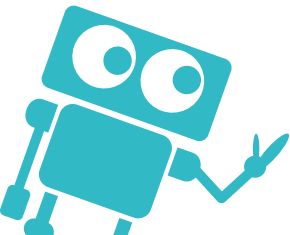# Hummingbird
Going the Distance

Use the distance sensor to trigger either an LED light or a servo. What will your robot do?

MackinMaker

Materials:
- Hummingbird Robotics Premium Kit
- Hummingbird Bit Compatible Device

Any additional low-tech engineering supplies that may include but are not limited to:

- Cardboard
- Tape (masking, scotch, and/or duct)
- Hot glue gun/glue
- Scissors
- Craft sticks
- Tinfoil
- String
- Coloring supplies

Quick Start:
1. Brainstorm and decide what you are going to communicate through the distance sensor, lights, and/or servo.
2. Follow the setup instructions laid out in the Hummingbird Robotics Kit user guide.
3. Make sure the micro:bit and battery pack are plugged into the Hummingbird Bit Controller.
4. Use the terminal tool to plug the distance sensor and any other components that you need into the Hummingbird Bit Controller corresponding terminal. Are all the colored wires plugged into the correct spot?
5. Use a coding program of your choice (Snap!, MakeCode, Java, Python, or BirdBlox) to code your distance sensor.
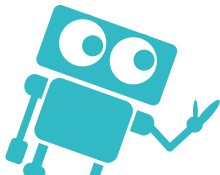
Hints and Tips:
- Need help figuring out which pieces do all the different functions? Look through the kit contents that are laid out in the Hummingbird Robotics Kit user guide.
- Will your Hummingbird program be used to alert people when others are nearby? Could it be used to turn on a light to help people see when they are in the space? What other objects could use a distance sensor to communicate a message or assist people?
- Having trouble figuring out how to program the Hummingbird Bit? Watch one of the tutorials here: **https://www.birdbraintechnologies.com/portal/**

Extended Challenges
Computer Science: Use the distance sensor, two rotation servos, and low-tech engineering materials to build a vehicle.
Computer Science: Instead of the distance sensor, use the light sensor to trigger other outputs.
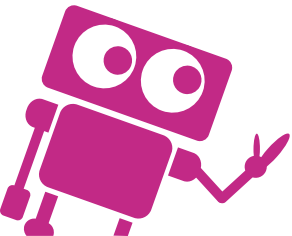
Hummingbird

Light It Up

Can you code the Hummingbird Bit to turn on an LED light? Can you code it to flash on and off?

Mackin Maker

Materials:
- Hummingbird Robotics Premium Kit
- Hummingbird Bit Compatible Device
- Paper and drawing supplies (optional)

Quick Start:
1. Follow the setup instructions laid out in the Hummingbird Robotics Kit user guide.
2. Make sure the micro:bit and battery pack are plugged into the Hummingbird Bit Controller.
3. Use the terminal tool to plug a single-colored LED light into the Hummingbird Bit Controller single-colored LED terminal.
4. Use a coding program of your choice (Snap!, MakeCode, Java, Python, or BirdBlox) to code the singled-colored LED to turn on when you start the program.
5. Can you code your single-colored LED light to flash on and off?

Hints and Tips:
- Need help figuring out which pieces do all the different functions? Look through the kit contents that are laid out in the Hummingbird Robotics Kit user guide.
- Remember, a single-colored LED wire plugs into the terminal a specific way. The colored wire goes into the + terminal, black wire goes into the – terminal.
- Having trouble figuring out how to program the Hummingbird Bit? Watch one of the tutorials here: **https://www.birdbraintechnologies.com/portal/**

Extended Challenges
Computer Science: Can you add a tri-colored LED to your Hummingbird Bit Controller, and program it to change colors? Can you make the colors purple and/or turquoise?
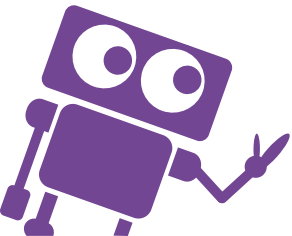**Art:** Make a drawing that uses the lights as a part of the design.
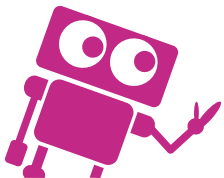
D
Design

15
Points

Hummingbird
Dialing in on Literature

How can you communicate something about the book you are reading through the dial sensor and visual displays of lights?

MackinMaker

D
Skill-Up

15
Points

Materials:
- Hummingbird Robotics Premium Kit
- Hummingbird Bit Compatible Device

Any additional low-tech engineering supplies that may include but are not limited to:

- Cardboard
- Tape (masking, scotch, and/or duct)
- Hot glue gun/glue
- Scissors
- Craft sticks
- Tinfoil
- String
- Coloring supplies

Quick Start:
1. Brainstorm and decide what you are going to communicate through the dial sensor and lights.
2. Create your display using any materials you have available to you.
3. Follow the setup instructions laid out in the Hummingbird Robotics Kit user guide.
4. Make sure the micro:bit and battery pack are plugged into the Hummingbird Bit Controller.
5. Use the terminal tool to plug LED lights into the Hummingbird Bit Controller LED terminals and plug the dial sensor into the sensor terminal.
6. Use a coding program of your choice (Snap!, MakeCode, Java, Python, or BirdBlox) to code the lights to turn on and off when you turn the dial to a specific point.

