



Wednesday 6 March 2024  
Academy of St. Nicholas

## Programme of Activities

<b>10.00</b> – 10.15	Arrival in our Lab & Welcome (including security induction & account registration)
10.15 – 11.00	<b>Workshop 1: Logic circuits (Nikita)</b>
11.00 – 11.30	<b>Giant Sorting Network</b> (outdoor activity)
11.30 – 12.00	Lunch Break
12.00 – 12.45	<b>Workshop 2: Wavefunction collapse (Ben C-W)</b>
12.45 – 13.45	<b>Hands-on Workshop: Lego EV3 drives the warehouse</b>
13.45 – <b>14.00</b>	Closing Talk

All workshops take place in Lab 3 of the George Holt building.

## Information about the Activities

### Wavefunction collapse algorithm

Wavefunction collapse is an algorithm based on concepts from quantum computing. Using just one input image, it outputs an image of selected size without aid of machine learning techniques. The goal of this lesson is to teach the students of both the algorithm's existence and Shannon entropy, the metric the algorithm uses to pick which pixel to 'collapse' next. This will occur intuitively via a board game and a connecting slideshow.

### Logic circuits

Logic underpins the entirety of computer science, from writing large pieces of code to the very bits that make up a computer. To be able to study and work in computer science you need to have a good understanding of basic logic such as AND, OR and NOT. People also need to be able to use the 3 (and others) in conjunction with each other to on programs for example. This lesson will help students understand how useful logic gates are and become more comfortable with complex knowledge of gates and circuits as well as their real-life applications in computer science.

### Giant Sorting Network

In this outdoor lesson, pupils will play the role of the "compute nodes" in a parallel sorting algorithm. They will experience first-hand how parallelism speeds up computation, but also makes it more challenging to reason about programs.

### Lego EV3 Drives the Warehouse

Robots managing large warehouses are one of the many examples where automation helps humans to solve a task faster and cheaper. For this to be effective, robots need to be at least partially autonomous, i.e., able to sense and react to the physical world without (constant) human intervention. In this hands-on lesson, pupils program Lego EV3 robots to follow a line, avoid obstacles, and ultimately navigate a warehouse safely and autonomously.