

The mission of **TEP** is to enhance and enrich **technology education** and **training**

## Welcome to issue 5 of newlook News & Views

Inside you will find a number features on new resources and and some exciting new opportunities to get involved with the **TEP-MTA (TDI) Technology Design Innovation awards**.

Send off for the **FREE Smart Materials samples** and TEP schools can look out for the **FREE Robotics CD-ROM** arriving in schools.

This issue has a wealth of ideas and provides a range of opportunities for the classroom. Also featured are some great ideas using the new **'Air' Motors** from TEP.

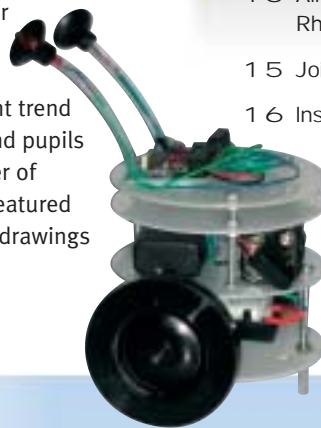
At Key Stages 3 and 4 low cost **Robotics** and **Animatronics** has real advantages for teachers and great attraction for pupils without them being too 'technical'. It also reflects the current trend on television, in publishing media and pupils interests towards robotics. A number of alternative solutions and ideas are featured and you can also find copyright free drawings to download on our website.

Packed with this issue is a **Teaching Resources** product update with new products and lower prices.

## inside this issue:

Pg.

- 2 TEP at the NEC
- 3 Free Smart Materials samples  
Dates for your diary
- 4 Robotics / TechnoGames CD
- 5 Centenary of powered flight
- 6 New products update
- 7 Jitterbug News
- 10 TDI Competition
- 12 An intelligent Robot
- 13 Air motors: a school perspective  
Rhyl High School, Turnford School
- 15 Joining TEP
- 16 Inside the next issue
- FREE Electronic Circuits  
Website downloads
- Contact Details



## LOG ON to TEP

A visit to the TEP website is well worthwhile and should be set as your favourite bookmark! Regular readers of TEP's News & Views really should take the trouble to log on to the TEP website at [www.tep.org.uk](http://www.tep.org.uk) and catch up with the latest features and support material. The site provides ready access to :

- New Downloadable circuits for Control and Electronics projects
- On-line browsing of the Teaching Resources catalogue
- Links to other sites
- CAD/CAM ideas and resources with a Pro/DESKTOP focus
- Details on How to join TEP
- Updated Training Portfolio and INSET update
- Latest news and ideas from TEP schools
- and much, much more!



# TEP at the NEC 2002



▲ TEP's New exhibition stand took the show by storm

## What an event with the new 'Quadra' stand from Dimension and a raft of new ideas, publications and products - TEP took the show by storm.

Allied to the show many visitors managed to attend the seminar on **'Getting it right at Key Stage 3'**. If you missed that opportunity the full presentation will be available from the TEP website.

Over three thousand teachers, students and advisors visited the stand during the show. TEP colleagues and associates were available throughout the three day event providing support and advice on all aspects of D&T. **Bill Nicholl** from Homerton College Cambridge was on hand to talk about the **GATSBY PGCE Design and Technology SCITT** programme. Now in its third year the course has an outstanding reputation for quality and content.

**John Cook** from Lancaster Girls Grammar School brought along a range of exciting **PIC** based projects and ideas for implementing them.

**Allen Bower**, Head of department from **Lady Manners School** in Bakewell was displaying and talking about their approaches to D&T at Key Stage 3 with some exciting and innovative desktop manufacturing.

**Jenny Dein** TEP teaching fellow from Sheffield Hallam produced the show seminar and gave demonstrations of TEP's **'Millennium Schools'** projects. These project resources and publications are available from Teaching Resources. This generated a lot of interest and was a popular seminar and topic during the three days of the show.



▼ Desktop products from Lady Manners School



**Matt Lear** from Essex was demonstrating the wide range of Systems and Control resources and smart materials. Matt is also responsible for the **GATSBY TEP** summer schools. **Keiron McGeever** from Harrogate School enthused about robotics and had brought along lots of examples of good practice of walking, crawling and light seeking robots. Some of his work is featured in this issue.

On the stand were a number of new products from Teaching Resources and the available new publications and software packages from TEP.

① **This year's D&T with ICT show is at the NEC once again from the 27-29th November. Do try to join us at the event. For more information, contact the show organisers ICHF on 01425 272711, or visit the website: [www.ichf.co.uk/d+t](http://www.ichf.co.uk/d+t).**

**On the next page are other key dates for your diary where you can meet the TEP team ▶**

# FREE Smart Materials Samples

TEP were giving away smart products and materials sample bags at the NEC if you missed yours and would like a free TEP sample bag please send an A4 SAE to:

TEP

'FREE SAMPLES'

International Manufacturing Centre  
The University of Warwick  
Coventry  
CV4 7AL

Free TEP sample bags contain the following:

● **Polymorph**, a new generation polymer that is already having a big impact on D&T it is fusible in hot water and moulds readily into desired shapes and components not easy to manufacture any other way.

