

Loti-Bot Coding Lessons

Loti-Bot is a member of the TTS bot family, featuring programmable movement, highly accurate drawing capabilities and a variety of inputs and outputs.



This unit of lessons will cover using Loti-bot and the accompanying block-based coding app to give students a good overview of the programming possibilities for floor robots.

This unit has been written with students from lower key stage 2 (age 8-10) in mind but can easily be adapted for older/more experience and younger/less experienced students as follows:

- For younger students you may want to write the code as a whole class so that students can all take part but are guided more by the teacher. You may decide also, as you go through the unit, on whether to complete Lessons 5 and 6 or to stop after Lesson 4, depending on how much they have been able to do so far.

- For older students you may want to add in the variables elements for Loti-Bot which include being able to give the robot instructions to follow if their battery drops below a certain point, or to use the light level sensor as a trigger to do certain actions. You could also explore adding random number generation so that the robot follows instructions based on a more random choice. These can all be explored via the app as older students, particularly those who have already done some coding, are sure to find these options and tinker with them.

For all students it is good to allow a bit of tinker time. This can mean they discover some of the coding blocks which will not be introduced formally until the later lessons. But it is fine for them to start experimenting whenever they find them. They can then apply this experience when it comes to lessons where these are specifically asked for.

Loti-Bot Coding Lessons

From the English National Curriculum this unit covers (wholly or partially) the following objectives:

- design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts
- use sequence, selection, and repetition in programs; work with variables and various forms of input and output
- use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs
- use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact.

Resources:

- In an ideal world you will have enough Loti-Bots available to use one for each group. But if not, groups can also view their output via the app so can practise with that even without having their own Loti-Bot to use.

For the purpose of modelling the coding in these lessons and showing students what the app can do, it is best if you can mirror your iPad/tablet to the Interactive Whiteboard either directly or via a web extension on your laptop. If not, then you can show the tablet under a visualiser or simply go round the groups to show them.

Loti-Bot Lesson 1

Introduction to Floor Robot and Basic Navigation



Objective

By the end of this lesson, students will be able to understand the basic principles of writing algorithms, use block-based coding, and directional vocabulary to move a Loti-Bot forwards, backwards, and turn by degrees to navigate a path to a destination.

Materials

1. Loti-bot(s)
2. Tablet(s) with Loti-Bot app installed
3. A large and clear space to move the Loti-Bot
4. Floor markers or tape to create a simple path

INTRODUCTION

Welcome to the exciting world of coding and robotics! Today, we will learn how to program a Loti-Bot to follow specific instructions and navigate its way to a destination. We will use block-based coding, which uses visual blocks to create programs, making it easy for us to control the robot's movements. Our robot is capable of moving forwards, backwards, and turning in different directions.

ACTIVITIES

1. Understanding Algorithms:

- Start by explaining the concept of algorithms in a simple manner. An algorithm is a set of step-by-step instructions given to the robot to perform a specific task or reach a goal.
- Show some real-life examples of algorithms, like a recipe for baking cookies or the steps to tie shoelaces. Explain that just like these examples, we can give instructions to our robot to make it move.

2. Introducing Block-Based Coding:

- Explain that block-based coding is a way of programming by stacking visual blocks together. Each block represents a specific command or action that the robot will perform.
- Show the students the programming app on the tablet and the available coding blocks. We will not cover all of them in lesson 1 but they will have a chance to use most of them by the end of this unit of lessons.

LESSON 1 Continued

3. Directional Vocabulary (with Maths Links):

- Introduce directional vocabulary such as "forward," "backward," "left," and "right." Explain how these directions relate to the robot's movements. Discuss the concept of 'degrees' for angles and relate this to their maths knowledge. How many degrees for a right angle turn?
- Relate this vocabulary to basic mathematical concepts. For instance, moving "forward" can be represented as a positive change in position, while moving "backward" can be represented as a negative change in position.

4. Robot Movement Practice:

- Create a simple path on the floor using markers or tape, consisting of straight lines and a few turns. Ensure that the path is clear and easy to follow.
- In pairs or small groups, let the students take turns to program the robot to move along the path to reach the destination.
- Encourage students to use the directional vocabulary and appropriate coding blocks to complete the task.

5. Challenge Activity:

- Once the students are comfortable with basic movements, introduce a more complex path or maze for the robot to navigate. Or give them big sheets of paper and ask them to draw their own maze.
- Ask them to plan and write down the algorithm on paper, in note form, before programming the robot. This practice will reinforce the concept of planning before executing the code.

6. Review and Conclusion:

- Gather the students and discuss their experiences with the Loti-Bot.
- Review the directional vocabulary and block-based coding concepts.
- Emphasise the importance of algorithms in coding and problem-solving.

