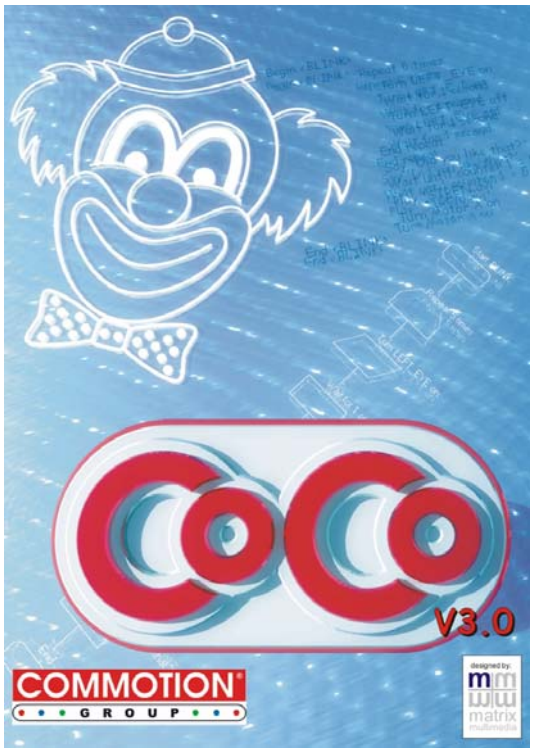


CoCo software products

matrixmultimedia

What does CoCo do? - Early years

CoCo3 software is used to fulfil the requirements of several aspects of learning in Primary education in the subjects of Design and Technology, and ICT . CoCo3 is also used to reinforce learning in other parts of the curriculum—particularly in Science. The diagrams below show you some of the learning objectives that can be achieved using CoCo software in the early years, ages 6 to 11.

Exploring simulations

Children use CoCo3 to help them to understand that computer simulations can represent real and imaginary situations. They learn how to explore simulations, explore options and to test their predictions. They evaluate simulations by comparing them with real situations and considering their usefulness.

Controlling devices

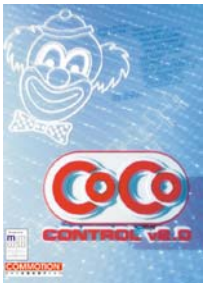
Children learn how to control simple devices, such as buzzers, small motors and lights, using basic control boxes. They learn how to control devices by turning them on and off according to a set of instructions. This is developed so that children understand how to sequence a set of instructions to get a desired outcome.

Control and monitoring

Children learn how to use input devices or switches to control a process and monitor the results. They learn that it is possible to connect devices such as pressure pads, light sensors, magnetic switches, on/off switches to a control box. The computer is programmed to carry out a process when it detects a change in a real world quantity. They learn the new control language necessary to program the control box to make such decisions, eg 'if... then...'

ICT

Music



Science

D&T

Fairground

Children gain an understanding of an important mechanism, using belts and pulleys, and to learn more about control using electricity and an electric motor. Children can then be introduced to computer control. The focus of the unit is to design and make a model of a fairground ride but it could be adapted to suit any product in which an electric motor produces rotating movement.

Alarms

Children develop an understanding of simple electrical control through the designing and making of an alarm system. They are introduced to the idea of feedback. The designing and making assignment involves an alarm system to protect a valuable artefact which has been placed in a safe, and the associated control program.

Controllable vehicles

Children develop their understanding of how products can be driven by electricity. They learn how to use motors within their models and how to control the speed and direction of movement. They develop their designing skills by using their own ideas and experiences to produce clearly labelled drawings. They use construction kits and a range of materials and components to develop their skills, knowledge and understanding.

What does CoCo do? - Secondary education

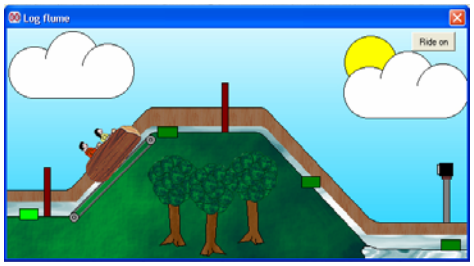
At secondary level CoCo3 software is used in several areas in both Design and Technology, and ICT: mostly in the 11 to 14 age range. The diagrams below show you some of the learning objectives that can be achieved using CoCo software at secondary level:

Control: input, process, output

Pupils learn about control technology through modelling the working of a car park barrier. Pupils program a simple cause and effect model, *eg pressing an input switch that produces an output, such as sounding an alarm*, and develop their knowledge and understanding of control devices by solving a problem using procedures as building blocks. They refine instructions and learn how the order in which instructions are given will be critical to the success of the project. It is important that during this unit pupils use a structured approach to solving this type of problem.

