ANZAGG 3D Meeting Minutes

Wednesday 17 August 2022  
11.30am AEDT

# 1. Roll call with self-introductions

Meeting chaired by Leona Holloway, Monash University

8 attendees from Monash University, Victorian Department of Education, NextSense, NSW Department of Education, SPEVI, NNELS, Yooralla

# 2. Icebreaker – What have you been designing/printing in the last month?

Getting feedback from touch readers on 3D printed map icons.

Designed punnet squares for genetics. Adding the braille on after, as the punnets print best upright while the braille prints best on the side. Students will put the squares into a grid for interactive learning. This design was in response to a request and discussion with a teacher.

Received a lot of orders for manipulatives:   
1. For electronic circuit diagrams, they made tiles with symbols and braille labels. There are also connecting wire pieces in different shapes and orientation. Each piece has a magnet on back so that if the teacher wants to use the pieces for the whole class, they can stick onto a white board.   
2. Leona’s water cycle, with nonslip material added on the back.   
3. Fractions set.

A member asked which site they should use to share files. Thingiverse is the most commonly used. The European 3D4VIP project is looking at whether a new repository is needed for blind users or if an existing repository can be recommended or enhanced.

A member asked about design for accessible 3D prints that will be used by the whole class. The most important thing is to provide high contrast and vibrant colours. For example, use text and braille labels in dark navy blue. The parts could be joined using very simple connectors like puzzle pieces. All tiles have top left corner chopped off to assist with orientation. Magnets on the back of pieces allows them to be used on a whiteboard. The electronic diagram pieces measure 10 x 5cm with large symbols.

Are kits with lots of parts are practical for 3D printing? It was agreed that multipart printing takes a long time but it is okay if you can print a lot at a time and your machine is well calibrated to avoid overnight errors.

Experimented with creating 3D from 2D images. A teacher requested a 3D print of the milky way as viewed from the earth (the emu in the sky according to aboriginal dreamtime). Used pic23d.com to create the STL but imported it into TinkerCAD so it could be printed directly onto a raft, without a base. Request for the .stl files to be shared.

The SASSVI Accessible Formats Production team will now learn 3D printing so that they can produce materials for other schools within SA.

Feedback was provided on the phases of the moon 3D print on the SVRC catalogue. This was originally from NextSense, who provided the files to SVRC to make the adjustments. Great teamwork!

# 3. Housekeeping

## 3.1 3D Guidelines for 3D printing on paper

A group member has tested out the instructions and successfully 3D printed a tactile graphic onto paper. They made some suggestions for clarifications that Leona will add to the instructions before publishing.

## 3.2 Tactile braille rulers

There is a 4 minute Dutch language YouTube tutorial on the tactile ruler at <https://www.eduvip.nl/liniaal/>.

A live demonstration was given on how to use the Visio tactile rulers. It has two orientations – one for touch readers (with braille and gaps on the edge) and one for print readers (with print numbers). You can use pins to stick the ruler on a soft board to keep it in place. In the centre is a hole where you can place a pin then draw with your pencil in another hole to draw a circle of a set diameter. The blue piece is a draw stop, so you can draw a line of an exact length.

# 4. Guest Speaker 1: Ka Li, National Network for Equitable Library Service (NNELS) – Accessible Lego instructions

NNELS tactile initiatives are motivated around:

* providing access to spatial information beyond academics to enrich lives
* fostering tactile literacy and spatial reasoning skills

Lego was chosen because it is popular and good for manual dexterity.

[Lego for the Blind](https://legofortheblind.com/) uses a shorthand system but does not allow for independence, e.g. ask for sighted assistance to sort colours.

[Lego audio and braille building instructions](https://legoaudioinstructions.com/) are good but there is only a small selection of kits, for younger builders. Visual assistance is still suggested.

NNELS solutions:

* use concise but descriptive language, mainly based on the Lego community.
* A specific tips and tricks section is given at the beginning. E.g. description of what is in the bags to help identify them, or give the weight to distinguish between them. Scanning the Lego bags with OCR does not work well.
* Instructions are provided in various formats.
* Also give extra information so blind builders can verify that they have placed the pieces correctly.
* Provide tactile graphics, sometimes with the view split into side and top.
* Sometimes pre-sort the bricks or add tactile markers like stickers. 3D printed Lego sorters are available.
* QR code can be useful for builder to get more information.
* Have an informal Lego club. People buy their own kits then build together online.

Future projects:

* COVID RAT testing instructions – available for free download from <https://nnels.ca/covid-19-rapid-testing-instructions>
* More Lego instructions
* Origami instructions
* Tactile illustrations in novels and picture books, available through inter-library loans.
* Open to partnerships with other organisations. Email [braille@nnels.ca](mailto:braille@nnels.ca)

A member commented on the instructions for placement on a plate. Column 1 from the left, and column 1 from the right. This is to make it easier to count across on large plates. Sometimes it gets confusing when there are little parts that stick out, but are not counted as a column or row.

A member asked about 3D printed Lego sorters. In a lot of bigger builds, there are a lot of unique pieces.

A member wondered if we organise a similar group in Australia, should we share any suggestions regarding descriptions. Yes please! Instructions will be on the NNELS website soon. Ka suggested starting with a small kit with around 200-300 pieces.

A member asked about the use of apps to identify colour and Lego pieces. Ka will look into the Lego apps to see if they are accessible. They already suggest using colour id apps or standalone colour identifiers which work much better. Ka recommends the colour star.

# 5. Other business

Aryan Saini was unable to attend the meeting to talk about his work on embedding sensors in 3D printed Lego. Videos are available at <https://dl.acm.org/doi/10.1145/3290605.3300286> and the paper can be downloaded from <https://www.researchgate.net/publication/332745440_VirtualBricks_Exploring_a_Scalable_Modular_Toolkit_for_Enabling_Physical_Manipulation_in_VR>

Abstract: Often Virtual Reality (VR) experiences are limited by the design of standard controllers. This work aims to liberate a VR developer from these limitations in the physical realm to provide an expressive match to the limitless possibilities in the virtual realm. VirtualBricks is a LEGO based toolkit that enables construction of a variety of physical-manipulation enabled controllers for VR, by offering a set of feature bricks that emulate as well as extend the capabilities of default controllers. Based on the LEGO platform, the toolkit provides a modular, scalable solution for enabling passive haptics in VR. We demonstrate the versatility of our designs through a rich set of applications including re-implementations of artifacts from recent research. We share a VR Integration package for integration with Unity VR IDE, the CAD models for the feature bricks, for easy deployment of VirtualBricks within the community.

# 6. Next Meeting

Wednesday 21 September 2022