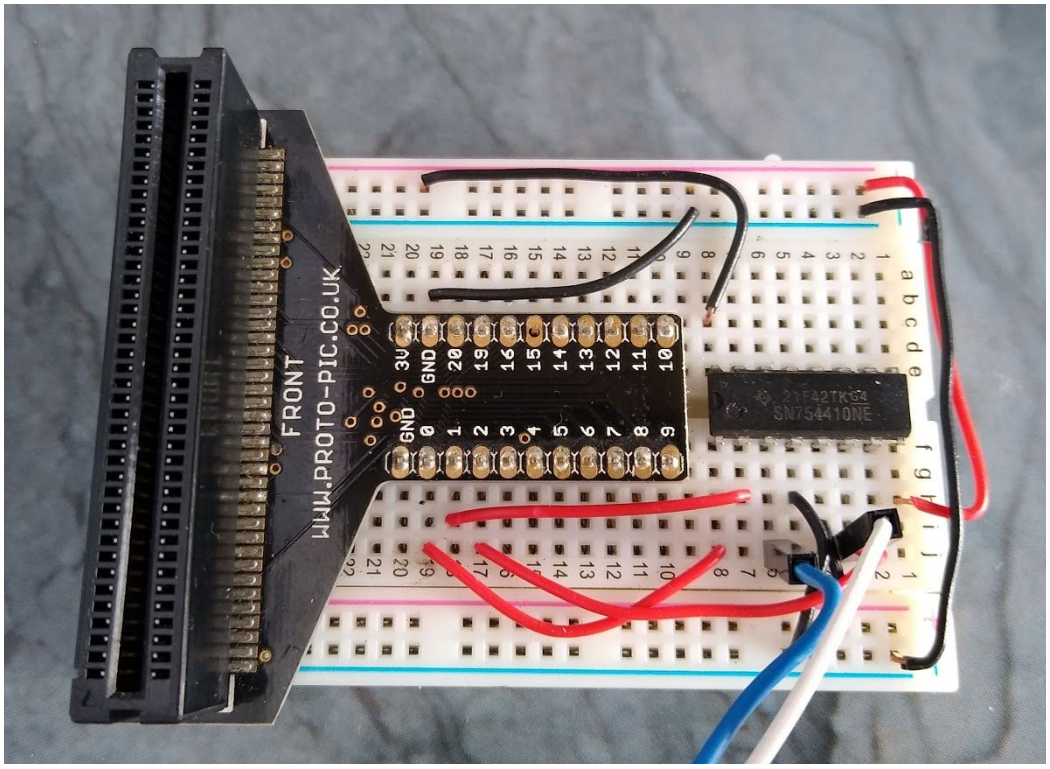


Launch Computer System

Based around the Microbit or the Raspberry Pi. The whole purpose of this exercise was to code a launcher for use at the Cornwall Tech Jam held at Bodmin Library. It has a 3 storey atrium entrance, an ideal place to fly rockets inside.

The image here is from the Microbit Launcher. The picture has been taken in the same orientation as the Tutsplus tutorial above. Wiring the launcher for a Raspberry pi would be the same as for a single motor. The blue and white wire leading off the bottom of the image connect to the wire from the valve. To the top rails of the breadboard connect a four AA battery pack. Again just like the Tutsplus tutorial.



Launching

Pump up the bottle to 15 ~ 20 PSI. Start your code countdown and watch the fun. If the air flows out of the valve run your code. This should reset the valve to closed. If it doesn't swap the wires to the valve around and again rerun the code. The valve should now shut.