● **Thermocolour Sheet**, containing a polarizing ink that changes colour at body heat temperatures and is ideal as a visual indicator for incorporating into electronic products using a wire heating element.



● **Lenticular Sheet**, is an interesting optical resource made from polypropylene and ideal for creating visual illusions and movement. This provides an interesting opportunity to include into graphic product activities.



● **CD Wheel converter**, this moulded nylon wheel has a 3mm axle hole centre and clips readily into the centre of any CD disk to create wheels, turntables and drive systems. The moulded-in shoulder also provides drive location for a belt or rubber band drive.



● **Circuit Block**, this clever little moulding allows pupils and students to make prototype circuits quickly and easily by inserting components and wires into the matrix of holes without the need for soldering and awkward small stripboard assembly.



## Dates for your Diary

TEP will be attending a number of events in 2003 and will be exhibiting a range of materials including projects, resources, publications and curriculum material for Key Stages 3 and 4. TEP staff will be on hand to provide advice, support, demonstrate materials and provide a technology clinic on the stand.

● **April 3th-4th**

**Welsh National Convention of Excellence in Engineering and Technology**  
at the Celtic Manor Centre, Newport

● **July 4th-5th**

**DATA UK education conference**  
at the Warwick Hilton

● **July 6th-8th**

**Specialist Schools Trust**  
at the G-Mex Centre, Manchester

● **November 27th-29th**

**Design and Technology with ICT Education Show**  
at the NEC, Birmingham



# Introducing Robotics Techno Games CD-ROM

In the last issue of News & Views we featured the idea of a 'Mini Robot Challenge' in schools. Many of you asked for more details and support so we have made available a limited number of copies of the popular 'Techno Games - Introducing Robotics' CD-ROM for schools.



All TEP Schools will have a copy sent directly to the school **free of charge** during the next few weeks. If you are not yet a TEP school and would like a copy please order your copy on the attached form below with a school order or cheque for £5 to cover production, postage and packing. These were originally produced by TEP for BBC Techno Games and run on both Mac and PC platforms.



This excellent resource has an easy to use menu system that allows pupils and teachers to easily navigate through the CD. The **Cyber Map** shows the entire contents and provides hyperlink shortcuts to all sections of the CD. There is an on-board **robot helper** for users and the resource also enables users to copy and print text from the CD.

With boundless hints and tips on teaching and making robots and excellent visuals this CD is a 'must have' on your department shopping list.



I would like to order \_\_\_\_\_ (QTY) 'Techno Games -Introducing Robotics CD-ROM(s) @ £5 each including Postage & Packing. I enclose a cheque for £\_\_\_\_\_ made payable to the **University of Warwick**, OR please invoice for £\_\_\_\_\_.

**Contact person:**

Title: \_\_\_\_\_ Name: \_\_\_\_\_ Surname: \_\_\_\_\_

Position: \_\_\_\_\_

School/College: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ Postcode: \_\_\_\_\_

Telephone: \_\_\_\_\_

Please complete and return to TEP at the address or Fax No. opposite

Please send this form to:

**TEP**  
**'Techno Games CD-ROM'**  
International Manufacturing Centre  
The University of Warwick  
Coventry  
CV4 7AL



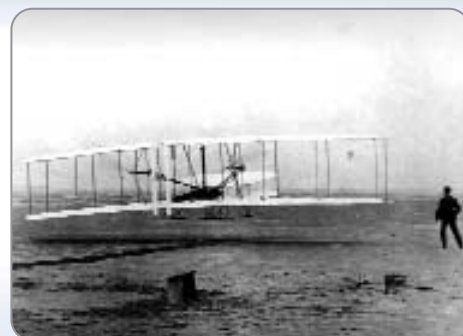
OR Fax it to: 024 7657 3975

# Celebrating the Centenary of Controlled Flight

The Centenary of controlled powered flight falls on the 17th December this year. It will be 100 years since the Wright Flyer at Kitty Hawk flew with Orville Wright at the controls.

Power sources and modern materials have rapidly developed to the point that air and space travel are now taken for granted. To celebrate that moment and to encourage some alternative manufacturing and control work in the classroom TEP are hosting a Powered flight challenge during the Autumn Term. TEP are tracking down some 'hangar' space for schools to design, build and test fly their creations this autumn. The challenge is open to TEP schools and will be hosted during the first two weeks of December 2003 in the Midlands.

① if you want to be a TEP-Wright Flyer email [nickbaldwin@enterprise.net](mailto:nickbaldwin@enterprise.net) and register your interest in the challenge.



▲ The Wright Flyer at Kitty Hawk



To that end schools should take advantage of TEP's wide range of lightweight constructional materials and the new 'air' motors from Teaching Resources. Needless to say keeping weight low and developing controlled flight with accurate build and stability is crucial. If you have yet to try out these miniature 'air' motors pupils and staff alike are missing out on some low cost fun and the opportunity to integrate into D&T some quality experiences using these great resources.

