Next level of coding

Don't know where to start? Start here! The Teacher Guide for Matatastudio's Sensor Add-on has sixteen engaging lessons for you to do with your students. Written by expert K-8 robotics educators, these lessons are sure to engage and inspire the next level of coding!

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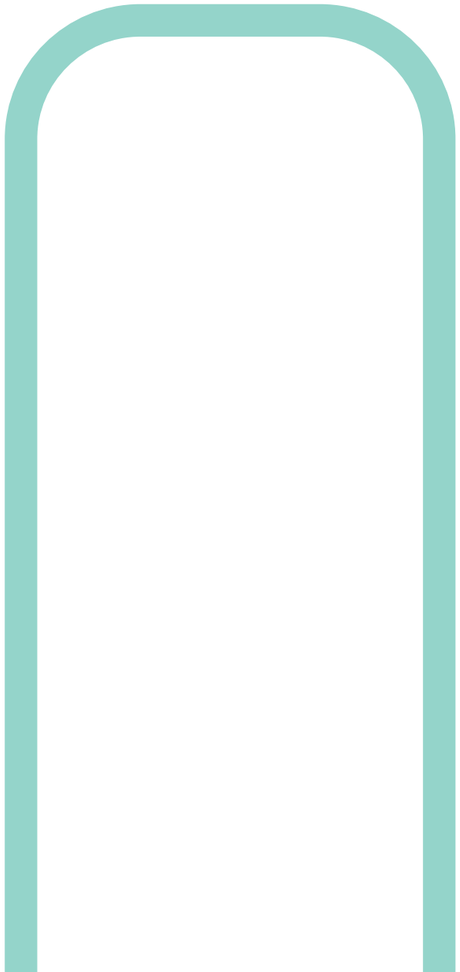
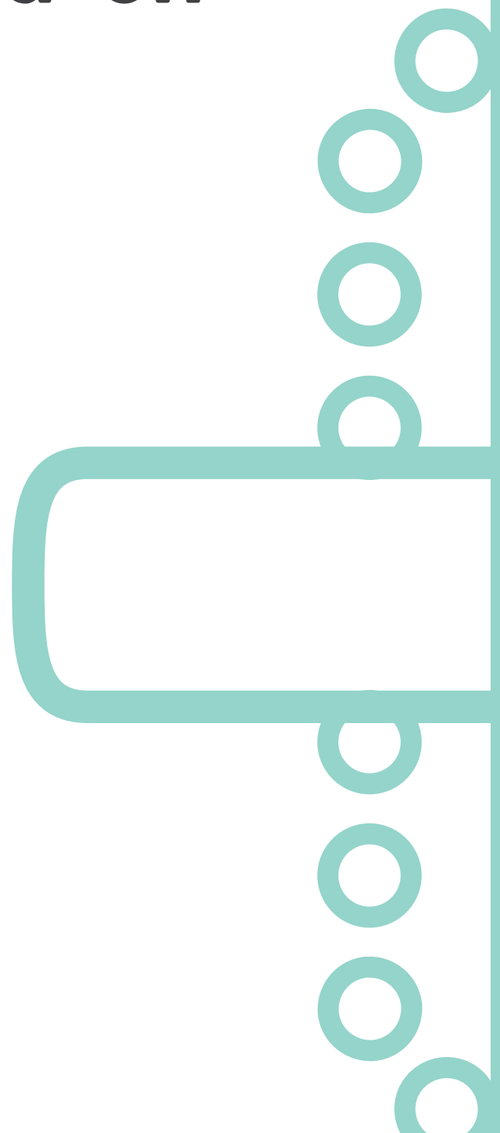
Sensor Add-on

Teacher Guide





lessons

Sensor Add-on

Teacher Guide

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How to Use This Book

Welcome! We've worked incredibly hard to make this book not only fun to read but easy to follow and understand. If you've written or delivered a lesson plan before, none of the sections of this guide should be unfamiliar to you. Each lesson has four sections: Introduction, Guided Practice, Independent Practice, and Wrap Up. By working this way, students are engaged right at the start with a fun conversation to prepare them for what is to come. Guided Practice gives you the opportunity to demonstrate a skill or technique you will be using in this lesson. Independent Practice is when we expect your students to take what they have observed and discussed and do it on their own. Finally, in Wrap Up, we summarize the learning experience, talk about successes and challenges, and what might be next in the learning process. We've taken the time to provide some ideas on how you can both modify and extend the learning. We've also added a rubric you can use for assessment. In the back of the book, we've aligned each lesson to Common Core, ISTE, CSTA and all the Canadian Provincial Learning Objectives that apply. We've also provided for you some great videos and resources you can use along the way. We hope you love these lessons as much as we do, and we can't wait to see all the great work you do!

