FIRST LEGO LEAGUE

EXPLORE

ENGINEERING NOTEBOOK

PLAY MAKERS

Presented by

IET The Institution of Engineering and Technology

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Welcome!

I'm May!

I'm Marco!

We are your guides to PLAYMAKERS℠.

Sometimes, you will work as a team and sometimes in two different groups.

Write down who will be in May's Group and who will be in Marco's Group.

Team Members:

May's Group

1. _____

2. _____

3. _____

Marco's Group

1. _____

2. _____

3. _____

I'm Max!
Come on!
Let's go!

Team Journey

Explore the Challenge

Learn About Core Values

Create Team Model

EXPLORE

CREATE

TEST

SHARE

Explore, Create, Test, and Share as You Go Through the Sessions

Explore   Create and Test   Share

Celebrate at an Event

Challenge Story

They noticed there are lots of places where people are not active.

May and Marco don't like to stay still – and that's a good thing!

Moving keeps them both healthy and strong!

May and Marco have great ideas for games and activities, wherever they go.

Can you help them create new, fun ways for everyone to get moving?

Your ideas could help change your community – and even the world!

Core Values

Draw an example of each Core Value!

DISCOVERY
We explore new skills and ideas.

INCLUSION
We respect each other and embrace our differences.

INNOVATION
We use creativity and persistence to solve problems.

TEAMWORK
We are stronger when we work together.

IMPACT
We apply what we learn to improve our world.

FUN
We enjoy and celebrate what we do!

Have lots of FUN as you develop new skills and work together.

Use the Core Values to guide your team through your journey.

Inspiration Toolkit

Can you use these real-life photos from different places as inspiration for what you build?

Getting moving helps your heart get healthy and strong!

When you get moving, your heart rate goes up.

I like to run at the dog park!

Find the prototyping pieces and baseplates from the Explore set.

☐ List different ways you like to play and get your body moving.

Where do you like to play and be active?

What games do you like to play?

☐ Pick your favorite activity and draw a picture of yourself doing it. Show where you are.

☐ Draw how you would build a LEGO® design of this activity.

☐ Build a design of your drawing on your own baseplate.

☐ Share your drawing and what you built with your team.

THIS IS ME:

Write your ideas above.

Draw your design above!

MAY'S GROUP
Place: Empty Lot

Session 2

MARCO'S GROUP
Place: Park

Session 5

Marco and I want to race! When our heart rates go up, the flag goes up!
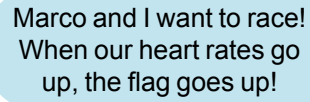
Can you build a game that we can both play that will raise our heart rate?

Heart Game

Find your Explore set.

- [ ] Follow the build instructions in Book 1 to make the heart game.
- [ ] Turn the crank. Watch what happens to the flag!
- [ ] Think about Marco's question and write your ideas in the box.
- [ ] Be sure to think about your group's listed <u>place</u>.
- [ ] Draw your design on page 16 or 17.
- [ ] Use your prototyping pieces to build a fun solution.
- [ ] Share what you did with the team.

I want to play the game too!
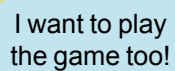
THOUGHTS AND IDEAS

Find your WeDo 2.0 set and device.

☐ Open the WeDo 2.0 app.

☐ Complete the Getting Started project: Cooling Fan.

☐ Answer Max's question in the box below.

☐ Change the code you created!

Can you increase the fan speed?

Can you stop the fan?

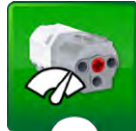☐ Change the build of the cooling fan.

Can you change the blades?

Make the fan taller?

☐ Draw your design on page 30.

☐ Share what you did with the team.

Can you make your own code for the cooling fan?

You could use the blocks below!

1

Explain how you could use these blocks to change the code you created!