Measuring physical data

Pupils can use CoCo3 to learn how to use a computer and remote sensors to measure changes in the physical environment. They can compare the use of computerised and manual methods and describe the advantages (and disadvantages) of each. Pupils will develop the underpinning knowledge, skills and understanding about datalogging they will need to support their work in other subjects, *e.g. science, geography.*



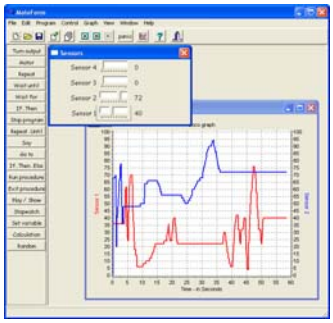
Control systems

Students explore ICT systems through the scenario of controlling a new water ride in a theme park. The design of the boat is not important; the focus is on developing a program where a number of individual boats move through a water channel safely and under control, and in extending their skills in using sensors and control software. The system could involve a feedback loop.

ICT

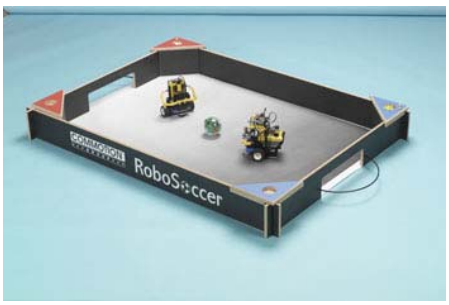
Science

D&T



Using control for monitoring

The main aim of this unit is for pupils to learn how to apply and combine their understanding of electronic control and product design control when designing and making. Pupils tackle a design and make assignment (DMA) on the theme 'Taking care', in which they bring together their knowledge and understanding of electronics, product design and modelling to meet a specific and appropriate purpose and produce an electronically controlled sensing device that includes feedback.

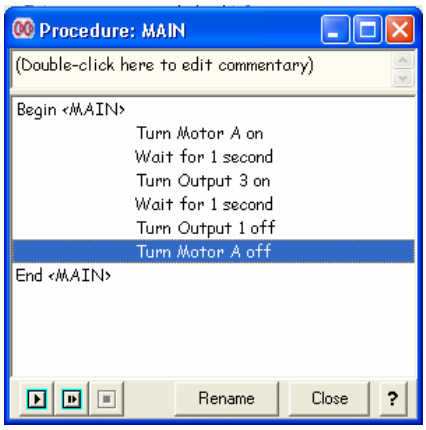


Systems and control

Students use a variety of equipment to enable them to recognise inputs, processes and outputs in their own and existing products. They must plan and develop more complex systems that can be broken down into sub-systems to make it easier for analysis and development, and understand that each sub-system also has inputs, processes and outputs. They must understand how electronics and mechanical systems can be linked and controlled with sensors and switches.

The benefits of CoCo

CoCo is built on three well-founded principles:

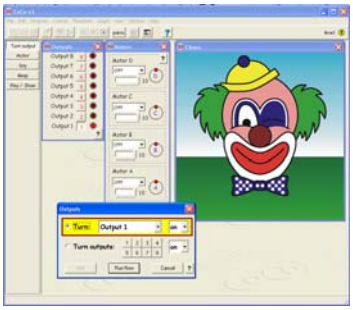


The language of CoCo is Everyday English

- **Teach the fundamentals using the language children use every day: English**

  Firstly CoCo allows pupils to build computer control programs in the easiest way possible - in the same way as they speak - using English. CoCo uses structured sentences to form the basis of control programs that range from the simple constructions used in Primary schools, through to the more demanding programs in Secondary schools. Pupils are assisted in forming each command by drop down menus which avoids syntax errors.

At level 1 students simply point and click to control the outputs….