Needless to say the scope for integrating a range of cross-curricular approaches should not be missed.

Available from Teaching Resources the 'air' motors feature a small piston driving a crankshaft and each motor has its own integral compressed air reservoir and propeller.



▲ The 1903 Wright Flyer at the National Air & Space Museum, Washington, USA.

These 'air' motors have great potential for driving water and land based vehicles too!



▲ The Wright Brothers, Orville and Wilbur Wright



▲ Powerful Air-driven motors



# **NEW** Products Update

The advent of high power UV-emitting LEDs and a new smart material – photochromic pigment – has enabled TEP to extend its range of products into areas that we only dreamed about a couple of years ago. For the first time, schools now have access to a more or less instant bonding technique previously available at a prohibitive cost and to a material transforming product design.

## UV Adhesive system

UV hardening adhesives are commonplace in manufacturing, but hardly used elsewhere except in dentistry (where the cost are still very high). TEP has obtained the first ultra-low cost system for hardening UV adhesive and is now able to supply a comprehensive starter pack (including PSU) for less than the quoted cost of a small quantity of the adhesive itself. The adhesive – which bonds to most materials including glass – is applied to the work and then cured by exposure to UV light from the energiser pen. It can fully cure within 10 seconds. Light penetrates into the material about 3mm and so it is ideal for ‘spot welding’ - impossible by any other means at this speed.



**NEW**

Apart from its obvious uses as an alternative to superglues, the system can be used generally to demonstrate an important ‘smart’ adhesive bonding technique.

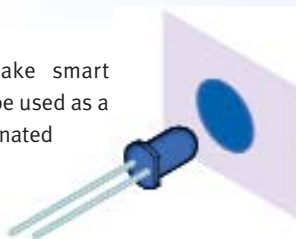
## Photochromic Pigment

TEP has already introduced schools to important smart materials through the Smart Colours range of pigments. The illusive one was a material that changed colour according to light levels. This has now been located and formulated so that it too can be mixed with acrylic media to create paint. Examples of applications include the design of UV warning badges (a small graphics product), toys and games, smart jewellery etc.



**NEW**

Apart from enabling pupils to make smart products, the pigment can, of course, be used as a demonstration in its own right. Illuminated by a UV LED, it changes colour with photographic effect.



## UV LEDs



**NEW**

UV LEDs, although still relatively expensive, are now affordable for wide-ranging project work in schools. Obvious examples of product design include UV security detectors (standard security pen ink glows under exposure) and glow-in-the-dark products such as menu boards (using the phosphorescent pigment). The LED revolution is clearly just beginning!



## Catalogue Update

The TEP and Teaching Resources catalogue update is enclosed with this issue of News and Views. It contains many other new products and details of new (lower) price breaks that we have achieved as a result of magnificent support from schools. Many of the new products have been suggested by teachers such as the cheap watches for packaging exercises. These come complete with a battery and can also be used for fund raising at special school events.



① If you have not yet received a catalogue or for further details of other products please contact:

Middlesex University Teaching Resources, Unit 10,  
IO Centre, Lea Road, Waltham Cross, Herts. EN9 1AS  
Telephone: 01992 716052 Fax: 01992 719474

teaching  
resources



# Calling all Jitterbug Fans!

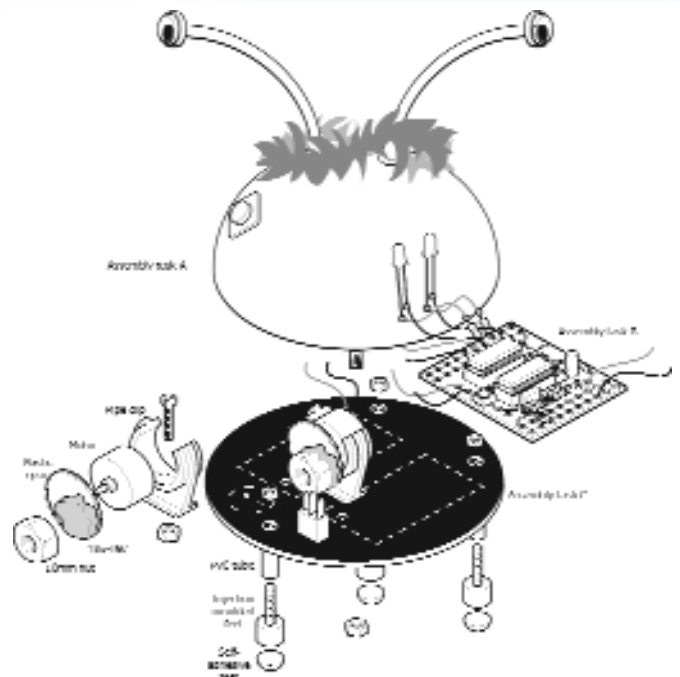


Children and adults are fascinated with animated quasi-intelligent toys and products. The Jitterbug project was born from this fascination and provides pupils with an experience of incorporating systems and control into a highly desirable product.