MAY'S GROUP
Place: Empty Lot

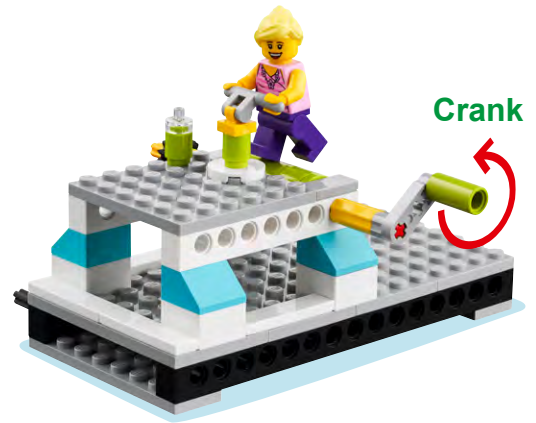# Session 3

MARCO'S GROUP
Place: Park

Session 6

Marco and I wait for the bus each day. There's a park and an empty lot right by it.

These could be fun places to play! Can you design different play stations like the treadmill for us?

Treadmill

Crank

Find your Explore set.

- [ ] Follow the build instructions in Book 2 to make the treadmill.
- [ ] Turn the crank to move the green roller. This shows how our leg power can be changed into motion.
- [ ] Set the treadmill aside.
- [ ] Think about Marco's question and write your ideas in the box.
- [ ] Be sure to think about your group's listed place.
- [ ] Draw your design on page 16 or 17.
- [ ] Use your prototyping pieces to build a fun solution.
- [ ] Share what you did with the team.

I want to have a go!

THOUGHTS AND IDEAS
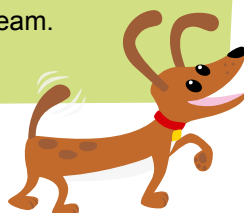
Find your WeDo 2.0 set and device.

☐ Open the WeDo 2.0 app.

☐ Complete the Getting Started project: Moving Satellite.

☐ Answer Max's question in the box below.

☐ Change the code you created!

Can you turn the satellite for 10 seconds?

Can you turn the satellite the other way?

☐ Change the build of the moving satellite.

Can you change the satellite shape?

Make it bigger?

☐ Draw your design on page 30.

☐ Share what you did with the team.

Can you make your own code for the satellite?

You could use the blocks below!

1

Explain how you could use these blocks to change the code you created!

MAY'S GROUP
Place: Empty Lot
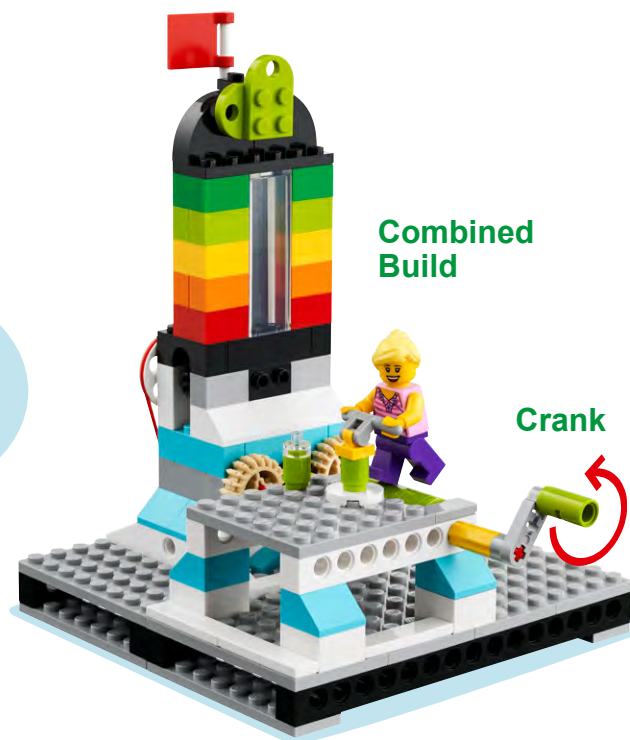
Session 4

MARCO'S GROUP
Place: Park

Session 7

We want to race! I'm going to ride my bike. When our heart rates go up, the flag goes up on the heart game!