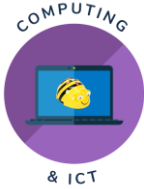
Homework (optional):

Ask the students to create a simple map of their house or classroom and write an algorithm using directional vocabulary to guide the Loti-Bot through the map to a specific location.

In the next lesson, we will continue to build on their coding skills and introduce more complex challenges for the Loti-Bot. Happy coding!

Loti-Bot Lesson 2

Navigating a Model Town with WAIT Instruction



Objective

In this lesson, students will recap what they learned in Lesson 1 about algorithms, block-based coding, and directional vocabulary. They will then progress to navigate a more complex path representing a model town with markers indicating specific locations (e.g., post office and bakery). The focus of this lesson is to introduce the WAIT instruction, where the robot will stop and wait at certain destinations before continuing its journey.

Materials

1. Loti-bot(s)
2. Tablet(s) with Loti-Bot app installed
3. Large space with markers or tape laid out to create a model town path
4. Markers representing specific locations in the town (e.g., post office and bakery)

RECAP

Begin by briefly reviewing the key concepts from Lesson 1:

What is an algorithm? (A set of step-by-step instructions)

What is block-based coding? (Using visual blocks to create programs)

What is directional vocabulary? (Words like "forward," "backward," "left," and "right" used to direct the robot's movements)

1. Introducing the Model Town:

- Set up a model town path in the classroom or a large space using markers to represent streets, buildings, and specific locations (e.g., post office and bakery).
- Explain to the students that the robot's task is to navigate through the town and make stops at the designated locations.

2. Introducing the WAIT Instruction:

- Explain the concept of the WAIT instruction, which allows the robot to pause and wait for a certain amount of time before continuing with the next instructions.
- Discuss scenarios where waiting might be necessary, such as when the robot arrives at a traffic light, a pedestrian crossing, or a busy intersection.

3. Programming the Robot with WAIT Instructions:

- Divide the students into pairs or small groups.
- Provide each group with a map of the model town and a set of instructions (algorithm) to program the robot's journey, including the WAIT instructions at specific locations.
- Encourage the students to collaborate and plan the robot's path using directional vocabulary and the new WAIT instruction.

LESSON 2 Continued

4. Implementing the Program:

- Allow each group to take turns programming the robot and testing their algorithm on the model town path.
- Observe and assist as needed to ensure the robot follows the instructions accurately.

5. Troubleshooting and Iteration:

- Encourage students to discuss and troubleshoot any issues they encounter while testing the robot's path. (Debugging)
- Prompt them to make improvements and adjustments to their algorithms if necessary.

6. Extension Activity (Optional):

- For students who grasp the concepts quickly, challenge them to add more destinations and instructions to their algorithms, incorporating multiple WAIT instructions in different scenarios.

7. Review and Conclusion:

- Gather the students and have a group discussion about their experiences navigating the model town.
- Ask questions to reinforce their understanding of algorithms, directional vocabulary, and the new WAIT instruction.
- Highlight the importance of waiting in real-life scenarios and how it can make the robot's path more efficient and safer.

Homework (optional):

Ask the students to create a new model town map with different locations and plan an algorithm using block-based coding, including the WAIT instruction for specific stops.

In the next lesson, we will introduce new challenges and features to further enhance their coding skills and robot navigation. Happy coding!

Loti-Bot Lesson 3

Adding a Pen to the Robot for Drawing Shapes



Objective

In this lesson, students will explore the new capability of the Loti-Bot: drawing shapes using a pen attachment. They will learn how to use the prebuilt block for drawing a square and understand the algorithm behind it. The students will then be challenged to create different shapes and explore the concept of tessellation using the robot's drawing capabilities.

Materials

1. Loti-bot(s)
2. Tablet(s) with Loti-Bot app installed
3. Large pieces of paper or individual tables (if using erasable markers)
4. Markers or pens for the robot's drawing

INTRODUCTION

Recap the previous lessons briefly, reminding the students of the concepts of algorithms, block-based coding, directional vocabulary, and the WAIT instruction. Introduce the new capability of the Loti-Bot: drawing shapes using a pen attachment.

ACTIVITIES

1. Exploring the Square Drawing Block:

- Show the students the prebuilt block for drawing a square in the programming app. Discuss the algorithm behind the square: moving forward, turning 90 degrees, and repeating this process four times.

2. Drawing a Square:

- Demonstrate how to use the square drawing block to make the robot draw a square on a large piece of paper or the table. (NB Loti-Bot has a handy sensor to stop it falling off tables!)
- Let the students take turns to program the robot to draw squares and observe the shapes they create.

LESSON 3 Continued

3. Understanding the Algorithm:

- Engage the students in a discussion about the algorithm for drawing a square. Encourage them to think step-by-step, considering the direction and number of movements required.