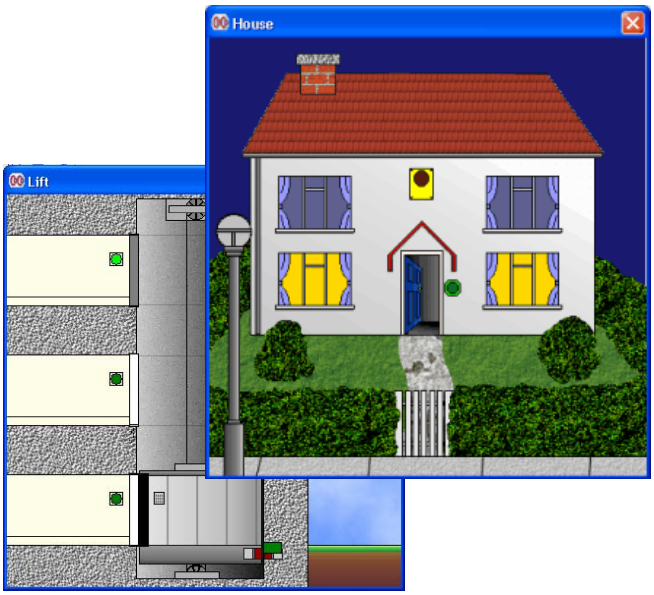
At level pupils build individual commands which have immediate effect….

At level 3 students start to construct simple text– based programs….

At level 5 students develop more complex programs with subroutines, feedback and reinforce learning through flow charts….

- **Built in progression**

  Secondly CoCo allows students to learn about control in different levels as their expertise develops. At its simplest (level 1) control actions are only one click away. At level 5 CoCo allows students to write complex programs with multiple subroutines and see the program in text or as a flowchart. The link with flow charts is important: it helps students visualise and understand program flow and strategy.



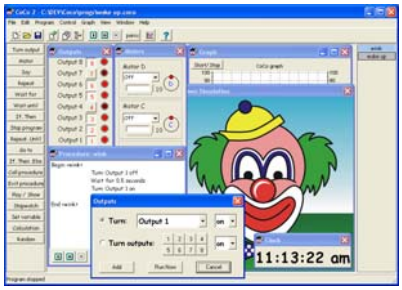
- **Learning through simulation**

  Thirdly CoCo 2 brings fun to control. The range of simulations and control tasks is varied and motivating and a host of features such as playing back students' own sound files, getting the computer to talk, and allowing control of real hardware simulations really motivates students to learn control.

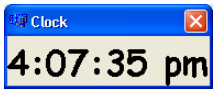
  Simulations shipped with CoCo include: Car park barrier, Clown

  House, Lift, Log flume ride, Traffic lights, Washing machine

CoCo features

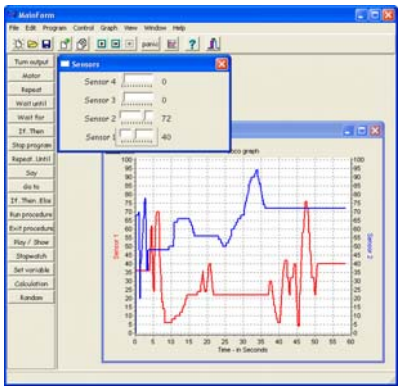


Some of the many features of CoCo include….

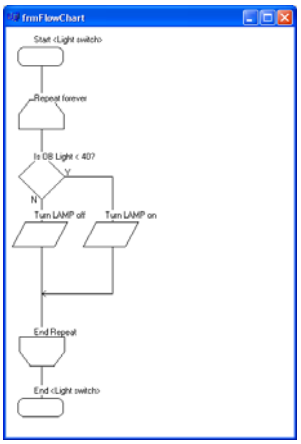


...a clock...

...a stop watch...



... a graph for recording what happened...



... the facility to move between text based and flow chart programming…

CoCo's many features include:

Time control

CoCo has a Clock and a Stopwatch. The clock uses the PC's system time, so the time will be that of your PC. The Stopwatch has Start, Stop, Reset and Lap features. The clock and the Stopwatch can be used in decision commands. The Stopwatch can be controlled by commands as well.

Sound features

CoCo can speak (soundcard and speakers required), and can play sounds and images in a number of common formats. CoCo also has the ability to play media files and can also play individual notes.

Graphs

Need to record what happened during your control experiment? CoCo 2 has a graph feature. Graphs can be saved and loaded allowing results to be viewed later in CoCo 2. You can also export or copy graph data in a number of different formats, including as images and in various data formats. Export formats include CSV and SID. Furthermore you can copy the data to the clipboard for use in other programs.

