

Adaptive switches, rewired circuits allow children with special needs to play with toys like others

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On May 29, 70 modified toys were presented to children aged seven to 18 who attend Rainbow Centre. PHOTO: LIANHE ZAOBAO



Syarafana Shafeeq (+)

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SINGAPORE – For 11-year-old Alaynaa Isabella, holding things and pressing small buttons is a challenge. Like many other children with special needs, she cannot play with most toys from regular shops.

Alaynaa has cerebral palsy and global developmental delay. When she was three days old, her heart stopped and she suffered brain damage before she was revived.

Her mother, Madam Mashurny Herniaty, told The Straits Times that buying toys off the shelf that are suitable for Alaynaa is difficult and expensive.

Many off-the-shelf toys require children to grasp or press small buttons, which may be hard for those with special needs.

Madam Mashurny, a homemaker, resorted to making toys for her daughter, such as putting beans in Yakult bottles.

“Toys in the market are not suited to her, and I have to source them online. It’s very difficult, and when I do find one, it’s always quite expensive,” she said.

When she goes to Toys “R” Us with Alaynaa and her younger daughter, who is eight, she can buy only soft toys for Alaynaa.

On May 29, Alaynaa and other children aged seven to 18 who attend Rainbow Centre received 70 toys modified to suit their needs.

They were adapted over the past five months by engineers from DSO National Laboratories, who rewired circuit components and customised 3D-printed switches so that the toys can be activated through light touch or limited movement. DSO is Singapore’s largest defence research and development organisation.

Commercial alternatives to these adaptive switches can cost tens to hundreds of dollars each, making them expensive to procure, repair or replace in classroom quantities, said DSO in a statement on May 29.

Customising these switches through 3D printing is a cost-effective solution, allowing each switch to be tailored to the needs of every child, it added.

Senior Parliamentary Secretary for Social and Family Development Eric Chua said that as a father, he gives his young son too many toys, but children with different needs do not have that same privilege.

Play is important for children as it allows them to learn and connect with one another, and establish bonds with those they are playing with, Mr Chua said.

“It is absolutely critical for learning... and also for their own development, which is why this project is so important,” he added.

The team lead for the toy modification project, Mr Wong Jit Chin, said that as defence engineers, the team wanted to find a way to use their skill sets to contribute to the community.

He likened the toy project to their everyday defence projects, where some of them work on technologies to detect airborne threats.

“The missions are similar. One protects the skies, the other protects a child’s right to play,” he said.

Many off-the-shelf toys are built for a child with typical development, and rely on fine motor skills to operate.

“A child is expected to press a tiny button to make the toy dance, so for many students at Rainbow Centre, that tiny button represents a physical barrier. It boils down to a very harsh reality – if you cannot press it, you cannot play,” Mr Wong said.

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The team chose 3D printing as it allows them to change the shape and size of a switch, as well as the amount of force needed to press it, to suit the child’s needs, he said. It also enables the staff to repair the toys themselves by printing the parts, instead of consulting an external vendor.

The engineers provided design files and instructional videos to Rainbow Centre so that it can print, repair and replace switches as needed. The costs are about one-fifth of what commercial switches would cost.

Since 2015, DSO has modified 190 toys and instruments for children with different needs, and has trained more than 50 people to modify toys and create custom switches.

Mr Wong said: “Our labs looked a bit different over the past few months. Instead of military hardware, our labs were filled with toys.”