Can you build a path for us where we can both race to raise our heart rate?

Combined Build

Crank

Find your Explore set.

- ☐ Find your assembled heart game and treadmill.
- ☐ Follow the build instructions in Book 2 to combine the heart game and treadmill.
- ☐ Turn the crank on the treadmill. How does the flag move?
- ☐ Think about Marco's question and write your ideas in the box.
- ☐ Be sure to think about your group's listed place.
- ☐ Draw your design on page 16 or 17.
- ☐ Use your prototyping pieces to build a fun solution.
- ☐ Share what you did with the team.

Be sure your path is built for May and Marco's wheels!

THOUGHTS AND IDEAS

Can you make your own code for the spy robot?

You could use the blocks below!

Find your WeDo 2.0 set and device.

☐ Open the WeDo 2.0 app.

☐ Complete the Getting Started project: Spy Robot.

☐ Answer Max's question in the box below.

☐ Change the code you created!

Can you record your own sound?

Can you detect motion in a new way?

☐ Change the build of the spy robot.

Can you get your spy robot to move?

Can you change its shape?

☐ Draw your design on page 30.

☐ Share what you did with the team.

Explain how you could use these blocks to change the code you created!

Draw your empty lot designs here:

Draw your park designs here:

Sessions 8 and 9 WHOLE TEAM

Can your team code your combined build?

Can your team motorize the combined build?

Combined Build

Motor and Hub Build

Find your WeDo 2.0 set and device.

☐ Find the WeDo 2.0 app.

☐ Use the blocks below to create a code to raise the flag to the top on the heart game.

☐ Work as a team to code solutions to these challenges!

1. **Raise the flag and then bring it all the way back down.**
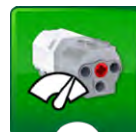2. **Add a sound to celebrate when the flag is at the top.**

Find your Explore set and WeDo 2.0 set.

☐ Follow the build instructions in Book 2 to make the motor and hub build.

☐ Find your combined treadmill and heart game.

☐ Connect it with the motor and hub build.

Work as a team to complete the tasks!

You could use these blocks to create your new code!

| ✕ | 1 | ▶ | | ⧖ |

Can you design an obstacle course for us to play on and then build it as your team model?

Find your Explore set, combined build, WeDo 2.0 set, and device.

☐ Think about the questions.

☐ Brainstorm ideas for each question.

☐ Look over the list of required parts below.

☐ Draw your obstacle course design on pages 20-21. Label all the required parts and the places the course is found.

Can you include fun activities that would raise our heart rates?