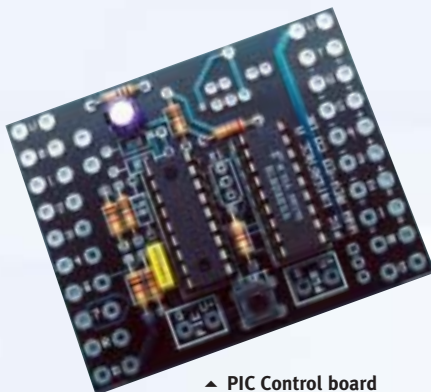
The original Jitterbug, developed in collaboration between **Sheffield Hallam University** and **TEP**, is a programmable electro-mechanical creature that is controlled by the use of a **PIC (Peripheral Interface Controller)**. Mechanical movement is achieved by the use of an eccentric rotating mass. When time is spent developing the PIC program, the Jitterbug will display a variety of entertaining behaviours through pupils interaction with a range of inputs.

The Jitterbug has become a source of inspiration for both teachers and pupils to develop their interest and capability within systems and control based activity. Through successfully infiltrating the design and technology curriculum in many schools, the Jitterbug has been developed to accommodate all levels of ability within both Primary, Secondary schools and beyond.

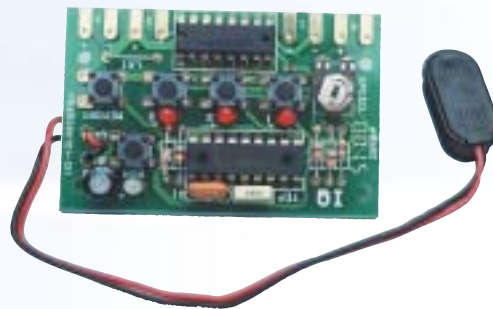


The following paragraphs (overleaf) provide guidance on two alternative control systems for the Jitterbug: the **IQ controller board** and **555 timer astable circuit board**, which offer opportunities for differentiation and low cost alternatives. They are less sophisticated in having fewer components, and reduce the level of controllability but still retain the essential characteristics of the original Jitterbug. Both systems can be easily substituted for the **PIC controller board** within the original Jitterbug construction.

① **Guidance on the construction and final assembly of the Jitterbug can be found within the Jitterbug Teacher Guidance publication available through TEP and Middlesex Resources.**



▲ PIC Control board



▲ IQ Controller board

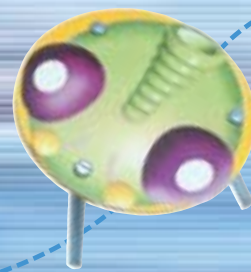


Base level activity ▲

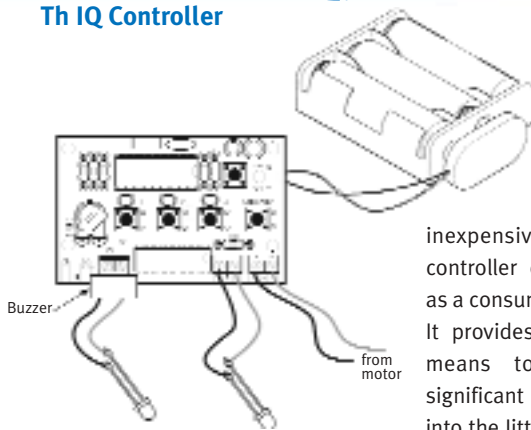
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# Calling all Jitterbug Fans!

(continued)



## Th IQ Controller



The IQ is a small inexpensive programmable controller designed for use as a consumable component. It provides pupils with the means to still build a significant amount of control into the Jitterbug.

The IQ controller can be programmed to switch up to three outputs off and on in a desired sequence. Programming is achieved using the three program switches and the 'MEMORY' switch. The 'RUN' switch is used to start or stop a program. The IQ board can store a sequence of up to 60 steps. At each step, any of the three outputs can be switched off and on. You can change the time delay between each step by adjusting the program 'SPEED' dial.

## 555 Astable Jitterbug

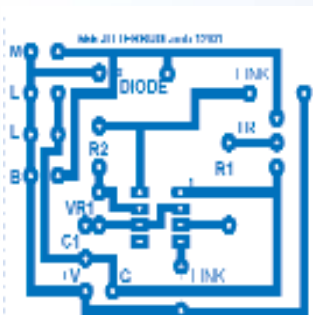
In this circuit, the motor and buzzer are connected in parallel. A standard 555 astable circuit is used to switch them on and off. The time period can be adjusted by using the potentiometer.

Two flashing LED's are used for the eyes and are connected independently.

