NATIONAL DESIGN PROJECT

An initiative of the
Design Education Advisory Committee

Report submitted by
: South View Primary School

R2 (RoboRecycle)

Background

The team is made up of students from the Robotics and Media club who are interested in deepening their knowledge and interest in the area of sustainability issues with the application of artificial intelligence technology.

With the use of the FIDS framework provided by Design for Change movement, students started the project by learning to ‘Feel’ for the user and empathize with the issues that they might be facing.

The team started by observing the behaviour of the students in the school in the area of sustainability. Through their observation and oral interviews with some of their classmates, they realised that the students in the school do not practice recycling actively. Most of the recyclables end up in the waste bin or even if they are recycled are not rinsed which result in the contamination of the recyclables. This is especially the case in the area of the canteen where students buy sweet drinks in plastic bottles, metal cans or milk cartons and simply chuck them in the waste bins. Those who did deposit in the recycling bins did not do it right by rinsing beforehand and resulted in contamination of the other recyclables.

Thus they begin to define their problem statement as “How might we increase the engagement level and awareness of recycling right in the canteen?”. They also empathized with the students that the recycling points are not positioned in an area that is prominent enough. Lower primary students might not have the awareness to rinse their bottles, cans or milk cartons beforehand.

In the next stage of imagining the possible solutions, the team wanted to produce an interactive A.I tool to engage the students in the canteen to deposit their recyclables after consumption of the drinks in the canteen. The tool will also help them to differentiate waste such as food wrappers from the recyclables as this is a common waste found in the recycling bins. This tool will help the students to be more engaged and clearer in cultivating the habit of recycling.

Prototyping of the A.I. tool

The team went through a few rounds of prototyping to decide how the A.I can be used to engage and empower the students in the knowledge of recycling in the canteen

The team decided on the following essential features in the prototype. The prototype will consist of an image recognition function to increase awareness of recyclable

materials especially among the lower primary students. Next, the prototype should interact and lead the students to deposit these recyclable materials into recycling bins. The prototype will also inform the students to throw the waste into waste bins as waste can be found quite frequently in the recycling bin and result in contamination.

The team has decided to use Pictoblox coding platform with built-in AI image recognition function. An ipad will be used to scan and recognise the objects. The team has trained the machine to recognise common objects and materials found in the canteen. This ipad will be mounted on a *Quarky* robot. The initial plan is for the prototype to move in designated pathways around the canteen. This will engage the students to come forward and interact with the robot. The robot will recognise the material and display a message for the students to recycle or throw it into a waste bin.

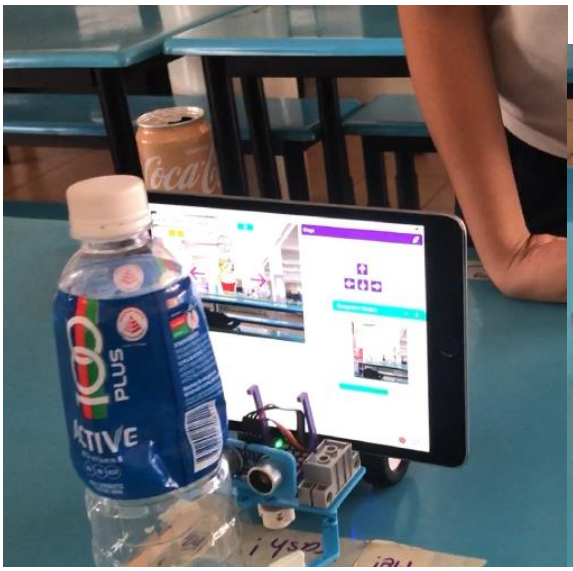
The final prototype will only involve the Quarky robot moving within a designated area in the canteen. This is a result of careful consideration that students might not have seen the small robot and knocked over it. The robot will recognise the object and move the object towards a bin for recycling. This is to encourage students to be more aware and active in recycling.

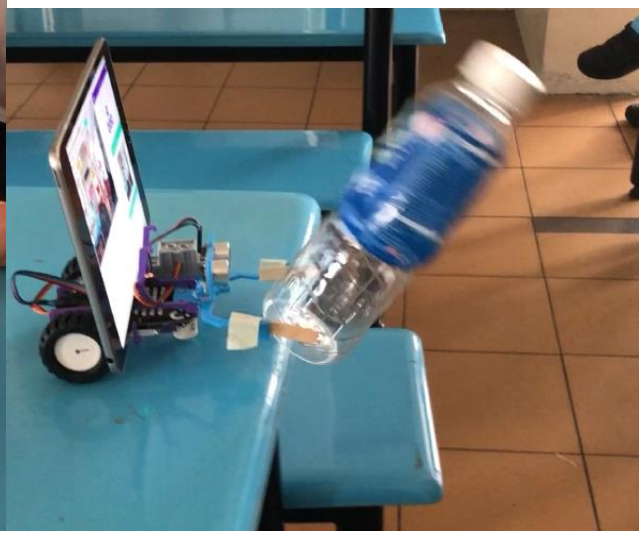
Implementation of the A.I tool.

This tool will be showcased on 8th August 2023 where the upper primary school students are also having a showcase of their project work on the theme of sustainability. The students will take the chance to introduce their project to the rest of the school.

The booth will be held in the canteen and students can bring their objects forward and placed in a designated space. The robot will take the chance to scan the image of the object.

With an ipad mounted on the Quarky robot, the object will be scanned for and identified if it's recyclable or waste.





If it's recyclable, the robot will move the object into the recycling bin, signifying that the object ought to be recycled. If it’s a waste, the robot will inform students that it should be put into the waste bin.

Moving Forward

The team recognised that more objects are made of composite materials these days. This can be challenging for recycling as it is difficult for people to understand if the

objects can be recycled. As such, AI can be deployed to help the public to understand and choose their materials more wisely.