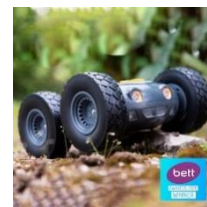# Rugged Robot Across the Curriculum

Get the most out of your Rugged Robot and use the robots across the curriculum. Our first programmable robot specifically designed for outdoors!

This collection of lessons will explore some ways that children can use and apply their learning with Rugged Robot into other areas of the curriculum. Rugged Robot is our first programmable robot designed for outdoor use and these lesson activities give you ideas for using the robot for outdoor learning.

Familiarise yourself with the controls on Rugged Robot and use the computer lessons to become confident with what the robot can do. Then enjoy using Rugged Robot across the curriculum. These lesson activities are only suggestions. You will discover many other ways to use Rugged Robot and if you would like to share them with us, we'd love to hear from you.

Rugged Robot is one of our intermediate robots and uses a 45 degree turn that will help to extend children's learning from Bee-Bot's 90 degree turn. This unit has been written with the skills of pupils **aged 5-11** in mind but can easily be adapted for younger or less experienced children or for those who are older or more experienced. Within the plans, there are also suggestions to make lesson activities 'more accessible' or to 'add a challenge' if you wish with your own class.

Resourcing

- It would be ideal to have at least one Rugged Robot for each group of children.
- Rugged Robot can also be controlled via a free tablet app or with the TTS Tactile reader. Use the app to see programmed sequences and to correct any errors (debugging).
- Rugged Robot also has a built-in camera mount holder and a storage area to hold his backpack data logger which is also available from TTS.
- You can purchase Rugged Robot mats including a Lunar mat, Construction site mat, Coral Reef mat and Treasure Island mat.

Rugged Robot: PE

Obstacle Trails- *Pupils will create obstacle courses and program Rugged Robot to move around them.*

Please note that there are many opportunities to use Rugged Robot in PE lessons from timed challenges to dance routines. Here is just one example.

Resources
- Rugged Robot (ideally one robot for every 3 to 4 pupils)
- Tablet(s) with Rugged Robot app installed
- Resources for obstacle course

Skills & Learning	
	• Construct assault courses by building ramps and obstacles. Get everyone to design an obstacle course for Rugged Robot and then vote on which design they like the best and create it.
	• Collaboratively plan how Rugged Robot should move around the obstacles course and take notes on the movements needed at specific parts on the course.
	• Set up own Olympic games for Rugged Robot. Time how long it takes for the robot to complete the challenges using a stopwatch or timer. Compare times and see if times can be beaten.
	• Explore directional language and angles during the course.

Make it accessible	Add a challenge
Provide layouts for the obstacle courses to support and give ideas.	Add small obstacles to course to increase difficulty and see how the students adapt their code.

Rugged Robot: Literacy

Story Telling- *Pupils will enjoy telling stories and taking Rugged Robot on their own adventures.*
Please note that there are many opportunities to use Rugged Robot in Literacy lessons from phonics work to instruction writing. Here is just one example.

Resources
- Rugged Robot (ideally one robot for every 3 to 4 pupils)
- Tablet(s) with Rugged Robot app installed
- Story to base Rugged Robots journey on

Skills & Learning	
	• Go on a Rugged Robot 'Bear Hunt' adventure, telling the story and moving Rugged Robot through different terrains and obstacles. For example, taking Rugged Robot through the long swishy grass, thick oozy mud! • Navigate through a story map and program Rugged Robot to move over, under and across a range of features. • Develop speaking and listening skills giving verbal and written instructions to a partner to program the robot e.g. Move forward under the bridge. Introduce imperative verbs. Instructions and directional language can be recorded using sound buttons. • Create own Rugged Robot adventures, taking the robot on a journey and writing about it. Identify and name things along the way and use adjectives for description. • Record stories by fixing a camera to Rugged Robot. You could also make your own films to record Rugged Robots adventures.

Make it accessible	Add a challenge
Use prompt cards to help to sequence the stories and support with using directional language to program the robot.	Get the pupils to create their own challenges throughout the story.

Rugged Robot: Geography and Science

Terrains-Pupils will explore friction and challenge Rugged Robot to venture over different terrains.

Please note that there are many opportunities to use Rugged Robot in Geography and Science lessons from creating a rock garden and exploring rocks and minerals to setting up a weather station to collect data. Here is just one example.

Resources
- Rugged Robot (ideally one robot for every 3 to 4 pupils)
- Tablet(s) with Rugged Robot app installed
- Different terrains (please note that Rugged Robot is weatherproof and works great in sand, dirt, paint and snow, but should not be submerged).

