

The 'smell'

Good design and technology project ideas are often difficult to derive. They not only have to satisfy curriculum requirements, departmental resources but also, and possibly most importantly, capture and stimulate pupil's imaginations. Product desirability is the key to promoting pupils enthusiasm for design and technology and is a positive platform to develop teaching and learning.

Jenny Dein TEP teaching fellow at Sheffield Hallam University gives us an insight into one such product. The Aroma Fan is one such project which can fuel imaginations and adapt to individual school circumstances. It is one of a suite of ten projects from the TEP Millennium Schools Project developed in association with Sheffield Hallam University which are all supported by teacher guidance unit publications. The Aroma Fan is a project concept which can be differentiated considerably to develop designing and making skills at various ability levels at Key Stages 3 and 4 in resistant materials, electronics and textiles.



The Aroma Fan

Throughout history, in many different cultures, perfumes, incense, aromatic plants and oils have been used to enhance human experience. Aromatherapy is the practice of dispensing aromatics not only as physical remedies but also to stimulate the senses to influence the mind and emotions. It has also been used to contribute to the remedy of some physical conditions.

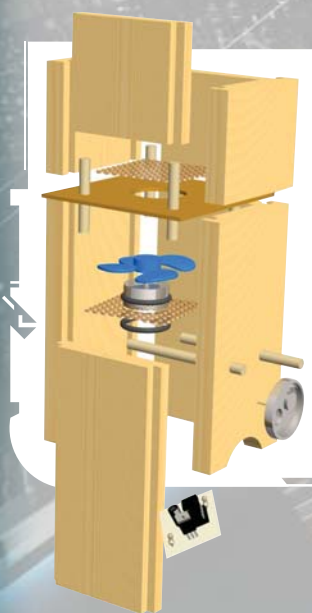
The Aroma Fan is designed to appeal to a variety of senses, to enhance the environment in which it is placed and to fit in with contemporary styles and fashion.

This project consists of a natural wood structure incorporating a motor and fan controlled by a simple electronic circuit. The fan draws in air through the base of the structure and blows it through absorbent material impregnated with vapourising oils or similar fragrant preparations releasing the aromas into the atmosphere through cool dispersion. The fan is controlled by a monostable circuit that is triggered by a touch sensitive panel switch cast from pewter.



The project concept provides many opportunities for pupils to develop their own individualised product and make decisions regarding scale, materials, construction, finish, structure, function and level of control. For example, the Aroma Fan could be controlled just with a motor and fan with just an on switch as a less sophisticated level of control. For more advanced ability levels light or sound could be introduced extending the variety of responses and could be controlled using a PIC (Peripheral Interface Controller) or an IQ board (a discrete programmable controller).

There are essentially five sub assemblies to the Aroma Fan. Shown in the table are exemplar solutions but the type of components and materials used and where they are positioned are design decisions pupils can make to produce different visual and technical characteristics.



Aroma Fan sub assembly	TEP Aroma Fan Solution
Construction	» PSE pine
Fan assembly	» solar motor and plastic propeller
Circuit	» monostable
Switch	» pewter touch sensitive switch
Aroma release plate	» aluminum mesh

The following page provides guidance on two sub-assemblies: the circuit and manufacture of the pewter touch sensitive switch.

Fan Aroma

of success!!

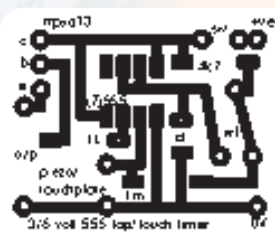
Touch sensitive timer circuit

The use of a touch sensitive switch allows the fan to be switched on by simply touching a pewter decorative plate located on the outside of the Aroma Fan construction. The monostable circuit will operate the fan for a few seconds and then switch off until the switch is touched again.