Programs and flowcharts

Programs can be saved and loaded, and also printed if you need a hard copy for records. You can also seamlessly convert a text based program to a flow chart program and back again: or even have procedures that use flow charts and text within the same program.

Tracing

CoCo can run procedures command by command, and uses a trace highlight allowing you to see what is happening in a program. Useful for when it all goes wrong, and you need to find the problem. Or for when you want to demonstrate how a command functions.

CoCo controlling simulations

CoCo contains a number of simulations, which can be controlled directly, programmatically, via software control panels or via direct input from Control Interface boxes. When activated the outputs and motors on the simulations will activate the corresponding outputs or motors on an attached Control Interface box or Lego RCX.

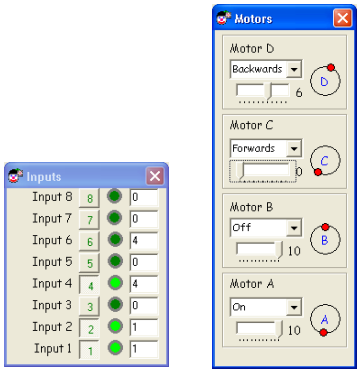
Programming

CoCo 2 uses a simple programming technique where commands are built using dialogs that contain the various options available for that command.
This helps users build commands without having to worry about the exact syntax or parameters of a command. All that is taken care of by the software.

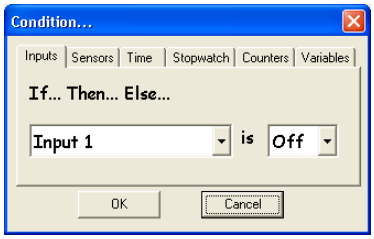
The resulting commands are dropped into a self-organizing program panel with automatic indentation and layout – once again making life easier for users. Commands can be edited, moved or deleted.

The commands are grouped into procedures, which can call each other. This allows splitting tasks into small easy to solve sub-tasks, which can be linked together to provide the full program. It also helps introduce concepts such as re-using code for common tasks.

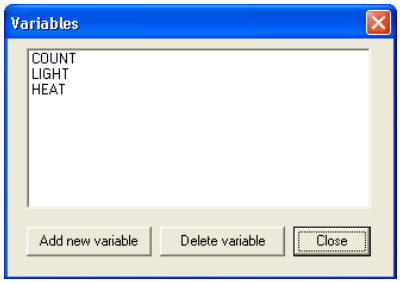
A number of commands can be run instantly. Allowing users to directly affect outputs, motors and variables.



...change output and motor settings instantly...



...dialogue screens that take care of syntax and parameters...



...and full variable support..

Commands:

```
Beep
Calculation
Call procedure
Comment
Exit procedure
Go to
If… Then
If… Then… Else
Output(s)
Motors
Play/Show
Random
Repeat
Repeat until…
Say
Set variable
Stop program
Stopwatch
Wait for
Wait until
Whenever
```

The CoCo family of products

There are many products in the CoCo family which together can be used to form a complete solution to teaching control at a variety of levels.

CoCo software products

The core CoCo software includes simulations of CoCo the clown, a car park, barrier, traffic lights, log flume ride, lift, house and a washing machine. An additional pack of simulations is available which includes simulations of a light house, greenhouse, safe, automatic door, stage, fairground wheel, and a buggy.

CoCo single user	£80
CoCo primary school site licence	£160
CoCo secondary school site licence	£300
CoCo Simulations pack site licence	£60

CoCo control projects

New for 2006 is a range of control packs each of which includes challenges for children as well as accompanying curriculum and explanations. There are 8 control projects : Supermarket, Supercar, Metro, The Gig, Aldermaston bridge, Sk8er, Boris the Burglar, The Gig 2.

These are sold individually and each site licence costs £50.

CoCo models and accessories

To add relevance to pupils' work a complete range of control models is also available —most of which also have simulations with the CoCo software. These range from simple corriflute models of traffic lights (great for class demonstration) to more sophisticated electronics models of car park barriers. In addition to these models a complete range of sensors, switches, bulbs and other electronics accessories is also available for project work and creating your own models.

Control boxes and Lego

CoCo supports a number of control interfaces: the Commotion CoCo control box, various Deltronics boxes, the FlowGO interface and Lego. Control interfaces provide an interface between the PC and a control model, or pupils' projects. Typically control boxes have several inputs, outputs which deliver 6V at 1.5 amps, interfaces for a range of external sensors, on-board light and sound sensors, and bidirectional motor outputs.