Skills & Learning	
	• With its oversized wheels Rugged Robot enjoys exploring different terrains. Challenge Rugged Robot to go through various environments. Set up tasks for the robot to complete like 'can he jump gaping canyons? Cross rapid rivers? Climb muddy mountains? 'Find out which terrains Rugged Robot finds the most challenging. • Use the torque (speed) settings to enable Rugged Robot to move over different terrains. The torque setting puts more power into the wheels, the higher the setting the more rugged the terrain. Setting 1 is for flat surfaces, setting 2 to move over grit or small stones and setting 3 for long grass or snow. Challenge the pupils to find the setting they need. • Investigate forces and how well and what speed Rugged Robot moves through different terrains. Plot findings in a graph and compare. • Use construction resources such as blocks, tunnels and tubes to create challenges for Rugged Robot. Navigate the robot using directional language. Use the built-in sensors to detect obstacles. Fit a camera to Rugged Robot to record the outdoor adventures and make observations.

Make it accessible	Add a challenge
Use the Tactile Reader which clearly lays out the code to support pupils.	During these adventures Rugged Robot might flip over. He will be able to keep going but students need to be aware that commands are in the opposite directions.

Rugged Robot: Maths

Shape Time- *Pupils will use Rugged Robot to create shapes and follow route, timing how long it takes to complete each one.*

Please note that there are many opportunities to use Rugged Robot in Maths lessons from exploring numbers and multiplication facts to calculating the area or perimeter of different places around school. Here is just one example.

Resources
- Rugged Robot (ideally one robot for every 3 to 4 pupils)
- Tablet(s) with Rugged Robot app installed
- Stop watches or timers

Skills & Learning	
	• Working collaboratively in groups of 3 or 4, ask the children if they can use the directional buttons on the robot to make the following shapes: A square, rectangle, triangle. In this activity, the above shapes could be drawn on the floor outside with chalk or marked with masking tape indoors so that Rugged Robot can follow them.
	• Learn and explore directional language – forwards, backwards, left, right and create shapes in the sand.
	• Trace perimeters of shapes and use this to work out shape area.
	• Rugged Robot has a 45 degree turn which can be used to teach angles. Discuss right-angles, acute and obtuse angles during the turns.
	• Use a stopwatch or timer to time how long Rugged Robot takes to follow the lines of different shapes.

Make it accessible	Add a challenge
Use directional language flashcards to support and pre-coded shape cards so pupils can change number of steps to draw out different size shapes.	Create debugging challenges for children to work through and encourage them to create their own programs with errors in for a partner or another group to identify and correct.

Rugged Robot: History

Treasure Find-Pupils will use Rugged Robot to support learning about the past program the robot on own archaeology digs.

Please note that there are many opportunities to use Rugged Robot in history lessons like an Apollo 11 mission lesson. Here is just one example.

Resources
- − Rugged Robot (ideally one robot for every 3 to 4 pupils)
- − Tablet(s) with Rugged Robot app installed
- − Artefacts that could be hidden in sand

Skills & Learning	
	• Get Rugged Robot to be an archaeologist and fix a camera to the robot and send him off on a mission to find evidence about the past. Give pupils a list of things they need to find as they program Rugged Robot to move around the site. Hide things in mud, long grass, in sand for them to find on their journeys. Collect the artefacts found and bring them back to the classroom to encourage further research. • Program Rugged Robot to find each artefact, add information from it to a fact file and measure the distance between each artefact and record the robot's journey. • Take Rugged Robot on a journey along a giant timeline and gather information about historical events, figures and civilisations and share facts. • Design outfits for Rugged Robot and turn him into a Roman chariot or Viking longship.

Make it accessible	Add a challenge
Use a Control Crib Sheet to support and help to identify the different features of Rugged Robot. Use the Tactile reader to support.	Create own fact files and research further.

Rugged Robot: Forest School

Scavenger Hunt-Pupils will plan a route for Rugged Robot around the outdoor space to explore nature and learn about the world around us.

Please note that there are many opportunities to use Rugged Robot in Forest school sessions. Here is just one example.

Resources
- Rugged Robot (ideally one robot for every 3 to 4 pupils)
- Tablet(s) with Rugged Robot app installed
- Camera (optional) to record rugged Robots adventures

Skills & Learning	
	• Plan a route for Rugged Robot around the outdoor space or woodland to explore nature and identify and name trees and flowers along the way. • Keep a note of what seen along the journey or tick off on a nature checklist. Use Rugged Robot's built-in storage area to collect small items or fit a camera to the robot to record observations. • Use Rugged Robot's built-in sensors to detect and avoid any obstacles. • Collect natural items such as leaves, stones, twigs along Rugged Robots journey and use these for discussions and for creative projects. • Create scavenger hunts for pupils to enjoy using Rugged Robots. Which robot can be the first to find something that is red? Begins with the letter c. Has 6 legs?

Make it accessible	Add a challenge
Use the Tactile reader to make it easier for pupils to program Rugged Robot.	Encourage pupils to create their own scavenger hunts or treasure hunts for them to share with other groups.

Rugged Robot: Art & Design

Paint it! – Taking advantage of Rugged Robots ability to go over different surfaces, pupils will program Rugged Robot to move through paint and create beautiful Rugged Robot art pieces.

Please note that there are many opportunities to use Rugged Robot in Art and Design Technology lessons like exploring Rugged Robot mats and designing own mats. Here is just one example.