Could your obstacle course be built in one of these places or maybe in all of them?
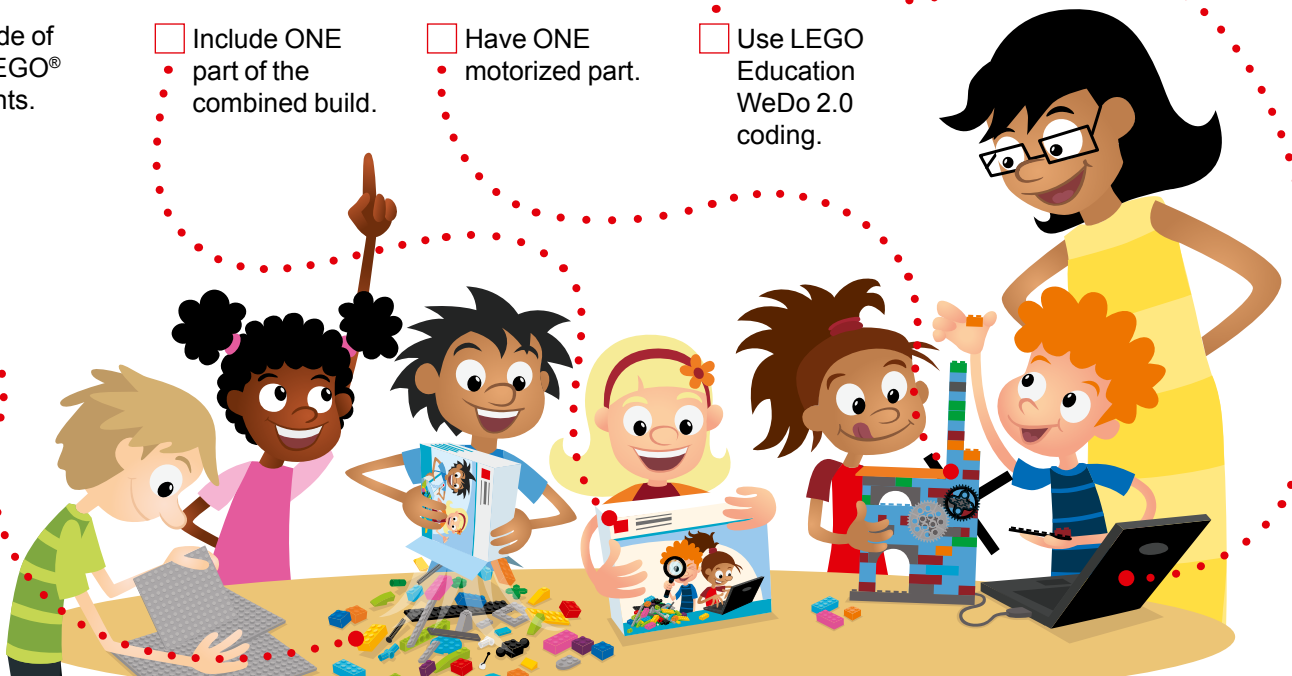
Team Model

Park

Empty Lot

Choose a Place

Required Parts:

☐ Be made of
• only LEGO®
  elements.

☐ Include ONE
  part of the
  combined build.

☐ Have ONE
  motorized part.

☐ Use LEGO
  Education
  WeDo 2.0
  coding.

Draw your obstacle course design here:

Use these two pages for your drawing. Label the required parts of your team model.

Required Parts checklist:

- [ ] Be made of only LEGO® elements.
- [ ] Include ONE part of the combined build.
- [ ] Have ONE motorized part.
- [ ] Use LEGO Education WeDo 2.0 coding.

Park

Empty Lot

Choose a
Place

Find your poster board and art supplies.