Lets Go!

Lesson 01

Ready, Set, Go!

Grades K - 3 *60 mins*

MatataBot is great at waiting for directions! Using the tiles that detect colours of red, green or yellow objects, create a code using the **Wait Until** block that allows MatataBot to wait for a traffic light signal colour. If it detects green, it should move forward a long distance, alternately, MatataBot should move forward a shorter distance when it detects yellow. Finally, if MatataBot detects a red object, it should stop and not move at all! Help MatataBot wait and follow the directions accurately!

Learning standards found on Pg. 133

Ready, Set, Go!

Lesson 01

Grades K - 3

60 mins

In Ready, Set, Go!, students will be able to allow the MatataBot to wait until certain colours are detected before moving using the sensor controller attached to the top of MatataBot. By "sensing" a particular colour, MatataBot will be able to successfully navigate through the Nature Map set up to their liking using colour cards and/or obstacles.

Big ideas & essential questions

As a result of going through this lesson, you will understand how to transform the controller into a sensor by waiting to sense certain colours in front of MatataBot. You will also understand how MatataBot will move in certain ways due to the certain colours sensed and learn how MatataBot will find its way around a map.

The ideas that will last with you beyond the classroom is how well you have transformed the sensor controller into a colour sensor allowing MatataBot to wait as it senses colours in front of it. In addition, you will have a lasting impression of how well you have coded MatataBot to find its way around the Nature Map through the opportunity of working in a team.

Learning outcomes

TSWBAT : the students will be able to:

1) Use the **Wait Until** coding block correctly to transform the sensor controller into a colour sensor using the **Green**, **Yellow** or **Red** coding blocks placed under it.

2) Use their own creativity to set up the Nature Map using colour cards from the Pro Set that MatataBot could sense and navigate around, moving in different ways when sensing different colours.

3) Use critical thinking and coding skills to determine the most strategic way to navigate MatataBot around the Nature Map.

What you'll do

Using the **Green**, **Yellow** and **Red** coding tiles and colour cards, set up the Nature Map for MatataBot to navigate through. Add a start and end flag to your path and use **Wait Until** block as well as the sensor controller to help MatataBot navigate through the map successfully by waiting until it detects certain colours in front of it.

What you'll need

- Class set of Matatastudio Pro Set
- Class set of Sensor add-on set
- Projector/Display Screen
- Nature Map
- Coloured cards or objects (specifically green, yellow and green)
- Animation Add-on set (optional for extension activities)

Prior to lesson

- Update Command Tower, MatataBot and Controller sets with latest software
- Download example programs and prepare to show to class

Introduction

5 mins

1) Welcome students to the course and introduce the rules of the class: Mutual Respect, Safety and Have Fun.

2) Ask, "What are the 3 colours of a traffic light?" "What do the 3 colours of the traffic light mean for drivers?" Say, "MatataBot loves driving around the city! Today, you will code your MatataBot to navigate around the Nature Map and use its colour sensors to find its way around. Have fun!"

3) Introduce how to use the **Wait Until** coding block in order for MatataBot to "sense" various colours in front of it by having the sensor controller placed on top of the MatataBot.

   a) First, connect the Controller to MatataBot by switching to the "Sensor Mode" on the Controller, turning on Both controller and MatataBot and wait to establish a connection (Both blue lights on controller and MatataBot will flash, then stop flashing and remain on when connection is established). In order to establish this connection, press the power button 3 times on the controller, finally hearing a connection sound.

b) Next, connect the Command Tower the same way by turning it on using the power button, attaching it to the Control Board, then pressing the power button 3 times to connect Both MatataBot and Controller to the Command Tower.

4) Next, allow students to place some movement coding blocks (**Move Forward**, **Move Backward**, **Left Turn 90°**, **Right Turn 90°**) followed by the **Wait Until** coding block on the Control Board with a **Green**, **Yellow** or **Red** coding block placed under it. Students may also choose to use the smaller **Number** blocks to place under the movement coding blocks in order to determine the number of times MatataBot will move.