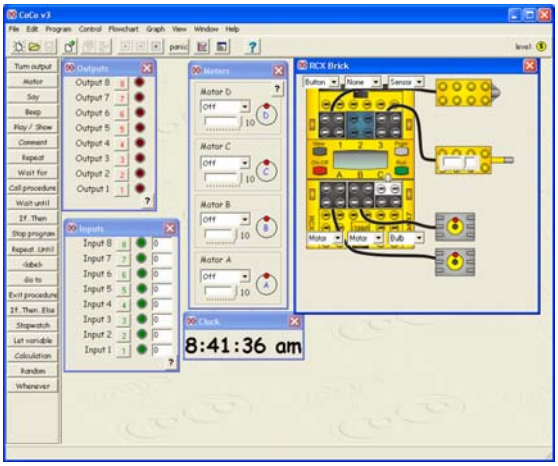
CoCo and Lego

New for 2006 is compatibility with Lego's RCX brick. The RCX brick is the heart of many Lego systems and solutions that enhance the teaching of Control at ages 10 and above. The flexibility of the Lego system, and its association with fun, has the ability to motivate students to learn more: Lego and partners have capitalised on this further with competitions like Robo soccer, and Team challenge.

In 2005 Matrix Multimedia decided to add Lego to Coco for 3 reasons:

- **Applying CoCo techniques to teaching Lego control**

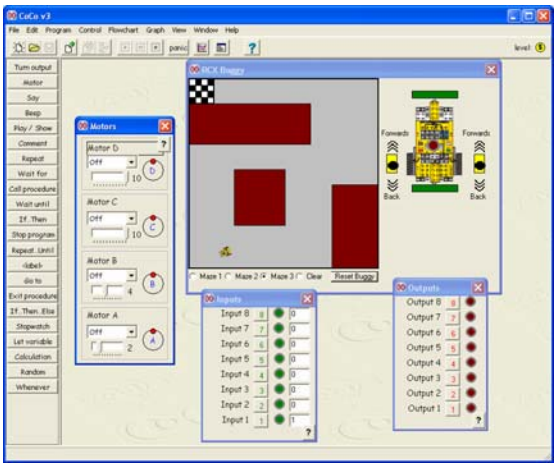
The staged introduction to control concepts that CoCo provides has been a great success. This has been applied to Lego hardware: pupils start by simply clicking on the RCB brick output on the screen and the RCX output on the brick immediately turns on. Pupils then build their understanding by writing single commands, which are executed on the RCX immediately. Finally pupils progress to writing full programs using text or flow charts which are downloaded to the RCX brick.



CoCo includes a full simulation of the RCX brick

- **An alternative to Robo lab**

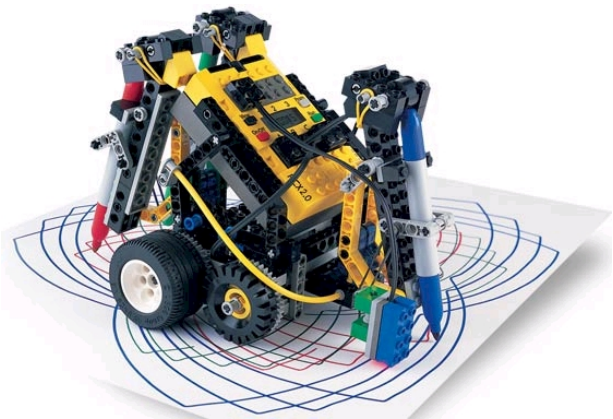
Some children do not find the Robolab software supplied with the Lego RCXbrick to be intuitive. Also the UK National Curriculum specifies that pupils must learn control with flow charts. CoCo's new Lego control feature means that teachers now have a genuine fully functional alternative to Robolab so that Lego can be used by more students.



CoCo also includes a buggy modelled on the RCX brick which students can program to solve a range of mazes.

- **Expanding the Lego age range**

In many schools Robolab is only used with older students aged 10 and above. A great advantage of CoCo is that it is compatible with younger pupils—as low as 8 years old. This now means that Lego can be used as a motivational control platform by younger children.



CoCo 3 and related products are marketed by the Commotion Group:

www.commotiongroup.co.uk

01732 773399

CoCo 3 is developed by:

Matrix Multimedia Limited

www.matrixmultimedia.co.uk

0870 700 1831

matrixmultimedia