- [ ] Brainstorm what you will put on your poster.
- [ ] Use the next page as a draft for your ideas.
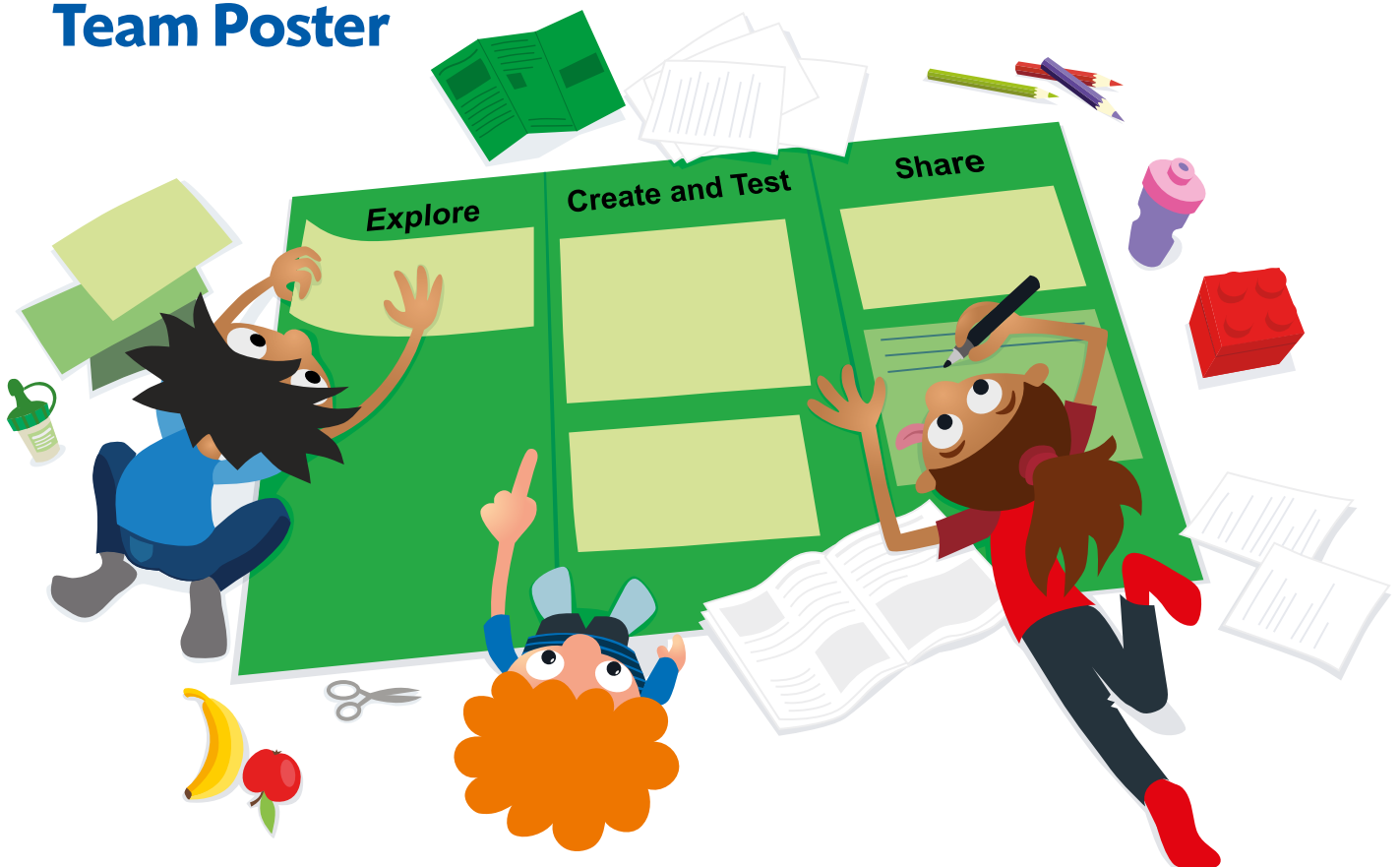- [ ] Work together as a team to create your poster.

Make a team poster sharing what you learned during PLAYMAKERSSM!

Describe your team journey throughout the sessions.

You can use words, drawings, and photos on your poster.

Team Poster

Explore

Create and Test

Share

Write and draw your ideas for your team poster:

Sample Topics:
- Explore
- Create
- Test
- Share
- Core Values
- Team Journey

Check out Core Values page 6 for ideas!

Session 12 WHOLE TEAM

It's almost time for your event! There are many ways to share what you have learned.

Find your completed team model and team poster.

- [ ] Talk about what your team would like to share at your event!
- [ ] Complete the next page to prepare for your event.
- [ ] Look over the reviewing sheet with your coach.

You could take part in a *FIRST®* LEGO® League Explore Festival. Invite your family and friends to a special meeting or showcase.