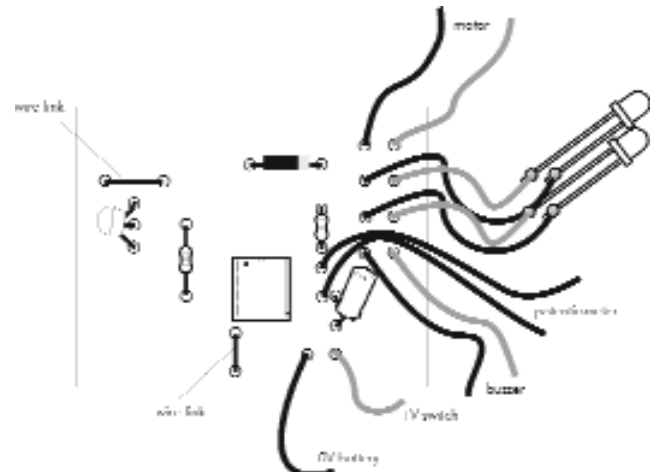
### Resources for one Jitterbug 555 Astable circuit

The resources for this circuit replace the components required in assembly task B of the PIC based Jitterbug.

- 1kW resistor x 2
- 555 timer x 1
- 500mA transistor MPSA13 x 1
- Diode IN4001 x 1
- 22k potentiometer x 1
- 5V flashing LED's x 2
- 22uf capacitor x 1
- 8cm RED multi stranded wire x 2
- 8cm BLACK multi stranded wire x 2
- 12cm RED multi stranded wire x 2
- 12cm BLACK multi stranded wire x 4



## Assembling the Astable circuit



1. Photocopy the PCB layout above. This circuit is reversed to enable correct orientation when the printed circuit board is manufactured.
2. Solder a length of black and red wire (8 cm long) to outputs M as shown on circuit board diagram.
3. Solder a length of black wire (12 cm long) to each short leg of the LED's and red wire to the long legs and connect to outputs L as shown.
4. Solder a length of red and black wire (8 cm long) to output B.
5. Solder the two 1kW resistor in positions shown.
6. Solder the diode and capacitor into positions shown ensuring they are correctly orientated. (Silver tip of diode should face the outputs. The negative leg of the capacitor should be connected to ground).
7. Solder the transistor into position. The flat side of transistor should face the outputs.
8. Solder two lengths of black wire (12cm long) to the potentiometer input position shown on the diagram. These will be connected to the potentiometer terminals during chassis circuit construction.
9. Create wire links in positions shown.
10. Solder the 555 timer chip holder into position in the correct orientation before placing chip.

# Jitterbug Mania!



## Jitterbug Mania!

Jitterbug mania is sweeping Bakewell as Allen Bower at **Lady Manners School** admits with a number of variations of the Jitterbug including this interesting one... 'Jitterstop'. It utilises a microswitch inverted beneath the base to set start and stop the bug, and can be 'parked' on a suitably designed bed to switch it off.



① The Jitterbug project is supported by a teacher guidance booklet, one of a series developed at **Sheffield Hallam University** by Jenny Dein -TEP teaching fellow and her colleagues. This Millennium publication is available from TEP and Teaching Resources.



Another interpretation from **Lawrence Sheriff School** is this attractive vacuum formed bug shell providing lots of scope for characterising pupils bugs.



The project has spawned a whole new generation of ideas for the jitterbug including: "TV Critter" that leaps up and down every time you change channel or set the video and one version we rather like is 'Jitterphone' that is a mobile phone holder bug that gesticulates wildly when you have an incoming call.



# The TDI Challenge 2003

## Celebrating Technology, Design and Innovation

### Context:

The MTA and TEP have developed a partnership of activity in recent years and in particular a successful programme of collaboration with the CD-ROM resource 'Manufacturing Innovation' and more recently the previous MTTA/ TEP Innovation competition. Both the DFES, HMI, QCA and the wider D&T community are seeking to exemplify and establish the principle of innovation as distinct from the design process and the need to teach towards innovation.

At a time of great change in curriculum demands and ever increasing pressures in classroom management and performance, the TDI Challenge seeks to establish the clear links between the school D&T experience and the wider manufacturing and marketplace challenges of industry.



Where literacy and numeracy are key to a 'knowledge economy', innovation and creativity are pivotal in revitalising an industrial economy reliant on quality manufactured goods. MTA and TEP celebrate the opportunity to foster and acknowledge innovative student work in that sector.

This challenge follows on from the success of the MTA/TEP manufacturing innovation award challenge in July 2002 and provides an opportunity for schools and students in Design and Technology to demonstrate clearly the breadth of innovation in the subject.

**Entries are open to all secondary schools in the UK and schools may enter as many students or pupils as they wish. There are three age group categories and awards for 1st, 2nd and 3rd prize are available. Prizes include CNC machine tools, Laptops and Digital Cameras**



Images for display purposes only

### The age categories are:

Group A: 11-13 years

Group B: 14-15 years

Group C: 16-19 years



Schools can submit students work in any of the innovation categories described below:

- Computer Aided Design and Manufacture
- Electronic Product Design and Manufacture
- Systems, Control, Robotics

The TDI Challenge seeks to reward and celebrate individual project work in D&T departments that demonstrates quality designing and making and most importantly innovative work.