5) Once students have a rough idea of where MatataBot is moving on the Nature Map, ask them to place green, yellow or red objects (or colour cards if accessible) around the Map. They should then test out their code to see if their MatataBot is sensing colours and moving around accurately.

Guided practice

5 mins

1) Together with you, create a sample program with the students using the **Wait Until** coding block and discuss how this could be used with the sensor controller placed on top of MatataBot to sense coloured objects placed on the Nature Map. Encourage the use of various movement blocks before and after the **Green**, **Yellow** and **Red** coding blocks are placed to allow MatataBot to move around the map, detecting different coloured objects or cards.

2) Ask students to place 2 flags on the Nature Map. One flag somewhere at the beginning of the map and another flag somewhere near the end.

3) Then, together with you, ask students to creatively design a path on the Nature Map where they will place their coloured cards or objects for MatataBot to sense and navigate around. Discuss what makes a good path (e.g. has a beginning and an end).

Independent practice

45 mins

1) Before students can start coding, encourage them to come up with a rough sketch of how their path will look on a blank sheet of paper or chart paper.

2) Once the rough sketch has been created, students can start placing their coloured objects on the Nature Map and start coding to use their controller sensor (placed on top of MatataBot) as a means of sensing and maneuvering along their path.

3) Once complete, students may choose to complete some extension activities from the Extensions section.

Wrap up

5 mins

1) Have students pack up their Pro and Sensor add-on sets and clean up the area they were working in.

2) Ask the following questions:

a) "What was the most exciting part of today's coding lesson?" (Field student responses and answer any questions about the controller or MatataBot's movements).

b) "What was the most challenging part of today's coding lesson?" (Field student responses and answer any questions about the controller or MatataBot's movements).

c) "How did you transform the sensor controller into a robot that senses colours?

d) "How did you code for it on the Control Board and use the Command Tower?"

e) "How did you move MatataBot around the map?"

f) "Was your group able to get to the end of the path successfully?"

Interdisciplinary & 21st century connections

This lesson can be used in Mathematics to help teach topics within Geometry and Spatial sense (describing location using positional language) as well as Science and Technology. This lesson could also be co-taught with another content area teacher.

21st Century Skills include:

- Critical thinking
- Creativity
- Collaboration
- Communication
- Flexibility
- Leadership
- Initiative
- Productivity
- Social Skills
- Technology Literacy

Modifications

As students are challenged to code for the sensing of coloured cards or objects in a path, consider stopping after 10 minutes and use a successful group's code to demonstrate/model the critical thinking involved in determining the code.

Accommodations

- If students have a difficult time drawing their concept for their path, in 1-2 classes prior to this lesson, come up with this rough sketch in advance on chart paper.
- Pair students to optimize co-teaching of prior knowledge.
- Pair students in groups of 3 to encourage positive social interactions.

Extension activities:

- Students may choose to change Both eyes on the MatataBot to match the colour of the object sensed (use Animation Add-on).
- Additionally, students may choose to create a celebration dance or play music through MatataBot when it reaches the end of the path.

Supporting files & links

An example sketch of a path showing the use of coloured cards/objects on the Nature Map with a flag at the beginning and end of the path.

How to Connect Sensor Controller to MatataBot [0:00 - 3:34]:
Youtube- *http://bit.ly/connect-sensor-1*

How to Connect Sensor Controller to MatataBot and Tower (along with blocks descriptions):
Youtube- *http://bit.ly/connect-sensor-2*

Firmware Upgrade:
Matatastudio- *http://bit.ly/upgrade-firmware*

Assessment

Student work will be assessed in the following manner:

- Students, in their groups, were able to successfully come up with a rough sketch for their path using various coloured cards/objects in their sketch.
- Students have correctly transformed the controller into an obstacle sensor using the **Wait Until** button as well as the **Green**, **Yellow** and **Red** blocks placed under it.
- Students were able to successfully code and exit their created path on the Nature Map by navigating their MatataBot through it.
- Students were able to complete any extension activities (time permitting).
- Students were able to successfully work in pairs or teams throughout the lesson.

