

## Incursion Description

### Robot Challenge

Students will have fun while learning to program LEGO robots to react to their environment and solve basic challenges robotically applying their science, math's and thinking skills. Lot's of fun and challenging.

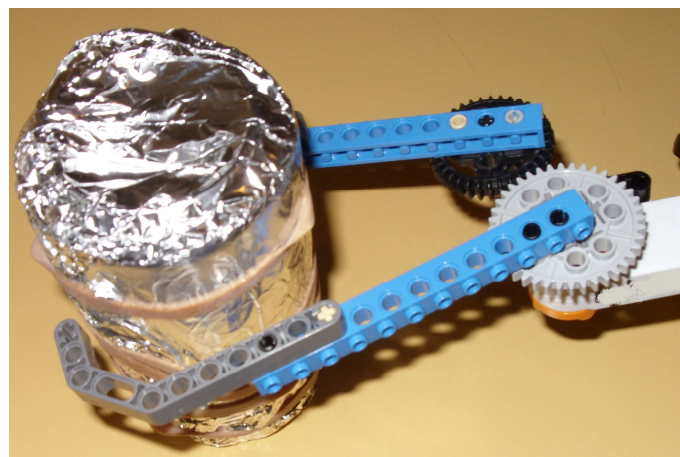
To solve the challenges students will work with rotational angles and how these can translate into linear movement ( think trundle wheel), light readings and thresholds. This session embraces a cross curricular approach with highly motivating challenges designed for age appropriateness and success.



At Left : Treasure Island - Students will use their robots to locate treasure ( sweets) and avoid dangers on the island challenge mat. This challenge can be solved at several levels of difficulty by using the robots light and rotation sensors.

This challenge incorporates a lot of "hidden" math's : circumference, angles and rotation to linear conversions. I have found that year 5 upwards love this activity and they cover the applied mathematics easily

OR Older students will enjoy the "Get A Grip" can grabber challenge where they will build and add a claw to their robot so that they can use programming and a light sensor to find the can and carry it back to base.



## Supplied Equipment

### My Software

LEGO MINDSTORMS NXTg / LEGO RoboLab 2.9.3 programming software

### My Hardware

- 15 Laptop Computers with all associated electrical leads and power-boards and electrical leads
- Data Projector
- 15 LEGO NXT basic robots with light, sound, ultrasonic, touch and angle sensors
- Treasure Island mat and objects
- Treasure Island work-sheets
- Tape measures

## Session Details

**Suitable for years 5 – 9**

**Session Length** - Best outcomes are obtained with a 2hr+ session due to the number of skills we are employing. **A half day per class provides optimum outcomes**

**Student Skills Required** –Computer experience and competence with a mouse. Previous robot programming experience would be beneficial but not mandatory.

Preparation – Ideally students should have completed the Robotics Background Activities supplied on my web site to place robots in context and for the best educational outcomes ( see following).

**Room required** – I bring in quite a lot of equipment so please make a fairly large room available with floor-space for the robots to dance, a GP, art room or hall is ideal . As I supply my own computers there's no need to tie up a computer lab for the sessions/s.

When I confirm your session booking I will provide additional information on the logistics of your day .

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<http://www.techellenttraining.com.au>    [sue\\_inness@bigpond.com](mailto:sue_inness@bigpond.com)

## **Additional Information – down-loads and web:**

Teachers can down-load the scope and expected outcomes from this session from this URL on my website

Find out additional information about the NXT robots I will be using here:

<http://www.techxellenttraining.com.au/about%20NXT.html>

Additional information on the LEGO programming software can be found here:

Information about the organisation on the day is available here:

<http://www.techxellenttraining.com.au/Incursion%20Logistics.pdf>

# **GETTING THE MOST OUT OF YOUR ROBOTICS INCURSION**

## **CLASS PREPARATION**

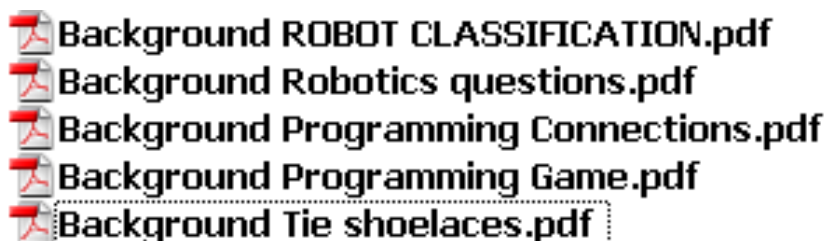
Your classes will gain the most from their robotics incursion if they have some prior knowledge about robots.

- My website will provide teachers with some basic activities that should place robots in the context of “thinking” machines that do work for us.
- Emphasise the fact that robots can only do what they are told to do if they have the required sensors (inputs) and motors /lights/ sounds etc. ( outputs)
- Robots can only process commands that are clear and sequential and provide the robot with all the information it needs to obey the command – what do you want it to do, using which outputs ( eg motors ) direction and speed and for how long.

Please go to :

<http://www.techxellenttraining.com.au/Resources.html>

Following links towards the bottom of this page will take you to .pdf documents with physical activities and discussion points on robots.



1 Initial class discussion, what is a robot, what do all robots have in common? – download the pdf document –

<http://www.techxellenttraining.com.au/Background%20ROBOT%20CLASSIFICATION.pdf>

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<http://www.techxellenttraining.com.au> sue\_inness@bigpond.com

2 Physical activity - makes programming outputs more understandable – download the .pdf document :

<http://www.techellenttraining.com.au/Background%20Programming%20Connections.pdf>

3 Simple programming game that helps train the discipline of programming- download the .pdf document:

<http://www.techellenttraining.com.au/Background%20Programming%20Game.pdf>

4 Can a robot tie it's shoe lace ? Activity

<http://www.thetech.org/robotics/activities/page05.html>

and the accompanying worksheet .pdf from my website.

[http://www.techellenttraining.com.au/Background\\_Tie%20shoelaces.pdf](http://www.techellenttraining.com.au/Background_Tie%20shoelaces.pdf)

*The Tech organisation has a fantastic website with plenty of other robotics activities that you may like to try.*

5 If you are still looking for more robotics activities and questions download this .pdf from my website:

<http://www.techellenttraining.com.au/Background%20Robotics%20questions.pdf>

***Please convey this information to all teachers of classes that are undertaking this incursion as some preparation will maximise your incursion outcomes***

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## **After the day**

### **Cut and Paste Programming Sheets**

Once your students have done the Robotics incursion you may like to try these cut and paste programming sheets to see how much basic programming they have taken on-board. The first template is the sheet they past their programming icons onto. Sheets 2 and 3 provide the icons to cut out as well as the configuration bars for each icon. You will only need one template for each student but you may need to print off 2 or 3 copies of sheets 2 and 3 per student

This is the master template that you paste your programming icons onto

<http://www.techellenttraining.com.au/NXT%20Programming%20template1.pdf>

This is a sheet of MOVE icons and their configuration bars

<http://www.techellenttraining.com.au/NXT%20 Programming%20icons2.pdf>

Here's a sheet with the wait for OBJECT ( sonar), play a sound and show a graphic icons and configuration bars

<http://www.techellenttraining.com.au/NXT%20 Programming%20icons3.pdf>

### **Debate / Discussion Topics**

- ☞ In the future robots will be doing all the jobs that humans now do.
- ☞ Eventually robots will be almost un-recognisable from human beings.
- ☞ Robots can do things better than humans.
- ☞ Robots could be dangerous to humans

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