**Entries for the TDI challenge will need to be received by the MTA by 30th May 2003. Winners in each category will be invited to the D&T exhibition at Birmingham NEC in November.**

### Entries received will be selected on the following criteria:

- **Innovation:**  
Range of ideas and sources explored and developed
- **Manufacturing:**  
Quality of manufacture, accuracy, finish and fit
- **Use of technology:**  
Selection and use of technology in design and manufacture
- **Manufacturing:**  
Range of processes, tools, materials and skills used
- **Presentation:**  
Displaying a range of graphic techniques, skills and literacy
- **Research/ Development:**  
Evidence of modelling, testing, evaluating, prototyping
- **Reflective practice:**  
Problem solving, improvements, production techniques

① **For the school to take part you will need to submit entries on the proforma attached which can also be downloaded from the TEP website at: [www.tep.org.uk](http://www.tep.org.uk). The form may also be photocopied.**



# An Intelligent Robot!?

by Kieron McGeever

## What do we mean by an “Intelligent Robot”?

**One that can solve problems and build Picasso type structures out of car parts or one that can blunder its way around a maze? Any of those types of robot would be amazing, but it is far better to keep it small and simple.**

If you have built the TEP Rover kit it is just a small step to give it some simple autonomous operations. Instead of using the slider switch control supplied with the kit, fit to it instead an IQ controller board, this will allow you to write simple programmes that will



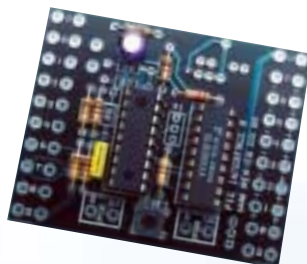
▲ IQ Controller

control the motor of the buggy, making it go forward and turn to the left and the right. The IQ controller board has three outputs that can be controlled separately, one for each motor and one controlling an LED for example. The outputs can be simply programmed from the

buttons on the board and there is even provision for having a separate power supply for the motors and the boards' circuits. The disadvantages of the IQ board are that you only have forward and stop on each motor (i.e. on/off) and it loses its programme when it is turned off. But, a lot of fun can be had with just this combination, for example, dancing competitions, obstacle races, and dropping a marker onto a target. The main advantage is that it is cheap to buy and simple to operate, but not intelligent.

## PIC Chips

A robot might be thought to demonstrate some intelligence if it appeared to make decisions for its self, for example turning away from obstacles that are in its path. This can be achieved fairly simply by using a PIC chip, instead of an IQ board, attached to a “High Power Project Board” The chip to use is a 16F627 which has two analogue inputs, four digital inputs and eight outputs, four of which, when it is fitted to the high output board, are routed through a motor driver chip (L293D). This combination of chips allows you to have forward and reverse on two standard dc motors. The ability of the PIC chip to be programmed through the “Chip Factory” or computer software so that its outputs are controlled by its inputs means that a robot can steer its own way through an obstacle course.



▲ PIC Control board

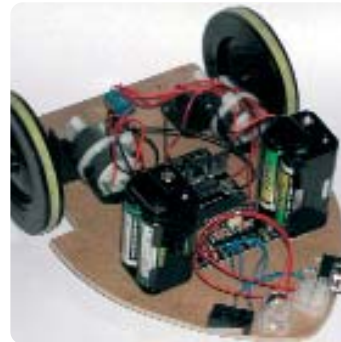
## Building a PIC Controlled Robot

Using the components from the Rover Kit as a starting point for the robot you will need:

- 1 PIC High Power Project Board,
- 1 L293D motor driver chip,
- 1 PIC16F627 chip,
- 2 large wheels,
- 2 LDR's,
- 2 micro-switches,
- 2 battery snaps,
- 2 6 volt battery holders,
- 1 double pole, single throw switch (it can be a DPDT)
- 2 resistors (5.6k)



The motors and gearboxes from the kit need to be adapted so that they will sit side by side on the chassis, as the robot is going to be a two and not four wheeled vehicle, to make steering and control easier. To do this the axles will need to be shortened on one side of the gear box so that you have a left handed and right handed motor. The chassis of the robot can be any shape you want it to be, the two versions shown here are round and arrow shaped, but any



suitable design will do. The arrow shape is my preference because it allows room for the positioning of the components all on one surface. The position of the components is shown in **diagram 1**.

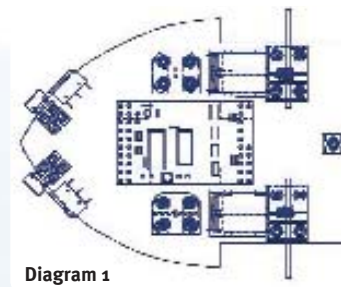


Diagram 1

Fix the gearboxes down with 4mm nuts and bolts, but everything else with double sided sticky pads for ease of modifications later on.

Fit the motor driver chip onto the PIC board and cut the connector resistor shown in **diagram 2** so that separate

power supplies can be attached to drive the motors and the PIC chip and attach the battery connectors.

On the right hand side of the board attach wires to output pins 4, 5, 6, and 7 labelled motor A and motor B.