Category/Level Criteria	*Level 1 Poor performance*	*Level 2 Needs improvement*	*Level 3 Adequate*	*Level 4 Excellent*
Computational Thinking	Demonstrates limited ability to: • Break a complex problem down into smaller problems. (Decomposition) • Create a simple set of steps to solve the problem. (Algorithms) • Describe the solution and apply lessons to future solutions. (Abstraction)	Demonstrates some ability to: • Break a complex problem down into smaller problems. (Decomposition) • Create a simple set of steps to solve the problem. (Algorithms) • Describe the solution and apply lessons to future solutions. (Abstraction)	Demonstrates considerable ability to: • Break a complex problem down into smaller problems. (Decomposition) • Create a simple set of steps to solve the problem. (Algorithms) • Describe the solution and apply lessons to future solutions. (Abstraction)	Demonstrates exceptional ability to: • Break a complex problem down into smaller problems. (Decomposition) • Create a simple set of steps to solve the problem. (Algorithms) • Describe the solution and apply lessons to future solutions. (Abstraction)
Communication	Demonstrates limited ability to: • Share thoughts and ideas with co-workers in order to solve problems. • Share with the teacher their learning through explanation and demonstration.	Demonstrates some ability to: • Share thoughts and ideas with co-workers in order to solve problems. • Share with the teacher their learning through explanation and demonstration.	Demonstrates considerable ability to: • Share thoughts and ideas with co-workers in order to solve problems. • Share with the teacher their learning through explanation and demonstration.	Demonstrates exceptional ability to: • Share thoughts and ideas with co-workers in order to solve problems. • Share with the teacher their learning through explanation and demonstration.
Collaboration	Demonstrates limited ability to: • Work with other group members. • Share materials, devices, and time appropriately. • Complete tasks in a group due to disruptive behavior.	Demonstrates some ability to: • Work with other group members. • Share materials, devices, and time appropriately. • Complete tasks in a group (some disruptive behavior).	Demonstrates considerable ability to: • Work with other group members. • Share materials, devices, and time appropriately. • Complete tasks in a group • Friendly and is somewhat a leader.	Demonstrates exceptional ability to: • Work with other group members. • Share materials, devices, and time appropriately. • Complete tasks in a group • Extremely friendly and acts as a leader.
Coding challenges	Demonstrates limited ability to: • Complete identified coding challenges. • Stay on task (cannot stay on task). • Complete extension activities as time permits.	Demonstrates some ability to: • Complete identified coding challenges. • Stay on task most of the time. • Complete extension activities as time permits.	Demonstrates considerable ability to: • Complete identified coding challenges. • Stay on task • Complete extension activities as time permits. • Find other ways to complete challenges.	Demonstrates exceptional ability to: • Complete identified coding challenges. • Stay on task • Complete extension activities as time permits. • Find other ways to complete challenges. • Going over and beyond, creatively, in completing challenges.
Independent Practice	Demonstrates limited ability to: • Work with their partner (very disruptive behaviour). • Stay focused on completing tasks (cannot focus).	Demonstrates some ability to: • Work with their partner (some disruptive behaviour). • Stay focused on completing tasks (some focus).	Demonstrates considerable ability to: • Work with their partner (little disruptive behaviour). • Focus on completing tasks. Somewhat engaged in tasks.	Demonstrates exceptional ability to: • Work with their partner (no disruptive behaviour). • Focus on completing tasks. Fully engaged in tasks.

Lesson 02

Colour & Sound Show

Grades 1 - 3 *60 mins*

MatataBot loves a good light and sound show! Using the tiles that detect various colours, create a code using the **Wait Until** block that allows MatataBot to wait for the detection of different colours. If it detects a certain colour, MatataBot would play a sound. Set up objects in a specific order and play different sounds while detecting the colours of each object. Help MatataBot compose a song and have a class concert!

Learning standards found on Pg. 135

Colour & Sound Show

Lesson 02

Grades 1 - 3

60 mins

In Colour and Sound show, students will be able to create their own songs by using the sensor controller connected to MatataBot. By "sensing" various coloured objects, MatataBot will be able to successfully play different musical notes and compose a song altogether. Students may also use colour cards instead of coloured objects to allow MatataBot another way to "sense colours" and play different notes or music.

Big ideas & essential questions

As a result of going through this lesson, you will understand how to transform the controller into a sensor in order to sense coloured objects in front of it. You will also understand how MatataBot will play a sound/musical note when a certain colour is sensed and learn how MatataBot will play a song from the coloured objects that are in place.

The ideas that will last with you beyond the classroom is how well you have transformed the sensor controller into a colour sensor while MatataBot plays various musical notes and songs. In addition, you will have a lasting impression of how well you have coded MatataBot to play different sets of songs through the opportunity of working in a team.

Learning outcomes

TSWBAT : the students will be able to:

1) Use the **Wait Until** coding block correctly to transform the sensor controller into a colour sensor and music player using the **Green**, **Yellow** or **Red** coding blocks placed under it.

2) Use their own creativity to play a song using the coloured objects set up in order.

3) Use critical thinking and coding skills to determine the most strategic way to play songs or sets of music through MatataBot.

What you'll do

Use the music button on the Controller to play different sounds when the sensor is placed in front of different coloured objects. Students will be challenged to set up objects to play an ascending/descending musical scale (from lowest to highest sound and vice versa) using the **Wait Until** blocks and **Green**, **Yellow** and **Red** blocks. Students will compose their own songs using different coloured objects.

What you'll need

- Class set of Matatastudio Pro Set and Sensor add-on set
- Projector/Display Screen
- Coloured objects (Green, Yellow, Red)
- Music warm-up cards

Prior to lesson

- Update Command Tower, MatataBot and Controller sets with latest software.
- Download example programs and prepare to show to class.

Introduction

5 mins

1) Welcome students to the course and introduce the rules of the class: Mutual Respect, Safety and Have Fun.

2) Ask, "How is traditional music made?" Give examples such as a piano, guitar, drums, etc. Ask, "How else would we be able to play music using Matatastudio?" Discuss the traditional ways we can play music using Matatastudio (e.g. music tiles, music button on sensor). Say, "MatataBot loves to play music in different ways! Today, you will code your MatataBot to play musical notes using the sensor controller by sensing different coloured objects. Be creative and have fun!"

3) Introduce how to use the **Wait Until** coding block in order for MatataBot to "sense" various objects in front of it by using the sensor controller to sense the coloured objects by holding the controller and waving it in front of the coloured objects.

   a) First, connect the Controller to MatataBot by switching to the "Sensor Mode" on the Controller, turning on Both controller and MatataBot and wait to establish a connection (Both blue lights on controller and MatataBot will flash, then stop flashing and remain on when connection is established). In order to establish this connection, press the power button 3 times on the controller, finally hearing a connection sound.

b) Next, connect the Command Tower the same way by turning it on using the power button, then pressing the power button 3 times to connect Both MatataBot and Controller to it.

4) Next, allow students to place the **Wait Until** coding block on the Control Board with **Green**, **Yellow** and/or **Red** colour coding blocks placed under it. Students should then test out their code to see if their MatataBot is sensing coloured objects and playing a musical note based on the colour sensed using the **Alto Clef Music**, **Treble Clef Music**, and **Melody** blocks. Place the appropriate music blocks after the **Wait Until** block in order for MatataBot to play different musical notes.

Guided practice

5 mins

1) Together with you, create a sample program with the students using the **Wait Until** coding block and discuss how this could be used with the sensor controller to play music when a particular coloured object is sensed.

2) Ask students to place the coloured objects in front of them strategically enough so that when the sensor controller is waved in front of the object, MatataBot plays the musical notes in an organized manner.

3) With the help of the Music warm-up cards, allow students to use the cards to assist them in playing different types of music (e.g. Twinkle, Twinkle).

Independent practice

45 mins

1) Before students can start coding, encourage them to come up with a rough idea of where their objects are placed. They are then able to place the **Wait Until** block followed by the colour and music coding blocks.

2) Students are encouraged to use their own creativity to create their own types of music and play them through MatataBot. They are also encouraged to use the **Preset Dancing** blocks at the beginning or end of their code to make a dance to go along with their coded music.

3) Once complete, students may choose to complete some extension activities from the Extensions section.

Wrap up

5 mins

1) Have students pack up their Pro and Sensor add-on sets and clean up the area they were working in.

2) Ask the following questions:

a) "What was the most exciting part of today's coding lesson?" (Field student responses and answer any questions about the controller or MatataBot's movements).

b) "What was the most challenging part of today's coding lesson?" (Field student responses and answer any questions about the controller or MatataBot's movements).

c) "How did you transform the sensor controller into a robot to play music? How did you code for it on the Control Board and use the Command Tower? What blocks did you use?"

d) "Was your group able to work with another group and present a song together?"

Interdisciplinary & 21st century connections

This lesson can be used in Art/Music to help teach topics such as creating compositions with purpose and demonstrating understanding that sounds can be represented by symbols. This lesson could also be co-taught with another content area teacher.

21st Century Skills include:

- Critical thinking
- Creativity
- Collaboration
- Communication
- Flexibility
- Leadership
- Initiative
- Productivity
- Social Skills
- Technology Literacy

Modifications

As students are challenged to code for the sensing of coloured objects in order to play music based on the colour sensed, consider stopping after 10 minutes and use a successful group's code to demonstrate/model the critical thinking involved in determining the code. In addition, instead of coming up with their own music, students may use the Music warm-up cards throughout the class time to help them ease through the coding process

Accommodations

- If students have a difficult time sensing coloured objects to play music, they can instead focus on using the Music warm-up cards to create music on the Control Board without the use of the sensor controller.
- Pair students to optimize co-teaching of prior knowledge.
- Pair students in groups of 3 to encourage positive social interactions.

Extension activities:

- Students may choose to compose a song together with another group and hold presentations for each group(s) to showcase their colour and sound show.
- Additionally, students may choose to create a celebration dance through MatataBot at the beginning or end of their composition.
- Finally, students may also try and display the same coloured lights through their MatataBot's eyes that match the coloured object sensed when a musical note is played.

Supporting files & links

How to Connect Sensor Controller to MatataBot [0:00 - 3:34]:
Youtube- http://bit.ly/connect-sensor-1

How to Connect Sensor Controller to MatataBot and Tower (along with blocks descriptions):
Youtube- http://bit.ly/connect-sensor-2

Firmware Upgrade:
Matatastudio- http://bit.ly/upgrade-firmware

Assessment

Student work will be assessed in the following manner:

- Students, in their groups, were able to successfully come up with a rough sketch for where their objects will be placed in order to make an organized piece of music.
- Students have correctly transformed the controller into a colour sensor using the **Wait Until** button as well as the **Green**, **Yellow** and **Red** blocks placed under it along with **Alto Clef Music**, **Treble Clef Music**, and **Melody** blocks.
- Students were able to complete any extension activities (time permitting).
- Students were able to successfully work in pairs or teams throughout the lesson.

Category/Level Criteria	*Level 1 Poor performance*	*Level 2 Needs improvement*	*Level 3 Adequate*	*Level 4 Excellent*
Computational Thinking	Demonstrates limited ability to: • Break a complex problem down into smaller problems. (Decomposition) • Create a simple set of steps to solve the problem. (Algorithms) • Describe the solution and apply lessons to future solutions. (Abstraction)	Demonstrates some ability to: • Break a complex problem down into smaller problems. (Decomposition) • Create a simple set of steps to solve the problem. (Algorithms) • Describe the solution and apply lessons to future solutions. (Abstraction)	Demonstrates considerable ability to: • Break a complex problem down into smaller problems. (Decomposition) • Create a simple set of steps to solve the problem. (Algorithms) • Describe the solution and apply lessons to future solutions. (Abstraction)	Demonstrates exceptional ability to: • Break a complex problem down into smaller problems. (Decomposition) • Create a simple set of steps to solve the problem. (Algorithms) • Describe the solution and apply lessons to future solutions. (Abstraction)
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Collaboration	Demonstrates limited ability to: • Work with other group members. • Share materials, devices, and time appropriately. • Complete tasks in a group due to disruptive behavior.	Demonstrates some ability to: • Work with other group members. • Share materials, devices, and time appropriately. • Complete tasks in a group (some disruptive behavior).	Demonstrates considerable ability to: • Work with other group members. • Share materials, devices, and time appropriately. • Complete tasks in a group • Friendly and is somewhat a leader.	Demonstrates exceptional ability to: • Work with other group members. • Share materials, devices, and time appropriately. • Complete tasks in a group • Extremely friendly and acts as a leader.
Coding challenges	Demonstrates limited ability to: • Complete identified coding challenges. • Stay on task (cannot stay on task). • Complete extension activities as time permits.	Demonstrates some ability to: • Complete identified coding challenges. • Stay on task most of the time. • Complete extension activities as time permits.	Demonstrates considerable ability to: • Complete identified coding challenges. • Stay on task • Complete extension activities as time permits. • Find other ways to complete challenges.	Demonstrates exceptional ability to: • Complete identified coding challenges. • Stay on task • Complete extension activities as time permits. • Find other ways to complete challenges. • Going over and beyond, creatively, in completing challenges.
Independent Practice	Demonstrates limited ability to: • Work with their partner (very disruptive behaviour). • Stay focused on completing tasks (cannot focus).	Demonstrates some ability to: • Work with their partner (some disruptive behaviour). • Stay focused on completing tasks (some focus).	Demonstrates considerable ability to: • Work with their partner (little disruptive behaviour). • Focus on completing tasks. Somewhat engaged in tasks.	Demonstrates exceptional ability to: • Work with their partner (no disruptive behaviour). • Focus on completing tasks. Fully engaged in tasks.