No matter how you celebrate, have fun!
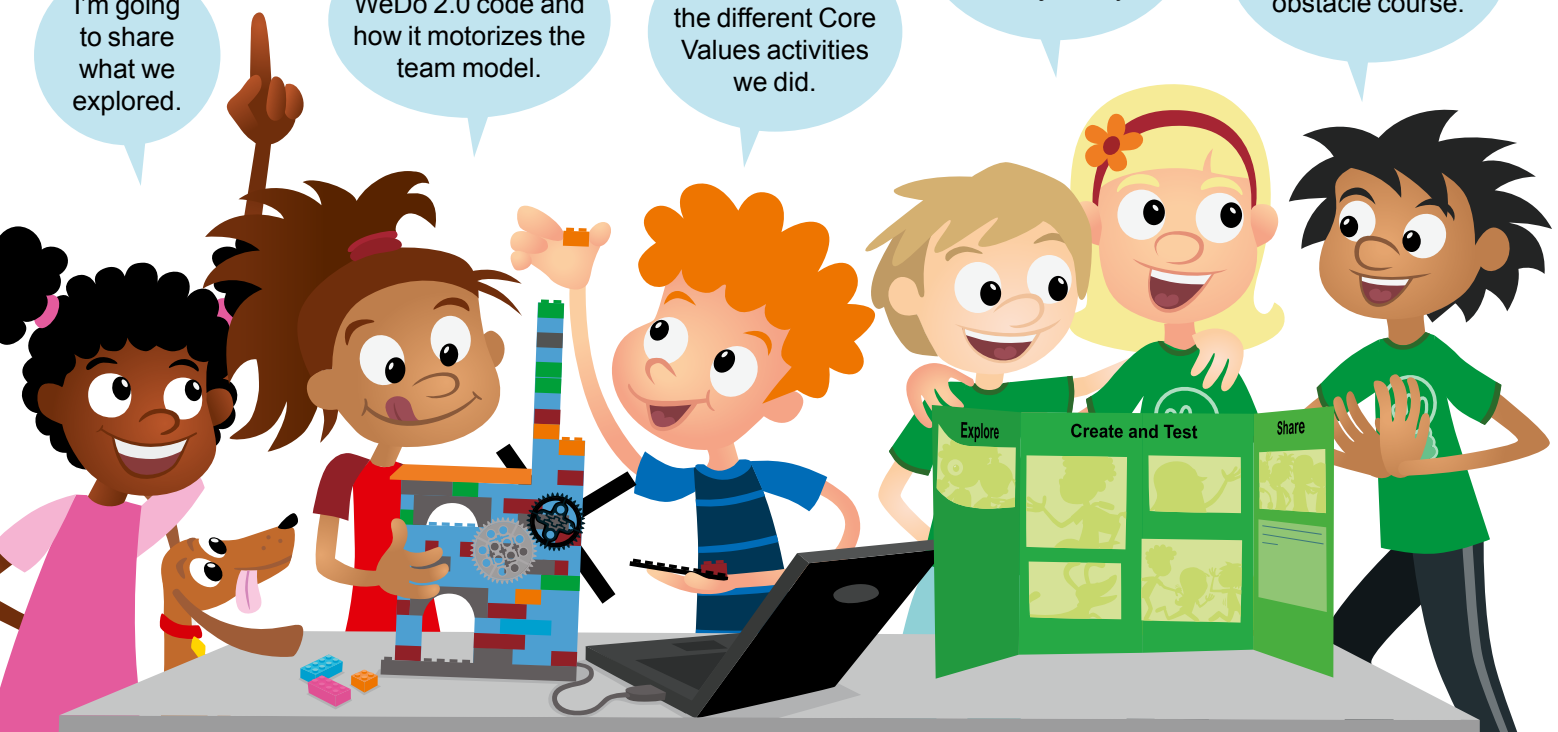
Typical Event Setup

I'm going to share what we explored.

I will explain the WeDo 2.0 code and how it motorizes the team model.

I can reflect on the different Core Values activities we did.

We will show how the poster captures our team journey!

I will describe the team model and the parts of the obstacle course.

Explore   Create and Test   Share

Record your ideas for sharing at your event:

- Can you describe your team model?
- Did you include the treadmill, the heart game, or the combined build?

- What did you learn about the challenge?
- How did you use Core Values?

- What part of your build is motorized?
- How did you code your motorized part?