On the right hand side of the board inputs 0 and 1 are the analogue

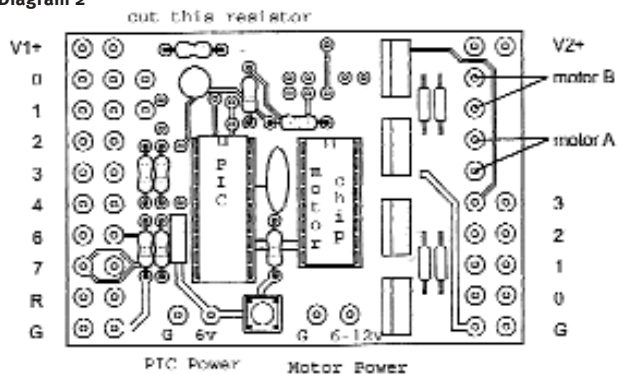
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# An Intelligent Robot!?

by Kieron McGeever

(continued)

Diagram 2



inputs and have three connecting pads each and inputs 2, 3, 4, and 6 are the digital inputs with two connecting pads each.

Attach the micro-switches via wires to inputs 2 and 3 using the common and normally open pins on the switches.

The LDR's are a little more difficult to attach as they use the 5.6k resistors to set the sensitivity of the inputs.

The 5.6k resistor is attached to the **outer pad of input 0** and the **centre pad** and then two wires, to attach the LDR to, are fixed to the **centre pad** and the **inner pad** (note, the resistor and a wire goes into the centre pad).

Do the same for input 1. The wires are then attached to the LDR with a double connector block for ease of sticking to the base.

You can experiment with the value of the 5.6k resistor but I have found this value works for average lighting conditions indoors.

Now fix the PIC board to the chassis and connect the wires for motor A to the left hand motor and the wires for motor B to the right hand motor.

Fix the micro-switches and the LDR's to the front of the robot, these positions can be easily altered later to suit modifications in your design.

Fit the battery boxes and as an optional extra, connect the battery snaps via the DPST switch.

You are now ready to write your first PIC programme and test your robot. Using the "Chip Factory", power up and select programme New and chip 18L (the code for the 16F627) and input the following programme:

```
00      out o80    both motors go forward
01 If 3 on  out o16  left motor forward right motor stopped
02 If 2 on  out o64  right motor forward left motor stopped
03          goto 00  return to start
04          end programme
```

Burn this programme onto your PIC and fit it to your robot.

When the robot is powered up check that both motors are running in the same direction and forwards. If one of the motors is running in reverse and the other forwards change the polarity on the

reversing motor by swapping the wires round.

Now press the left hand micro-switch and the right hand motor should stop and the left hand motor go forward. The opposite should happen for the right hand micro-switch. Adjust the positions of the switches if this does not happen.

When you have your robot running correctly you are in the position to do some serious programming. But, first try this:

```
00      out o80
01 if a = b  goto 04
02 if a > b  goto 07
03 if b > a  goto 10
04 if 2 on   goto 10
05 if 3 on   goto 07
06          goto 00
07          out o16
08          wait o10
09          goto 00
10          out o64
11          wait o10
12          goto 00
13
```

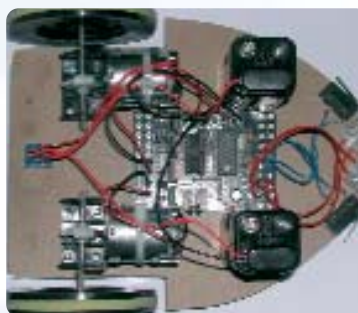
This programme will make your robot autonomous, but only test it by placing it on the floor, otherwise damage could occur.

In the above programme, a and b are the analogue inputs connected to the LDR's and the chip is being asked to compare the light level falling on each LDR. If you have positioned the LDR's so that they look to the left and the right, then the robot will only go in a straight line if the light levels are the same.

The micro-switches act as bumpers and if the robot bumps into an obstacle it will turn away from it. This is a very simple programme but it will make the robot perform some very complicated behaviour.

If you can answer these two simple questions you are ready for some advanced programming in the next article.

1. Is the robot "Light seeking"?
2. How could you reverse this action?



📧 If you have any further questions you can contact me at: [mac@cercot.demon.co.uk](mailto:mac@cercot.demon.co.uk)

Kieron McGeever runs the TEP Development Centre at Rossett School, Harrogate.

# Air Motors: News from Rhyl High School and Turnford School

## Air Motors : A New Idea in Motion from Mark Harmsworth, TEP Associate at Rhyl High School

Since the introduction of air motors to the TEP catalogue, pupils have been given a new impetus to create things that will move – or at least, this is certainly my perception.

For the current academic year, I needed a short project to set my Year 10 pupils just before the Christmas holiday and it seemed an ideal opportunity to try to build air powered boats that could be tested in the school swimming pool. After setting them the challenge to build a boat that would go the furthest distance, it felt only proper to build one myself. The workshop soon became a hive of activity, with groups cutting foam, card and any other materials they could get their hands on. (Testing at this stage was limited to the eight-foot water tank that I had built.)



