Module 8: LEGO WeDo Introduction

**Purpose:**
- Participants will be able to identify the main LEGO WeDo components and explain how they are used.
- Participants will be able to lead a basic LEGO WeDo activity using a kit, building guides, and Teacher’s Guide.
- Participants will be able to articulate at least 3 ways in which they can use WeDo activities in the 4-H robotics program.

**Time:**
3 hours

**Materials:**
- LEGO WeDo Kits (1 kit per 2-3 participants)
- LEGO WeDo Building Guides
- Laptop computers (1 per kit)
- Tables and chairs
  - At least one table per LEGO WeDo kit is recommended.

**Trainer Resource:**

**Handouts:**
- LEGO WeDo Component Identification Sheet (2 pages)
- LEGO WeDo Internet Resources

**Notes:**
Take time to familiarize yourself with the training material. It is recommended that before sharing any robotics activity with youth, you have a ‘practice run’ first. Going through the steps ahead of time will help you become comfortable with the material and you’ll be able to anticipate any difficulty young people might have, or questions they might ask.

Before the activity begins, all LEGO WeDo software should be loaded onto computers, with an icon available on the desktop for easy access. You will need to install two discs; one that is part of the LEGO WeDo kit, and then one that is part of the Activity Pack. This software has step by step on screen instructions for installation. Make sure that your laptops have enough battery life or an extension cord available for external power.

Before the activity begins, it is recommended that you practice building and programming the alligator. This process may take between one to two hours, depending on your comfort level and familiarity with the material. As you work with the LEGO WeDo kit, you will gradually become more familiar with the components and you will be able to work faster.

It is also recommended that the trainer familiarize themselves with the additional internet resources for this module.
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Trainer Notes:

If you are presenting this training directly after another module, feel free to adjust the text of Step 1 as needed to suit your situation.

STEP 1: Welcome

Welcome to the 4-H Robotics Train-the-Trainer program. This is module 8, and we’ll be getting acquainted with the LEGO WeDo robotics kit. You will learn how robotics interact with the world around us and gain a better understanding of how you can use the LEGO WeDo to facilitate positive youth development. You will be introduced to the LEGO WeDo kit and components. We’ll review the LEGO WeDo Activity Pack, a curriculum and interactive software provided by LEGO. You will also get to spend some time building and programming with the LEGO WeDo kit.

My name is ___________ and I’ll be your guide in this module.

All facilitators can introduce themselves at this time.

We want you to enjoy your time with us and we know you need to be comfortable to do so. Please feel free to go to the restroom or move around the room as needed. Although we are going to be diving into the world of technology, please do silence your cell phones for the length of our training time.

Point out any other useful information, such as the location of restrooms, at this time.

STEP 2: Everyday Robots (15 minutes)

Trainer Note: Before the activity begins, you will need to have a container or bag full of LEGO blocks of various colors. Do not use blocks from the LEGO WeDo kit. If you have a small audience, be sure to only include blocks in a few colors, so that you will have at least two or three people with the same color block.

We are all here to learn more about robotics—today, we’ll be building and programming some simple robots from the WeDo kit. Some of you may have experience with this type of project, but for some this is unfamiliar territory. You may not even be entirely sure what a robot actually is, or what role robots play in our daily lives. Let’s take a few minutes to think about what we already know about robots.

Have each participant choose a loose LEGO piece from the container. Then, have participants form small groups (3-5 people in each) based on having a similar color of LEGO
block. (For example, everyone with a green LEGO block joins together in one group for this activity. Groups should then move to separate areas in the room.

What do you think about when you hear the word, “robot”?

Encourage participants to respond with their thoughts and reactions.

If you look up “robot” in a dictionary, you will probably find that a robot is defined as a machine that may look like a human being, that can perform complex acts (like walking), that is guided by automatic controls, and automatically performs tasks which may be complicated or repetitive.

Now I am going to ask you some questions about robotics. Each group should discuss an answer, choose a spokesperson, and send that person forward to share the group’s answer. The first question is:

Choose as many questions as you like from this list, or make up your own.

- What role do robots play in our daily lives?
  - Example: Automated sliding doors, which use the same type of motion or light sensors that we will find in the LEGO WeDo kit.
- What is a career field where people work with robots?
  - Example: Law enforcement (robots diffuse or detonate bombs), medicine (robots assist with minimally invasive surgeries)
- What is something we have or do each day that would not be possible without robots?
- What is your favorite fictional robot (from movies, television or books)?
- Where could we find a robot in our town/city/county?
- What are some jobs that robots can do today more safely or efficiently than people can?