4. Challenge: Drawing Different Shapes:

- Present the students with new challenges to draw different shapes, such as triangles, rectangles, pentagons, or hexagons.
- Ask the students to plan and write down the algorithms on paper before programming the robot.

5. Introduction to Tessellation:

- Explain the concept of tessellation, which is the repeated use of a shape to cover a surface without any gaps or overlaps.
- Show examples of tessellating patterns found in art and architecture.

6. Challenge: Tessellating Shapes:

- Challenge the students to create tessellating patterns using the Loti-Bot's drawing capabilities.
- They can experiment with different shapes and orientations to achieve tessellation.

7. Showcasing and Sharing:

- Allow the students to showcase their drawn shapes and tessellating patterns to the class.
- Encourage them to explain their algorithms and how they approached the challenges.

8. Extension Activity (Optional):

- For advanced students or those who finish early, challenge them to create more intricate shapes and complex tessellating patterns.

9. Review and Conclusion:

- Recap the key concepts covered in the lesson: using the pen attachment to draw shapes, understanding algorithms for different shapes, and exploring tessellation.
- Discuss the importance of creativity and problem-solving in coding and robotics.

Homework (optional):

Ask the students to create a design on paper using the concept of tessellation. They can draw their tessellating shapes and colour them using markers or pencils.

In the next lesson, we will introduce the concept of loops in block-based coding to add more functionality and complexity to the robot's movements. Keep up the great work, and continue to have fun with coding and robotics!

Loti-Bot Lesson 4

Creative Robot Dance Choreography



Objective

In this lesson, students will recap the concepts of using the WAIT instruction, directional instructions, and pen drawing from previous lessons. They will then explore loops and more creative movement possibilities for the Loti-Bot, culminating in a fun activity where each group will choreograph a dance routine for their robot. They will have time to continue this choreography in Lesson 5 too so do not worry if they do not feel they have finished their dance in this lesson.

Materials

1. Loti-bot(s)
2. Tablet(s) with Loti-Bot app installed
3. A large and clear space to move the Loti-Bot

INTRODUCTION

- Recap the key concepts from the previous lessons, including the WAIT instruction, directional vocabulary, and pen drawing.
- Emphasise that coding and robotics can be creative and fun, and in this lesson, they will explore more imaginative ways to program the robot's movements.

ACTIVITIES

1. Review of WAIT Instruction and Directional Vocabulary:

- Briefly review the WAIT instruction and directional vocabulary (e.g., forward, backward, left, right).
- Ask students to share examples of real-life situations where waiting is important.

2. Exploring Creative Movements:

- Encourage the students to experiment with the Loti-Bot's movements beyond simple shapes and paths.
- Show them how to combine different movements, turns, and waits to create more complex sequences.

3. Understanding Loops:

- Introduce the concept of loops as a way to repeat a sequence of instructions multiple times.
- Show examples of how loops can be represented as blocks in the programming app.

LESSON 4 Continued

4. Using Loops in Robot Dance:

- Explain to the students that they can use loops to repeat specific dance movements, creating patterns and rhythms in their routines.
- Demonstrate how to use a loop to repeat a set of dance movements and encourage the students to try it out with their robot.

5. Creating Robot Dance Ideas:

- Divide the students into groups and challenge them to think of ideas for a robot dance routine.
- Prompt them to think creatively about movements, patterns, and pauses in their dance.

6. Choreographing the Robot Dance:

- Provide time for each group to program and choreograph their robot's dance routine using the programming app.
- Remind them to incorporate a variety of movements and to make use of the pen attachment for drawing if they wish.

7. Robot Dance Showcase:

- Let each group showcase their robot dance routine to the class.
- Encourage the students to explain the different movements they programmed and the inspiration behind their dance.

8. Group Feedback and Reflection:

- After each performance, encourage the other students to provide positive feedback and ask questions about the choreography.
- Facilitate a brief reflection session where each group discusses their creative process and what they learned.

9. Dance Collaboration (Optional):

- As an optional activity, allow the groups to collaborate and combine their robot dance routines into a larger performance.
- This can be a fun way to promote teamwork and creativity among the students.

10. Review and Conclusion:

- Recap the key points from the lesson, emphasizing the creative possibilities of coding and robotics.
- Celebrate the students' creativity and efforts in choreographing their robot dances.

Homework (optional):

Ask the students to reflect on their experience of choreographing the robot dance and write a short paragraph describing the challenges they faced, the most enjoyable part, and what they would like to improve.

In the next lesson, we will introduce the concept of messages in block-based coding, which will allow the students to add even more dynamic and complex outputs to their robot's dance routines. Keep up the fantastic work, and let's continue dancing with code!

Loti-Bot Lesson 5

Introducing Messages for Dynamic Robot Dance



Objective

In this lesson, students will be introduced to the concept of messages in block-based coding. They will explore using messages in their code to change the colours of the robot's side lights dynamically during the dance performance.