Three lessons later, all of the groups were ready for the big test in the swimming pool. It soon became apparent that some of their designs were doomed to failure, but others had managed to achieve a well-balanced and sleek prototype.



Rhyl's propeller driven boats

The results of all their hard work paid off as the boats set off across the pool, with some achieving 5, 10 and even 15 metres travelling distance. Their efforts were slightly overshadowed by 'Sir's' boat, which managed a staggering 75 metres, but I must admit that this was largely due to a much larger reservoir which utilised a 2-litre lemonade bottle, with an adaptor positioned between motor and bottle.

The pupils thoroughly enjoyed the project, with some wanting to buy more motors to experiment with at home and we are now in the process of building a delta winged aeroplane to see the potential of flight.

## News from Turnford School

News & Views previously featured some of the work of Turnford School's new CAD/CAM facility structured around ten TEP milling machines.



More recently the department, headed by **John Cowgill**, has run a series of awareness days for Y6 pupils from feeder schools, and these have been judged an unqualified success. Enthusiasm was really fired up by use of the CNC machines and using the new TEP air motors to make propeller-driven vehicles.



'Air' Vehicle workshop

Although it was not possible to supply everyone with an air motor, pupils found the challenge of creating a chassis really challenging and rewarding. For ease of manufacture, 'Corrflute' was used as the main constructional material and inspired a variety of ingenious designs – as well as stunning speeds!

Turnford School is now trying out some new resources – notably the use of cheap watches as a focus for packaging projects. We hope to include an update in the next edition of News & Views.



Final race preparations



On your Marks, get set...

The Technology Enhancement Programme (TEP) provides help and support for teachers of Design & Technology. TEP is supported by the **Gatsby Charitable Foundation** and is at the forefront of innovation in design and technology education in schools and colleges throughout the United Kingdom.

The original aim for TEP was to address the need for well-trained, educated and motivated young people with the practical skills demanded by industry. TEP has vigorously pursued this agenda and has made significant progress in putting the 'technical' back into education in the UK. It has set standards for quality making and has pioneered new and innovative resources for schools and colleges.

The aim of TEP continues to concentrate upon the following points:

1. success and excellence - the drive for quality
2. the age range 11 to 19
3. cross-linking of technology with mathematics and science and
4. the encouragement and recognition of the practically able.

TEP has also had the effect of setting entirely new agendas by giving schools real access to modern technology resources at ultra-low costs. This has had a real influence on framing new examinations and the National Curriculum and has extended further the boundaries of technology education to many institutions and professional bodies.

Exciting opportunities to work in partnership with a major curriculum development initiative

To date over 1600 schools and colleges across the UK have joined the TEP network. Schools and Colleges that join TEP are entitled to a range of benefits.

Immediately upon joining, the institution receives a substantial package of TEP products designed to give a comprehensive introduction to the Programme.

**The total value of the pack is over £375.**

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TEP welcomes applications from individual schools, groups of schools and colleges, from LEAs, employers, Setpoints and other agencies.

Should you require further information please contact the **TEP office** on **024 7657 3994**, email [tep@warwick.ac.uk](mailto:tep@warwick.ac.uk) or visit our **website**, [www.tep.org.uk](http://www.tep.org.uk)

The mission of TEP is to Enhance and Enrich Technology Education and Training



## New Member's Pack

The package of resources sent to new member's of the TEP network is designed to give schools and colleges a comprehensive introduction to the range of materials and resources that TEP has to offer. These include multimedia resources, publications, hardware and consumables.

The new member's pack comprises:

- ✓ The TEP cd-rom library
- ✓ TEP Teacher Guidance Units
- ✓ Bug kit class pack
- ✓ Injection moulding class pack
- ✓ Smart materials and smart products sample pack
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- ✓ Smart grease starter pack
- ✓ Robotics universal starter kit
- ✓ Geodesic and space frame starter pack
- ✓ Shadow Air muscle sample pack



① If you are interested in becoming a TEP member fill in the form on the back cover or visit our website and download the Joining PDF at: [www.tep.org.uk](http://www.tep.org.uk)

# Inside the next issue of TEP News & Views

- ◆ **Millennium Schools** Update on resources and projects
- ◆ **More Robotics** to include Walkers, Crawlers and Creepers!
- ◆ **Electronics in Schools** feature reviewing circuits and resources for electronics teaching
- ◆ **Desktop Manufacturing** How schools are using new low cost manufacturing resources
- ◆ **Systems and Control** A new approach in South Wales

And all the usual TEP News & Views features



If you have an interesting article or project running in school do let us know. TEP will provide £100 worth of resources for schools featured in News & Views.

## FREE Electronic Circuit Website downloads...



Visit us now at:

[www.tep.org.uk](http://www.tep.org.uk)

As soon as you have finished reading this issue get on the web and look at TEP's free practical electronic on-line circuits and project downloads!

**PIC's** -In this section you will find a selection of PIC circuits which have been thoroughly built and tested.

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## Have we got News for you?

To receive your own copy of TEP News & Views fill out the form on the bottom of this page to join our mailing list.



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