- What did you include in your team poster?
- How does it show your team journey?

Let's Celebrate!
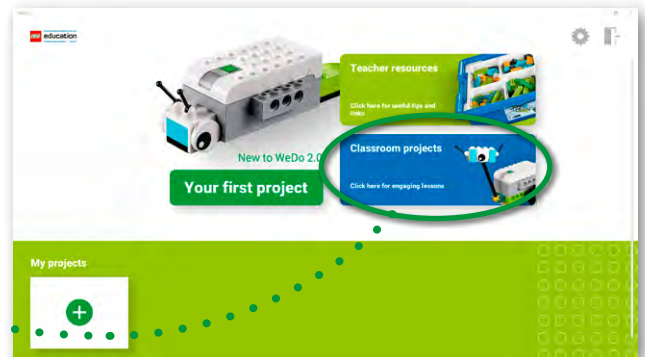
Find Your Projects

1. **Open the WeDo 2.0 app. The app might be an icon on the main screen or in the Start menu.**
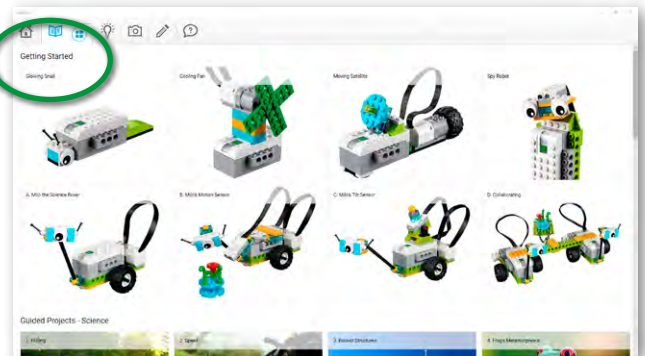

2. **Follow the Introduction directions if this is your first time using the app. Otherwise, click the X.**

3. **Select Classroom Projects from the main page.**

4. **Choose the appropriate Getting Started project listed in your session.**

Programming Block Descriptions

Flow Blocks

Start Block

When used, always place at the beginning of a program string. Press on it to start the program string you have written.

Wait For

Use this block to tell the program to wait for something to happen. It can wait for a set amount of time or for input from a sensor. This block always requires input in order to work properly.

Repeat Block

Use this block to repeat actions. Blocks placed inside the Repeat Block will be looped. This can also be called the Loop Block. The loop can be repeated forever, for a certain amount of time, or until something happens.

Other Blocks and Inputs

Light Block

Lights up the LED on the Smarthub in a specific color. The color can be changed with a numeric input between 0 and 10.

Play Sound

Plays a sound. The sound is chosen from a list available within the software. You can choose a sound using a numeric input. Choose sound number 0 to play a sound that you have recorded yourself.

Bubble

Use the bubble to insert comments into your program. This is not a programming block.

Number Input

Inputs a numeric value to a block.

Text Input

Inputs a text value to a block.

Motor Blocks

Motor This Way Block

Sets the motor to turn the axle in the direction shown and starts the motor.
Tap on the block to quickly change the direction of the rotation.

Motor Power Block

Sets the motor power to the specified level and starts the motor. The level can be set with a numeric input from 0 to 10.

Motor On For Block

Starts the motor for a chosen amount of time specified in seconds. The amount of time can be set with a numeric input, using whole or decimal numbers.

Motor Off Block

Stops any movement of the motor.

Sensors Inputs

Any Distance Change

Inputs the Motion Sensor mode "Any Distance Change" to a block.

Distance Sensor Input

Inputs the value detected by the Motion Sensor (from 0 to 10) to a block.

Shake

Inputs the Tilt Sensor mode "Shake" to a block.

Motor Off Block

Stops any movement of the motor.

Career Connections

Jay Flores
Global STEM Ambassador

Where I work: Rockwell Automation

My *FIRST*® connection: I helped design the *FIRST* Robotics Competition experience and help *FIRST* create the strategies to reach more kids.