Materials

1. Loti-bot(s)
2. Tablet(s) with Loti-Bot app installed
3. A large and clear space to move the Loti-Bot

INTRODUCTION

- Begin by recapping the creative robot dance choreography from the previous lesson.
- Explain to the students that in this lesson, they will learn how to make their dance routines more dynamic by using loops and adding messages to control the robot's side lights.

ACTIVITIES

1. Introducing Messages:

- Explain the concept of messages as a way to send commands or signals to the robot during the dance routine.
- Show examples of how messages can be used to control the robot's side lights and change their colours.

2. Dynamic Robot Dance with Lights:

- Instruct the students to add messages to their dance routines to control the robot's side lights.
- Encourage them to experiment with different colours and timing to match the dance movements.

LESSON 5 Continued

3. Group Practice and Improvement:

- Allow the students to practise and fine-tune their dance routines, incorporating loops and messages as needed.
- Offer support and guidance to help them overcome any challenges.

4. Robot Dance Performance:

- Each group will perform their dynamic robot dance routines with changing side lights for the class.
- Remind them to showcase their creativity and use of loops and messages in the performance.

5. Peer Feedback and Reflection:

- After each performance, have the other students provide positive feedback and ask questions about the loops and messages used.
- Facilitate a short reflection session where each group shares their experiences and what they learned from using loops and messages.

6. Extension Activity (Optional):

- For advanced students or those who finish early, challenge them to add more complex loops or use conditional statements in their dance routines.

7. Review and Conclusion:

- Recap the key concepts of loops and messages and how they were applied to the robot dance routines.
- Celebrate the students' achievements in creating dynamic and colourful robot dance performances.

Homework (optional):

Ask the students to write a brief reflection on how using loops and messages enhanced their robot dance routines. Have them describe any challenges they encountered and how they overcame them. **In the next lesson, we will explore further possibilities for the Loti-Bot and an open creative task. Keep up the fantastic work and let the robot dance to the beat of your code!**

Loti-Bot Lesson 6

Recap and Real-World Applications of Floor Robot



Objective

In this final lesson, students will recap all the concepts and skills they have learned throughout the series of lessons. They will have the opportunity to share any new blocks they have discovered and tinkered with. The class will then explore real-world applications of programmable robots, such as delivery robots in cities. Lastly, students will engage in a creative project of their own choosing, showcasing various functions of the Loti-Bot within a real-world idea.

Materials

1. Loti-bot(s)
2. Tablet(s) with Loti-Bot app installed
3. A large and clear space to move the Loti-Bot
4. Art materials for the creative project

INTRODUCTION

Begin by recapping all the key concepts, skills, and activities from the previous lessons. Ask the students if they have discovered any new coding blocks or experimented with additional functionalities.

ACTIVITIES

1. Sharing New Discoveries:

- Allow the students to share any new coding blocks they have found or creative ways they have tinkered with the robot's capabilities.
- Encourage them to explain how these new additions enhanced their robot's movements or functions.

2. Real-World Applications:

- Facilitate a discussion about real-world applications of programmable robots, especially those with similar functionalities to the Loti-Bot they have been using.
- Discuss examples like delivery robots in cities, warehouse robots, or robots used in exploration and research.

3. Creative Project Planning:

- Explain the creative project assignment to the students. They are required to come up with their own real-world idea for using the Loti-Bot's capabilities.
- They should plan and design a creative project that showcases as many functions as possible within this real-world idea.

LESSON 6 Continued

4. Project Execution:

- Give the students ample time to work on their creative projects. They can use art supplies and materials to bring their ideas to life.
- Encourage them to incorporate the robot's movements, pen drawing, and side lights into their projects.

5. Project Presentation:

- Each student will present their creative project to the class. They should explain their real-world idea and demonstrate the robot's functions in action.
- Allow time for questions and feedback from their peers.

6. Group Discussion:

- Facilitate a group discussion after the presentations, allowing students to share their thoughts on each other's projects and provide positive feedback.

7. Recap and Reflection:

- Recap all the key concepts and skills learned throughout the series of lessons.
- Have the students reflect on their journey, what they enjoyed the most, and what they have learned about coding and robotics.

8. Appreciation and Celebration:

- Express appreciation for the students' hard work, creativity, and enthusiasm throughout the series of lessons.
- Celebrate their achievements and growth in coding and robotics.

Homework (Optional):

Encourage the students to continue exploring and tinkering with coding and robotics on their own. They can create new projects and share their discoveries with the class or their families.

Congratulations on completing the series of lessons! The students have embarked on an exciting journey into the world of coding and robotics, and they are now equipped with valuable skills and creativity. Encourage them to continue using these skills to innovate and solve real-world challenges. Happy coding!