Lesson 03

Gyro Match Up

Grades K - 1 ***60 mins***

MatataBot loves to play matching games! After being assigned a specific colour, each group will drive their MatataBot from the center towards a matching MatataBot that has the same colour. Using the **Wait Until** coding block and the **Shake** block, shake the controller as fast as you can to get to the matching MatataBot first!

Learning standards found on Pg. 138

Gyro Match Up

Lesson 03

Grades K - 1

60 mins

In Gyro Match Up, students will be able to match up their MatataBot with another MatataBot with the same colour by "shaking" the controller. By shaking the controller and using its gyro features, students will be able to race and move their Bot towards another matching colour MatataBot by shaking as fast as they can. Match up with another Bot first to win!

Big ideas & essential questions

As a result of going through this lesson, you will understand how to transform the controller into a gyroscopic device by being able to shake it. You will also understand how MatataBot will move based on how fast you shake the controller and learn how MatataBot will match with another MatataBot that has the same assigned colour.

The ideas that will last with you beyond the classroom is how well you have transformed the controller into a gyroscopic device when the controller is shaken. In addition, you will have a lasting impression of how well you have coded MatataBot to match with another MatataBot with the same colour as quick as possible.

Learning outcomes

TSWBAT : the students will be able to:

1) Use the **Wait Until** coding block correctly to transform the controller into a gyroscopic device using the **Shake** coding block placed under it.

2) Use their own critical thinking skills to find a matching MatataBot with the same colour as fast as they can and drive towards it.

3) Use the necessary coding skills to determine the most strategic way to get their MatataBot to match with the same coloured MatataBot.

What you'll do

After being assigned a specific colour, each group will drive their MatataBot from the center towards a matching MatataBot that has the same colour. Using the **Wait Until** coding block and the **Shake** block placed under it, shake the controller as fast as you can to get to the matching MatataBot first!

What you'll need

- Class set of Matatastudio Pro Set and Sensor add-on set.
- Projector/Display Screen.

Prior to lesson

- Update Command Tower, MatataBot and Controller sets with latest software.
- Download example programs and prepare to show to class.

Introduction

5 mins

1) Welcome students to the course and introduce the rules of the class: Mutual Respect, Safety and Have Fun.

2) Ask, "How do you play matching games?" "What are some matching games you have played before?" Say, "MatataBot loves matching! Today, you will code your MatataBot to move and navigate to another groups' MatataBot that has the same colour as yours by shaking the controller as fast as you can. Have fun!"

3) Introduce how to use the **Wait Until** coding block in order for MatataBot to move only when the controller is shaken.

   a) First, connect the Controller to MatataBot by switching to the "Control Mode" on the Controller, turning on Both controller and MatataBot and wait to establish a connection (Both blue lights on controller and MatataBot will flash, then stop flashing and remain on when connection is established). In order to establish this connection, press the power button 3 times on the controller, finally hearing a connection sound.

   b) Next, connect the Command Tower the same way by turning it on using the power button, then pressing the power button 3 times to connect Both MatataBot and Controller to it.

4) Next, allow students to place some movement coding blocks (**Move Forward**, **Move Backward**, **Left Turn 90°**, **Right Turn 90°**) followed by the **Wait Until** coding block on the Control Board with a **Shake** coding block placed under it. Students may test out their code by pressing the 'X' (clear) button on the controller and hold down the button for 2 seconds to enter this shaking mode. By continuing to hold down the button, it will enhance the speed of the robot's movements - the faster you shake the controller, the faster MatataBot will move.