Resources

- Rugged Robot (ideally one robot for every 3 to 4 pupils)
- Tablet(s) with Rugged Robot app installed
- Paints and large sheets of to create art pieces

Skills & Learning	• Rugged Robot is able to move over different surfaces and can move through paint. Set up a large canvas or paper outdoors and get pupils to program Rugged Robot to move in specific patterns through paints to create their own unique Rugged paintings. Experiment with different colours and shapes. • Find ways to attach a paintbrush, sponge or texture cloth to the robot to create different effects. • Trace the formation of letters or shapes and run Rugged Robot's wheels through different colour paints to create patterns. • Work in teams on a class mural. Give each group a section of the mural to paint and then combine the sections at the end to create a collaborative masterpiece. • Attach leaves or flowers or the like to the base of Rugged Robot, dip them in paint and let Rugged Robot create prints on paper.

Make it accessible	Add a challenge
Use the Tactile reader to visualise the code.	Challenge the pupils to create symmetrical patterns.

Rugged Robot: Music and PE

Let's Dance-Pupils will use coding to create dance routines and get Rugged Robot to move and groove to different styles of music.

Please note that there are many opportunities to use Rugged Robot in cross curriculum lessons. Here is just one example.

Resources
- – Rugged Robot (ideally one robot for every 3 to 4 pupils)
- – Tablet(s) with Rugged Robot app installed
- – Music to dance to

Skills & Learning	- Rugged Robot has an impressive memory of up to 256 steps and is perfect for coding to create dance routines that can be shared for other groups to follow and learn the dances. - You could begin by watching video tutorials and learning well-known dance routines. Encourage the pupils to break down the dances into stages and to plan the dance routines using algorithms. - Allow the children time to experiment programming Rugged Robot to create the dances and to adapt the dances and change any errors. - Perform the dances using a range of movement patterns and have your own Strictly Rugged Dancing Show! - Groups can give other groups the instructions to program the robot to perform their dance. Use more than one robot and create group synchronised dances.

Make it accessible	Add a challenge
Pupils could work in mixed ability groups to support one another. Start with simple moves.	Set specific requirements such as creating a dance to fit a piece of music.

Rugged Robot: Geography

Compass Points- *Pupils will use Rugged Robots 45 degree turning to explore the points of a compass.*

Please note that there are many opportunities to use Rugged Robot in geography lessons for outdoor fieldwork, using coordinates on a map and creating treasure maps. Here is just one example.

Resources
- Rugged Robot (ideally one robot for every 3 to 4 pupils)
- Tablet(s) with Rugged Robot app installed
- Teaching compass to show directions

Skills & Learning	
	• Rugged Robot is capable of 45 degree turns and is ideal for turning and exploring the 8 points of a compass. Identify any errors pupils might make for instance getting east and west mixed up. • Explore different Rugged Robot mats and program the robot to travel around and explore them. Use a teaching compass to learn about the 8 points of a compass and talk about what Rugged Robot will find if he travels in different directions. • Create outdoor maps using natural materials and move around the map trying to avoid any obstacles that may be on the way. • Create own maps and program Rugged Robot to find features on the map. How can you get Rugged Robot to the …? • Turn Rugged Robot into different vehicles, for example a farmer's plough or combine harvester as part of a farming topic.

Make it accessible	Add a challenge
Use directional flashcards as a support and the Tactile reader to help children to visualise the coding.	Create maps with coordinates and program Rugged Robot to move to different places on the map recording the coordinates.

Rugged Robot: Science

Data Logging- *Pupils will be able to put on the Rugged Robot Data Logger Backpack to gather and create data, measuring and comparing light, sound, and temperature levels.*
Please note that there are many opportunities to use Rugged Robot in Science lessons from exploring habitats to investigating materials. Here is just one example.

Resources
- Rugged Robot (ideally one robot for every 3 to 4 pupils)
- Tablet(s) with Rugged Robot app installed
- Rugged Robot Data Logger Backpack

Skills & Learning	- Attach the data logging backpack to Rugged Robot and collect data on light, sound and temperature at various points in your outdoor environment. Use Excel to see the data collected and to analyse patterns. - Set up a journey for Rugged Robot to go on to collect the data and repeat the journey at different times in the day and compare the data collected. - Program Rugged Robot to move around different areas indoors and outdoors and observe how light changes in different locations. Where is the brightest or darkest place at school? - Program Rugged Robot to move around and explore sound levels. Compare different areas. Which is the quietest or noisiest place at school? How do the areas compare at different times of the day? - Program Rugged Robot to move through different temperature zones e.g. near a window, under a tree, in direct sunlight. Record the data from each location. Create a temperature map of the school to show variations. - Discuss data collected and compare findings.

Make it accessible	Add a challenge
Use a child friendly Control Crib Sheet for Rugged Robot and the Data Logger to show clearly what the functions do.	Encourage pupils to create their own problems to solve using the data logger backpack.