The Circuit

Resources required:

- » 2/4 AA (AAA) battery holder
- » battery snap
- » 40mm x40mm pcb
- » 1K resistor
- » wire
- » MPSA transistor
- » 7555/555 chip
- » R100k preset variable resistor
- » Electrolytic capacitor 100uF
- » solder
- » self adhesive foam pads
- » hook and loop tape



The monostable timer circuit suggested in the teacher guidance unit provides two operating options. The circuit using standard components (555 timer chip) will operate on 6V (4AA batteries). To save battery consumption in the standby mode this arrangement requires an on/off switch as shown on the diagram.

Alternatively the same circuit board can use a 7555 timer chip. This will run on 3V using 2AA or 2AAA batteries without the need for an on/off switch.

Tuning of the 100K preset resistor enables the time period that the fan remains on to be adjusted. If longer time period is required, a larger capacitor can be used.

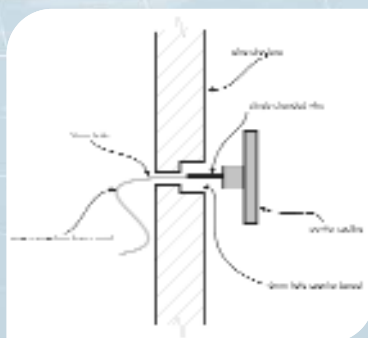
Touch sensitive switch

Resources required:

- » Pewter sheet/bar.
- » Double sided tape
- » 12mm MDF blocks for CNC mould
- » Wire (stranded)
- » M6 x 40 x 2 bolts and nuts (secure 2 part mould)



The switch component is manufactured by casting pewter into a two part mould. To enable connection to the circuit board a 1mm hole is drilled into one part of the mould to allow a single stranded wire to be inserted into the mould cavity. This is counter-bored to a depth of 6mm with a 6mm drill to produce a collar around the wire when cast. Pewter is then heated to molten temperature in a ladle or small crucible and poured into the mould. A small ring of plasticine will aid pouring. Once cooled the position of the plate is marked on the box and a 6mm hole drilled to allow the collar to be inserted through and soldered on to the pin 2 terminal on the PCB from inside the Aroma Fan construction.



All resources including further guidance on the construction and final assembly of the project can be found within the Aroma Fan Teacher Guidance publication available through Middlesex Teaching Resources.

teaching resources



Overleaf: Aroma Fan SHOWCASE >>

Aroma Fan - SHOWCASE

The following showcase illustrates the possibilities the Aroma Fan project can provide for original design work.



Smelly Drawers! The fan and circuit is housed in a draw at the base of the construction and is operated via an on/off switch. Different lighting effects are achieved with the use of a bulb behind a tower mosaic of different coloured acrylic.



Fluorescent Aroma Fan

The fan and circuit is placed inside the aluminum casing at the bottom of this tower. A central tube enclosed by fluorescent coloured rods, carries the air to the top and through a reservoir of essential oils.



Aroma Fan Clock

An Aroma Fan using Big Ben as inspiration. As well as permeating wondrous smells it also tells the time!



Clear Aroma Fan

A similar design to the original construction but manufactured from 3mm acrylic sheet.



This aroma fan integrates both acrylic and wood in a simple but interesting design. Instead of casting pewter this Yr8 pupil has made use of a metal door knob to act as the touch sensitive switch.



Hanging Aroma Fan

A textile version of the Aroma Fan which can be hung from the ceiling. A piezo transducer activates the circuit instead of the pewter touch sensitive switch.



Using a similar construction to the original but adding coloured stain for decorative effect. Wath Comprehensive have created an attractive touch sensitive switch in pewter with an acrylic inlay designed and manufactured using CAD/CAM



Acknowledgments

TEP and Sheffield Hallam University would like to acknowledge the staff and pupils responsible for work featured in this article: Chris Canavan, Head of Design and Technology, Foremarke Hall School, Derbyshire for the excellent examples designed and manufactured by Yr8 pupils at his school.

Pupils and staff at Wath Comprehensive School, Rotherham and ITT students at Sheffield Hallam University.