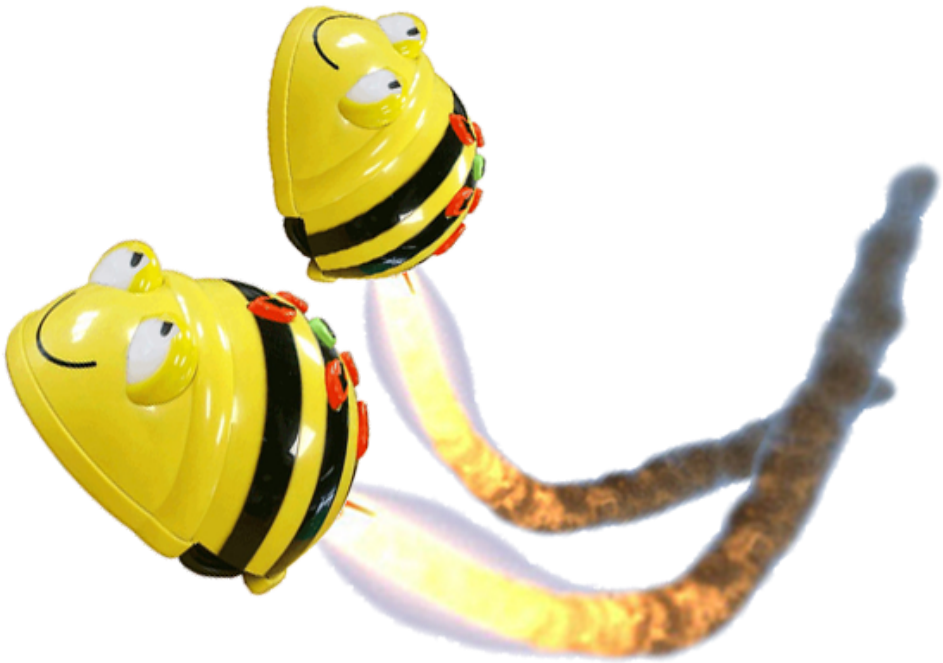
Creative Computing

for

Northumberland



Star Control

A Control Experience for pupils in Key Stages 2 and 3

Preamble:

This experience is intended to engage and stimulate interest in coding and control by using a wide range of physical control devices to which pupils may not have been previously exposed. It is intended to be engaging and fun, it is also planned to hit a number of different statements for the Computing requirements and also to allow teachers to show experience, coverage and progression.

How it works

The experience is planned to last for half a day and can accommodate up to 30 pupils per session. It will require a large open space such as a school hall.
The whole event is themed around the Star Wars movies, each device has a simple task and is linked to a narrative. Pupils work in groups of 3-4 and will work around the range of devices gaining as many different experiences as possible in the time allowed.

Devices used:

- Roamer
- Bee Bot
- Blue Bot
- Sphero 2.0
- BB-8
- Wedo & Makey Makey
- Learn & Go
- Big Trak
- Rolling Spider
- Roamer Too

There may be additional devices, depending on availability.

Timetable

This is the ideal format, in practice all things must change!

Introduction	5 mins
Introduction to devices and pupil support material	10 mins
Task rotation 1	15 mins
Plenary	2 mins
Task rotation 2	15 mins
Plenary	2 mins
Task rotation 3	15 mins
Plenary	2 mins
Task rotation 4	15 mins
Plenary	2 mins
Break	10 mins
Task rotation 5	15 mins
Plenary	2 mins
Task rotation 6	15 mins
Plenary	2 mins
Task rotation 7	15 mins
Plenary	2 mins
Task rotation 8	15 mins
Final Plenary	

Total time approximately 2h 30m

Task Breakdown

activity	device	context	learning targets
1	Roamer	The delivery Droid. An urgent part must be delivered to the hanger so that the pilots can take off. He must be programmed to travel down a corridor and turn a corner, wait for the doors to open and then enter the hanger. To warn of his presence, he must program his warning system, so lights will flash and buzzers sound.	breakdown of task iterative approach record of task
2	Bee Bot	Formation flight task. Both roamers must arrive over the target at the same time. They must fly in V formation all the way along the route and arrive, still in formation over the target.	problem solving spatial awareness
3	Blu-Bot	BluBot must be pre-programmed to operate a shuttle bus for pilots. He is taking pilots to the hanger. He must wait for people to get on, go to the hanger, wait for people to get off, then return to start. This process should be able to repeat.	using repeats using loops
4	BigTrak	Big Trak is a long range supply craft. He must journey to the mine and pick up the power cell crate. He should be programmed to wait long enough for the power cell to be placed on his back.	reversing a program
5	Rolling Spider	Rolling spider is on a photo-recce mission. He will take off, fly to the target, take a photo over the target and fly back to the helipad and land	awareness of accuracy checking twice to validate accuracy
6	Roamer Too	Millennium Falcon take off task. It will fly out of the hanger, hover, turn and fly away.	following instructions
7	Learn & Go	Learn and Go will control a warning system for the hanger doors. Before the doors open a set list of warnings (lights and buzzers) must operate.	using and recording sequences of instructions
8	BB-8	BB-8 must deliver a message. This is a direct control task using i-Pad and bluetooth.	direct control pairing experiencing speed versus accuracy
9	Sphero 2	Using the draw-n-drive programming interface, Sphero must be guided through a distant door.	evaluating efficiency of devices
10	Scratch MM Wed	A console display for the targeting computer has failed. Pupils must fix it quickly. A scratch system is controlled by a Makey-Makey switch. We-Do powers the radar screen.	controlling external devices in a connected system

Potential Learning Outcomes

progression pathways		National Curriculum in England: computing programmes of study	
Algorithms *pupil progress will be indicated because pupils will:*	Programming & Development	Key Stage 2	Key Stage 3
Understand that algorithms are implemented on digital devices as programs. Design simple algorithms using loops, Use logical reasoning to predict outcomes. Detects and corrects errors i.e. debugging, in algorithms.	Use logical reasoning to predict the behaviour of programs. Detect and correct simple semantic errors i.e. debugging, in programs.	**design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts**	design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems
Design solutions (algorithms) that use repetition and two-way selection i.e. if, then and else. Use diagrams to express solutions. Use logical reasoning to predict outputs,	Create programs that implement algorithms to achieve given goals.	use sequence, selection, and repetition in programs; work with variables and various forms of input and output	understand several key algorithms that reflect computational thinking; use logical reasoning to compare the utility of alternative algorithms for the same problem
Show an awareness of tasks best completed by humans or computers. Design solutions by decomposing a problem and creates a sub-solution for each of these parts (decomposition). Recognises that different solutions exist for the same problem.	Design, write and debug modular programs using procedures. Know that a procedure can be used to hide the detail with sub-solution (procedural abstraction).	use sequence, selection, and repetition in programs; work with variables and various forms of input and output	understand several key algorithms that reflect computational thinking; use logical reasoning to compare the utility of alternative algorithms for the same problem
Understand that iteration is a repetition of a process. Recognise that different algorithms exist for the same problem. Represent solutions using a structured notation.			use 2 or more programming languages, at least one of which is textual, to solve a variety of computational problems; design and develop modular programs that use procedures or functions

Requirements from host school.

The eLearning Team will supply all the required documents, resources and control devices.

There are really only a few things we need:

- Adequate space, especially if the flying robots are used
- Access to power sockets
- Projection Screen/surface (for introduction)
- Set up and strike down time, this can be 20 minutes or so

Preparation before the event.

In order to get the most learning out of the experience, teachers might like to use the introductory presentation before the event, to help pupils understand what is going to happen, and to help them understand that there are some learning goals for this event.

The learning goals are:

- To gain hands on experience with a wide range of devices
- To find out what works well
- To complete some control tasks
- To work fast – time is very tight!
- To enjoy it!

It would be very helpful if teachers could prepare the children with a few messages relating to approach and care. The robots are fragile and the experience can be quite exciting. While breakages are inevitable, it would be very much appreciated if pupils are prepared to help minimize accidents.

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