5) Alternatively, keeping in "Control Mode" will allow students to press and hold the 'Play' button on the controller to begin using the gyro function. Toggle your controller in different directions to move MatataBot in various ways (e.g. twisted left = turns left, twist right = turns right, twist towards you = moves backward, twist away from you = moves forward).

Guided practice

5 mins

1) Together with you, create a sample program with the students using the **Wait Until** coding block and discuss how this could be used with the controller to move around only when the controller is shaken. Encourage the use of various movement blocks after the **Shake** coding block for MatataBot to move around and match with another MatataBot that has the same assigned colour.

2) Alternatively, press the 'Play' button to enter gyro mode and maneuver MatataBot by twisting your hand holding the controller in various ways.

3) Then, together with you, ask students to move to and match with the same coloured MatataBot by shaking the controller. The faster you shake, the faster MatataBot moves.

Independent practice

45 mins

1) Before students can start coding, encourage them to think about how they can use and place the movement blocks after the **Wait Until** and **Shake** coding blocks.

2) Once they have a rough idea of how their MatataBot will move while the controller is shaken, students can start coding and place their coding blocks on the Control Board. Encourage them to either use the 'X' or clear button on the controller for MatataBot to move or the gyro feature by holding the 'Play' button and twist the controller for MatataBot to move in various ways.

3) Once complete, students may choose to complete some extension activities from the Extensions section.

Wrap up

5 mins

12) Have students pack up their Pro and Sensor add-on sets and clean up the area they were working in.

13) Ask the following questions:

a) "What was the most exciting part of today's coding lesson?" (Field student responses and answer any questions about the controller or MatataBot's movements).

b) "What was the most challenging part of today's coding lesson?" (Field student responses and answer any questions about the controller or MatataBot's movements).

c) "How did you transform the controller to control MatataBots movements? Which button did you press on the controller in Control Mode? How did you code for it on the Control Board?"

d) "How did you move MatataBot to match with other MatataBot's who had the same colour as yours?"

e) "Did your groups' MatataBot successfully match with another group's MatataBot in the fastest time? If not, how will you change your code to do so if you had another chance?"

Interdisciplinary & 21st century connections

This lesson can be used in any subject area as a means to test student knowledge in the subject area. This lesson could also be co-taught with another content area teacher.

21st Century Skills include:

- Critical thinking
- Creativity
- Collaboration
- Communication
- Flexibility
- Leadership
- Initiative
- Productivity
- Social Skills
- Technology Literacy

Modifications

If students have a difficult time coding using the **Wait Until** and **Shake** coding blocks on the Control Board, they may use the alternative way to move their groups' MatataBot using the "Play" button and twisting the controller in various ways. As students are challenged to code their controller, consider stopping after 10 minutes and use a successful group's code to demonstrate/model the critical thinking involved in determining the code.

Accommodations

- If students have a difficult time thinking about their code using the **Wait Until** and **Shake** coding blocks, in 1-2 classes prior to this lesson, come up with an example code and write it down in order to be used in the class you are running the lesson.
- Pair students to optimize co-teaching of prior knowledge.
- Pair students in groups of 3 to encourage social interactions.

Extension activities:

- Students may program a random colour of lights with the **Random** block, then drive MatataBot to find their colour match in this manner! Create a celebration dance or music when your group matches with another groups' MatataBot.
- Hint: use the **Music** button on the Controller to randomly play music on MatataBot. Students may also play for fun or keep score between groups the number of times their group finds a match first.

Supporting files & links

How to Connect Sensor Controller to MatataBot [0:00 - 3:34]:
Youtube- http://bit.ly/connect-sensor-1

How to Connect Sensor Controller to MatataBot and Tower (along with blocks descriptions):
Youtube- http://bit.ly/connect-sensor-2

Firmware Upgrade:
Matatastudio- http://bit.ly/upgrade-firmware

Assessment

Student work will be assessed in the following manner:

- Students in their groups have come up with their code using the proper coding blocks before starting to code on the Control Board.
- Students correctly transformed the controller to move MatataBot as fast as possible to match with the same coloured MatataBot from another group with the colour being assigned previously by the teacher.
- Students have chosen at least one way to move their MatataBot and match with the same coloured MatataBot (hold and press the Play button, Clear button (shaking)).
- Students were able to match with another group's MatataBot successfully first.
- Students were able to complete any extension activities (time permitting).