# Goose Fair Crumble Rides

Bringing computer programming and control to life in D&T with the Crumble controller.

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Year 5 pupils at Nottingham's Milford Academy recently brought their fairground ride project to life with the help of some primary D&T specialist trainee teachers from Nottingham Trent University (NTU), during a visit to the Clifton Campus.

As a primary D&T senior lecturer at NTU, I was keen to make links between my subject and local Clifton schools as part of the 'Raising Aspirations' project, designed to encourage more children from deprived backgrounds to aspire to attend university and obtain graduate jobs. I decided to use this opportunity for the third year D&T primary undergraduate trainees to support a class of children in tackling the Design, Make and Evaluate Assignment (DMEA): *"To design and make a new children's fairground for Nottingham Goose Fair"*. At the same time, this would enable them to develop their own knowledge and understanding of working with a Crumble controller, a programmable board suitable for primary children (see Fig 1) as well as work within the six design principles: **user, purpose, function, design decisions, authenticity** and **innovation**.

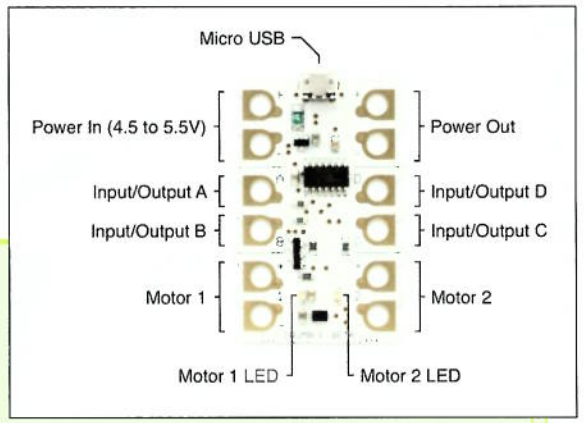


*Figure 1 – Crumble controller*

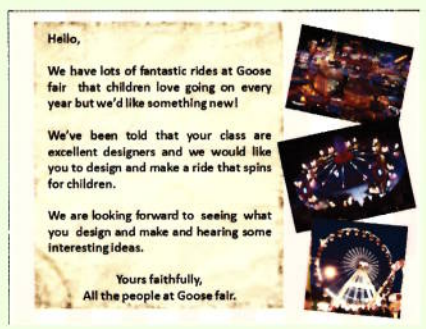


*Figure 2 – the DMEA shared with the children*

*Figure 3 – Children carrying out an IEA on the trainees' fairground rides*

## Innovation part 1– Mechanisms and Computer programming

Before the children came into NTU to design and make their rides, the trainees designed and made their own rides in pairs, initially powered with motorised pulley wheels and reversible switches that allowed the ride to change direction. The trainees were then introduced to Crumble through a Focused Task (FT). After learning the basics of programming the Crumble controller, they were then able to programme it to control the ride, which this time involved more options: change of speed, change of direction, sequences of flashing LEDs that changed colour ('sparkles'), as well as using sensors to trigger the ride to start. The trainees planned for the visit to include the three key D&T activities: Investigate and Evaluate (IEA), FT and DMEA activities, as well as experience many aspects of university life as part of the 'Raising Aspirations' project.

## On the day: Setting the scene – Authenticity, User and Purpose

Initially I introduced the DMEA to the children, which clearly identified the user and the purpose (see Fig 2) within a real-life authentic context – Nottingham Goose Fair. Once the children knew what the design problem was, the trainee teachers shared their rides with the children, which the children then investigated, evaluated and analysed (IEA) to help create their own design criteria.

## Function and Design Decisions

Through small-group discussions with their trainee teachers, the children decided on possible **Design Criteria**. Ideas were shared as a whole class, and together they decided the ride needed to: appeal to children, rotate (either vertically or horizontally), to be attractive and fun. Pairs of trainees worked with small groups of children to think through the DMEA, and generate different ideas for names and types of rides. This gave them a chance to think about how their ride was going to work (function), and start to make some design decisions.

Once the final design was chosen, the children used a shoe-box as the base for the ride and, with guidance from the trainees, measured, cut and constructed the ride mechanism, developing their making skills, technical vocabulary and safe use of tools (see Figure 4).

## Innovation – part 2

The trainees then led a Focused Task in which the children learned how to make their Crumble control traffic lights so they lit up in the right sequence and so they responded to a 'button press' input (see Fig 5). **Innovation** in a primary setting can be described as

*Figure 4 – Children developing their making skills on various aspects of the ride*

*Figure 5 – Children programming the Crumble*

'a new idea for you or your peers', and using the Crumble was new for all of the children, as well as for their teacher!

After these basics had been learnt, the children were able to make further design decisions, such as deciding what they would like their rides to do and the Crumble controllers were duly programmed. A range of high quality decorating resources were available to help the children finish making their rides, which meant that the children were very proud of the finish.

Finally, the children **tested** and **evaluated** their rides against the **design criteria.** All rides successfully met the criteria and the wide range of themes, from Spongebob Squarepants to Spooky Spiders was wonderful (see Figure 6)!

## Project Summary

Children's surveys completed after the experience gave very positive responses, particularly on the aspect of 'working in teams' and 'exploring the rides'. Many children felt they have developed their skills in using D&T tools, teamwork and computer programming and that they had '*learned a lot*' and '*had lots of fun*'. They also commented on how this project had helped with other curriculum subjects, such as maths, art and science.

Class teacher Mr. Goff agreed that the children had enjoyed the project, and that it had '*utilised and enhanced existing D&T skills, particularly focusing on the crucial initial design phase. It also gave them opportunity to be innovative with more complex components such as Crumble. All the children were delighted with the outcome of a working fairground ride and talked enthusiastically about their experience for a long time afterwards*'.

Finally, the opportunity to work with children on this project was met with real positivity from the trainee teachers, with comments such as '*a great opportunity to gain experience in our subject specialism whilst having the opportunity to put into practise our pedagogical skills and planning*', '*the link to computing helped us make cross-curricular links between subjects and also helped improve computing knowledge*' and '*absolutely loved it! It brought everything together*'.

Using Crumble controllers enabled the children to 'apply their understanding of computing to program, monitor and control their products' in an effective, engaging and primary-appropriate way. The low cost of the Crumble controller kits and the ease of use of the software (which closely matches the Scratch programming language many children will be familiar with) means this approach has real potential for bringing D&T projects to life in many schools.

Primary Crumble Controller Starter Kits and Components packs are available from the D&T Association website. The 'Primary Crumble Controller Starter Kit Bundle' includes pdfs of two Projects on a Page Primary Crumble Planners: Years 3/4 Simple Programming and Control and Years 5/6 Monitoring and Control and the 'Programming and Control at KS2' article from D&T Primary #32.


*Figure 6 – The children with their final products*