Hints and Tips:
- Can you make something that shows how a character changed throughout the story (dial has an arrow attached to it that points to "beginning," "middle," and "end," and the LED lights are programmed to light up different images to show how the character changed in action, appearance, or another way)?
- Can you create a map of an event over time (for example, if reading a novel on WWII, the map could light up different parts of Europe correlating to specific years and/or events)?
- Need help figuring out which pieces do all the different functions? Look through the kit contents that are laid out in the Hummingbird Robotics Kit user guide.
- Having trouble figuring out how to program the Hummingbird Bit? Watch one of the tutorials here: **https://www.birdbraintechnologies.com/portal/**

Extended Challenges
Social Studies: Can you use the dial sensor and lights to express important events during a war or other significant time period?
Science: Can you build something to help communicate the sequence of different body systems (or any other sequential system)?
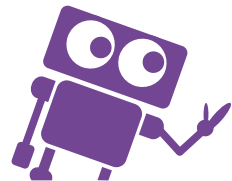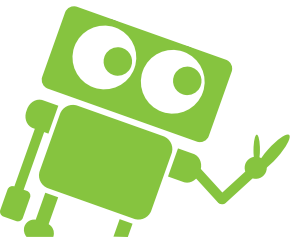
G
Global

20
Points

Hummingbird
Creative Gaming

Make a new game or a prototype of a new sport that could be played by at least two people.

20
Points

Materials:
- Hummingbird Robotics Premium Kit
- Hummingbird Bit Compatible Device
- Multi-colored paper, cardstock, and/or copy paper
- Recycled cardboard, containers, cups, and/or plastic bottles

Any additional low-tech engineering supplies that may include but are not limited to:

- Cardboard
- Tape (masking, scotch, and/or duct)
- Hot glue gun/glue
- Scissors

- Craft sticks
- Tinfoil
- String
- Coloring supplies

Quick Start:
1. Brainstorm and decide what kind of game or sport you are going to create using the Hummingbird Bit. What other objects or materials will you need to play your game? Engineer them!
2. Construct the item(s) using materials that are available to you.
3. Make sure the micro:bit and battery pack are plugged into the Hummingbird Bit Controller.
4. Use the terminal tool to plug any components that you need into the Hummingbird Bit Controller corresponding terminal. Are all of the colored wires plugged into the correct spot?
5. Use a coding program of your choice (Snap!, MakeCode, Java, Python, or BirdBlox) to code different components.

Hints and Tips:
- Be creative and incorporate lights, servos, and maybe even sensors into your design!
- What are typical elements of a game? How do you track scores or points? Think through the game design and rules before building.
- Want to add moving objects or targets into your game? Build a "basic mechanism" like one on the Birdbrain Technologies website. You can find them here: **https://www.birdbraintechnologies. com/hummingbirdbit/build/**
- Need help figuring out which pieces do all the different functions? Look through the kit contents that are laid out in the Hummingbird Robotics Kit user guide.
- Having trouble figuring out how to program the Hummingbird Bit? Watch one of the tutorials here:

  https://www.birdbraintechnologies.com/portal/

Extended Challenges
Computer Science: Can you use the Makey Makey to help keep track of scores during the game? Use Scratch to help code a counter using the Makey Makey.
Physical Education: What kind of physical activity could you incorporate into the game or sport that you have created?
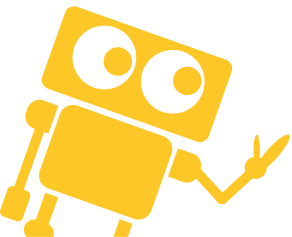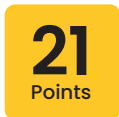
I
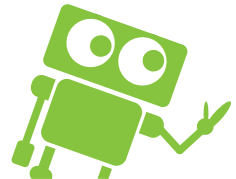
Innovator

21

Points

Hummingbird
Holiday Design

Choose a holiday and make something that you can use to assist in celebrating it. Will you make something interactive that you can leave out as a decoration? Maybe something you could use to deliver a special message to people?

MackinMaker

I
Innovator

21
Points

Materials:
- Hummingbird Robotics Premium Kit
- Hummingbird Bit Compatible Device
- Multi-colored paper, cardstock, and/or copy paper
- Recycled cardboard, containers, cups, and/or plastic bottles

Any additional low-tech engineering supplies that may include but are not limited to:

- Cardboard
- Tape (masking, scotch, and/or duct)
- Hot glue gun/glue
- Scissors
- Craft sticks
- Tinfoil
- String
- Coloring supplies

Quick Start:
1. Choose a holiday, brainstorm, and decide what you are going to create using the Hummingbird Bit.
2. Construct the item using materials that are available to you.
3. Follow the setup instructions laid out in the Hummingbird Robotics Kit user guide.
4. Make sure the micro:bit and battery pack are plugged into the Hummingbird Bit Controller.
5. Use the terminal tool to plug any components that you need into the Hummingbird Bit Controller corresponding terminal. Are all of the colored wires plugged into the correct spot?
6. Use a coding program of your choice (Snap!, MakeCode, Java, Python, or BirdBlox) to code your sensor(s), light(s), and/or servo(s).

Hints and Tips:
- Be creative and incorporate lights, servos, and maybe even sensors into your design!
- Want to make your creation more animated? Build a "basic mechanism" like one on the Birdbrain Technologies website. You can find them here: **https://www.birdbraintechnologies.com/hummingbirdbit/build/**
- Need help figuring out which pieces do all the different functions? Look through the kit contents that are laid out in the Hummingbird Robotics Kit user guide.
- Having trouble figuring out how to program the Hummingbird Bit? Watch one of the tutorials here: **https://www.birdbraintechnologies.com/portal/**

Extended Challenges
Social Studies: Make something that honors a historical leader of your choice.
English/Language Arts: Design and build an item that somehow represents a story that you have read or that you are currently reading.