Fun facts about me: I was on two athletic competition TV shows: *Exatlon Estados Unidos on Telemundo* (2019) and *BattleFrog League Championship* on ESPN (2016).

My STEM superhero: *FIRST*® LEGO® League students who are solving real problems in their community.

Advice to teams: Invent the change you want to see in the world!
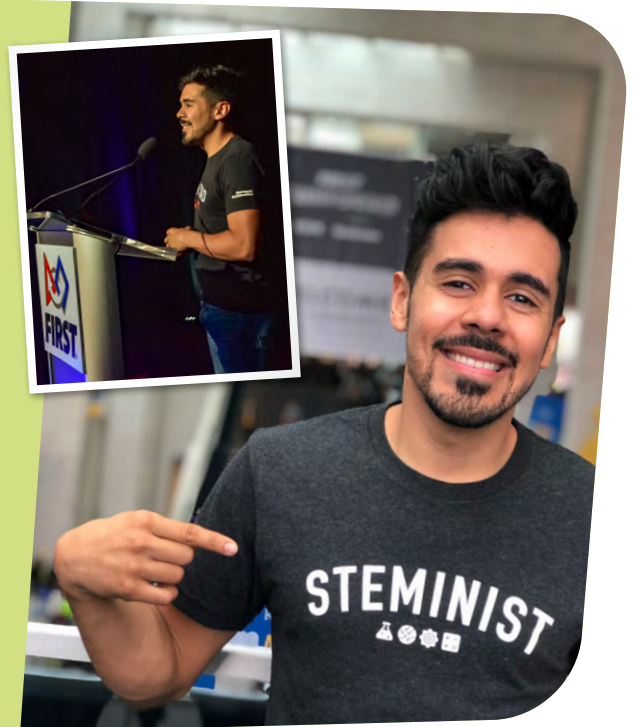
Javion Mosley
Mechanical Engineering Senior

Where I work: Rockwell Automation

My *FIRST* connection: Riverside Robotigers 2830 mentor, *FIRST* alumni

Fun facts about me: I like to travel a lot and experience as many new things as I can. I was also a Rockwell Automation intern in China.

My STEM superhero: Wilbur and Orville Wright. I have an admiration for flight.

Advice to teams: *FIRST* is a great opportunity to get your first steps in engineering. Treat it as part of your building blocks for your future as the steps you take today will affect your outcome tomorrow.

Leanne Cushing
Mechanical Engineer

Where I work: Bellwether Coffee

My *FIRST*® connection: I did *FIRST* Robotics Competition in high school, and with the help of my mentors, I learned that mechanical design was the one thing I'm good at and love doing.

Fun facts about me: Most of my spare time is dedicated to *Battlebots* and my team, Valkyrie, where we design, build, and compete with our 250 lb robot on Discovery Channel.

My STEM superhero: Bill Nye, for his love of entertaining combined with his love of engineering and teaching. He showed me you could be entertaining, social, and brainy. He fed a lot of my curiosity and taught me so much when I was little.

Advice to teams: Passion isn't perfection. Be your own favorite version of yourself; don't let other people tell you who to be or what you can or cannot do. Don't talk yourself out of trying something new. Worst case, you have a new opinion or story to share.

Pedro Alejandro Yang
Manager

Where I work: LEGO® Education

My *FIRST* connection: I work in LEGO Education's competition team, and we are a Strategic Partner of *FIRST*.

Fun facts about me: I played badminton in the 2004 Summer Olympics. My hobby is to cook recipes that famous chefs post on YouTube.

My STEM superhero: Woodie Flowers. Even though he was a STEM advocate, he also acknowledged the human empathy factor for people to succeed, thus inventing what we know today in our *FIRST* LEGO League community as *Gracious Professionalism*®.

Advice to teams: It's not about winning, but the learnings and friends you make in your journey.

Draw your designs here: