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**What’s up dog? Building Renishaw’s Gromitronic**

**A team of young engineers at** [engineering technologies company](http://www.renishaw.com/?utm_source=Stone_JunctionREC240&utm_medium=PR), **Renishaw, has designed and built Gromitronic, an interactive Gromit sculpture for The Grand Appeal’s Gromit Unleashed 2 trail.** As one of the Trailblazer companies involved, the team was asked to create one of three interactive Gromit sculptures for the trail that represents innovation in engineering and design.

**Background**

In October 2017, Bristol Children’s Hospital charity, The Grand Appeal, asked Renishaw to design and build an interactive Gromit sculpture for its summer 2018 67-sculpture trail. Gromit Unleashed 2 is the third sculpture trail organised by The Grand Appeal, but the interactive sculptures produced by Renishaw, Rolls-Royce and the University of Bristol are the first of their kind in the world. The team designed and built Gromitronic with the aim to create a sculpture that showcases the mechatronic nature of Renishaw’s products and to get children and adults excited about STEM subjects, including engineering.

The team working on Gromitronic had the necessary skills in software, electronics, design engineering and mechanical engineering to ensure that the sculpture would work well during two months on show at the M Shed in Bristol. Each member of the team worked on a component of Gromitronic to make sure he was interactive and interesting for the public.

**Challenge**

The Grand Appeal predicted the over 1.2 million members of the public would take part in the Gromit Unleashed 2 trail. The Renishaw team had to create a sculpture that would appeal to a large audience and remain functional and safe.

“Gromitronic is very different to any product we normally make,” explained Steven Brace, Graduate Mechanical Engineer at Renishaw. “Normally, we can accurately predict the working environment of our products, particularly in machine tool or medical applications. We then spend around two years alpha and beta testing the product to make it perfect.

“When building Gromitronic, we only had a few months to design, build and perfect the sculpture,” continued Brace. “Creating each component was fairly simple, but it was difficult to design a product for such a public space. To make this happen we worked hard to incorporate safety and efficiency in to our designs.”

Working to a short deadline meant that each team member had to work quickly to ensure Gromitronic was interesting to the public, powerful enough to work for the entire trail and safe enough for public interaction.

**Solution**

Each member of the team used their specific skill set to contribute to a part of Gromitronic. Brace built Gromitronic’s eyes, which were engineered to follow visitors during their visits. The eyes were made to move using two servos, which move the eyes on two axes, left and right and up and down.

Apprentice Software Engineer, Lucy Spiteri-Beale, created the eye movement patterns using her software skills. Spiteri-Beale started by creating eyes on screen to test their movement and write a code to control the servos.

“It was a challenge to get the eyes to move naturally,” explained Spiteri-Beale. “To achieve this, we had to think mathematically, adding small movements in lines and curves in a routine. We tested the code until it was perfect – now Gromitronic’s eyes move just like Gromit’s in the films when he rolls his eyes at Wallace and crosses his eyes when scared.”

The Renishaw team then fitted over 5,000 separate LED lights onto Gromitronic. Controlled by over 10,500 lines of code written using Python, the result means that visitors can press touchpads designed to look like Wallace’s inventions to change the colour, pattern and speed of the LEDs.

“With any software program there are always parts that do not work the way you expect,” explained Hannah Howell, Software Engineer at Renishaw. “However, we had to wait for Gromitronic to be designed and painted before fitting any lights and testing them. So, we improvised and built a Gromit Junior to test the LEDs and touchpads system, discovering that it required a lot of power to create a range of patterns.”

The Renishaw team also wanted to showcase its products on the sculpture to get visitors, both children and adults, excited about engineering. The team used its additive manufacturing (metal 3D printing) machines to produce Gromitronic’s tail and collar. Ben Collins, Design/Development Technician at Renishaw also metal 3D printed Bristol landmarks that can be seen set in resin studs on the collar.

The team also used additively manufactured cranial plates for Gromitronic’s toe nails. The plates are used in healthcare applications to help patients after a serious head injury. Surgeons can design an implant based on a scan of the patient so that a fully customised titanium implant can be produced.

**Results**

Renishaw team members created a control system for Gromitronic using a printed circuit board fitted with two raspberry pi computers, one to control his eyes and tail and one to control the LED lights.

The team worked for over 2,000 hours to design and build Gromitronic before the start of the trail. The resulting sculpture is designed to look like a circuit board and is full of interactive features, including a plasma ball nose, moving tail and buttons to control his lights. He is now on show along with other sculptures across Bristol and in has been seen by tens of thousands of visitors, including a daily record of 8,000 visitors to M shed on one day during July.

You can visit Gromitronic at the M Shed in Bristol until September 2nd, 2018.

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Notes to editors

UK-based Renishaw is a world leading engineering technologies company, supplying products used for applications as diverse as jet engine and wind turbine manufacture, through to dentistry and brain surgery. It has over 4,500 employees located in the 35 countries where it has wholly owned subsidiary operations.

For the year ended June 2018 Renishaw recorded sales of £611.5 million of which 95% was due to exports. The company’s largest markets are China, the USA, Germany and Japan.

Throughout its history Renishaw has made a significant commitment to research and development, with historically between 13 and 18% of annual sales invested in R&D and engineering. The majority of this R&D and manufacturing of the company’s products is carried out in the UK.

The Company’s success has been recognised with numerous international awards, including eighteen Queen’s Awards recognising achievements in technology, export and innovation.

Further information at [www.renishaw.com](http://www.renishaw.com)

About Gromit Unleashed 2

Since 1995, The Grand Appeal has raised over £50 million to save lives and support children and their families from across the South West, South Wales and beyond. This years’ interactive trail will boost the fundraising further, to benefit young people in the area.

Led by Bristol Children’s Hospital Charity, The Grand Appeal, Gromit Unleashed 2 will see Nick Park's Academy Award®-winning character Gromit return to Bristol in 2018 for his second starring role in the award-winning charity's sculpture trails. But this time he's not alone; the loveable pooch will be joined by his pal Wallace and arch nemesis Feathers McGraw!

Gromit Unleashed 2, is bringing together the best and brightest of Bristol’s diverse creative and tech industries. With the help of its pioneering ‘Trailblazers’ Creditcall, Renishaw, Rolls-Royce and the University of Bristol, Gromit Unleashed 2 will showcase both Bristol’s rich engineering heritage and the city’s reputation as an internationally renowned creative and technological hub.

The Grand Appeal supports Bristol Children’s Hospital by funding pioneering, life-saving equipment and research, including ventilators, a cardiac hybrid theatre and an inter-operative MRI scanner, so that patients have access to the best possible healthcare and life-saving equipment. We provide free accommodation to families of critically ill patients from the Neonatal and Paediatric Intensive Care Units in our Cots for Tots House and Paul’s House, as well as providing free family accommodation and family support service for parents and siblings. We ensure the hospital is a vibrant and child friendly place to help distract young patients through our music therapy, art and play programmes and much more.

Bristol Children’s Hospital covers the largest geographic area of any children’s hospital in England, treating more than 100,000 children each year, and serves as the paediatric intensive care centre for the whole South West region. The hospital is an international, national and regional specialist centre of excellence for a range of services including neurosurgery, burns, epilepsy, cardiac, leukemia and bone marrow transplants. For more information, visit [www.grandappeal.org.uk](http://www.grandappeal.org.uk).