For each question, have a spokesperson from each small group share their answer with everyone. You may wish to record the answers on a flip-chart or whiteboard so that they will be visible for the rest of the session.

As you have all just shown, robots are actually a part of every day life, whether we depend on them to build things for us, assist doctors in performing surgery, or to explore the depths of the ocean! And the building blocks of those robots, and the scientists and engineers who design and create them, can be traced back to the activities we’re going to learn about today.
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**STEP 3: WeDo Demonstration (15 minutes)**

*Trainer Note: Before introducing the WeDo robot, be sure to ask participants to dispose of any food or drink, or move open containers to an area away from the robots.*

This should be the rule for the remainder of this module.

*Before the activity begins, choose a project from the lesson plans included with the WeDo kit. Build and program the project before this step. (We recommend the Alligator build.) Place the robot and laptop computer in an area where participants can gather around to observe and interact with the robot during the demonstration. In a separate area, lay out the other components of the WeDo kit for participants to see.*

WeDo is a LEGO product that allows elementary aged youth to build robots using LEGO pieces and then program the robot to perform specific function using an icon based software.

WeDo engages users in hands-on technology experiments that focus on science, mathematics, social studies and language concepts. The basics of programming, engineering, and constructing are all part of the process.

LEGO WeDo is recommended for use with elementary age youth, and will help them learn basic construction and programming skills.

Each LEGO WeDo kit has plans for twelve different robot builds in four areas:
- Amazing Mechanisms
- Wild Animals
- Play Soccer
- Adventure Stories

LEGO also offers instructions for additional builds that you can complete with a WeDo kit.

In order to demonstrate this for you, I have constructed this robot according to the instructions included in the kit. This is one of the typical builds and is a great place for us to start. In a few minutes you are going to be building this robot and programming it yourself, but first I would like to show you some of the key aspects of the WeDo kit.

*Using your chosen project, briefly review the LEGO parts and electronic pieces, show the connection to the laptop, and give participants a view of the screen with programming visible.*
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*Trainer Note:* Only a brief identification is needed at this time, as the next step will introduce each piece in-depth.

Show participants how the robot moves and reacts to carry out the program. Give everyone a chance to interact with the robot and ask any questions.

Lead participants in a brief reflection on the LEGO WeDo demonstration. Ask any of the following questions, or add your own:

- How does the LEGO WeDo compare to the ideas about robots we shared earlier?
- What aspects of the LEGO WeDo demonstration catch your interest?
- What experiences or knowledge do you have that might relate to working with the LEGO WeDo? (for example, working with computers)
- How do you think youth will respond to the LEGO WeDo robots?
- How do you think a LEGO WeDo activity could be part of a 4-H club meeting?

I hope this simple demonstration has ignited your imagination, because it’s your turn to get some hands-on experience with the LEGO WeDo kit.
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Activity:
Let’s Do WeDo

Time:
2 hours, 5 minutes total (does not include breaks)

Materials:
WeDo Kits (1 kit per 2-3 people) - including building guides
Computers (1 per kit)
Tables with space to build—1 table per kit is recommended
Chairs

Handouts:
WeDo Inventory, description, and FAQ handout (2 pages)

STEP 4: Let’s Do WeDo (20 minutes)

**Trainer Note:** Before the activity begins, if possible, set up the room so that each group (and kit) have a dedicated table. This will ensure that each group has enough space to work and help to prevent parts from accidentally getting lost into a different kit.

Distribute a WeDo kit to each group of 2-3 participants. Each group will also need a laptop computer that will run the programming software.

Now that you’ve had a chance to meet a WeDo robot, you’re going to become the engineers and build a robot from the kit. It’s important to have this experience because you’ll learn about the kit and activities first hand.

In fact, I suggest that before sharing any robotics activity with youth, you have a ‘practice run’ first. Going through the steps ahead of time will help you become comfortable with the material and you’ll be able to anticipate any difficulty young people might have, or questions they might ask.

You might be wondering what is included in a WeDo kit.

*Hold up a kit for participants to see.*

Each WeDo kit is contained inside this small box. The box has a snap on lid and is conveniently stackable. Let’s get familiar with what is inside each kit.

*Have participants open the kit. The first thing they will see is a hard cardboard sheet that lists all the parts included, and the quantity of each part.*

This parts-inventory sheet is essential and should not be discarded. It will be used to inventory each kit when needed.

*The next thing they will see is a clear tray that neatly nests inside the kit; it has four compartments and is useful for housing the sensors and smaller parts.*

There are a few essential parts that are included in each build. These are typical LEGO bricks, sensors, a motor and a few other specialty pieces. You each have a hand-out that pictures these key pieces. For the next few minutes, go through your pieces and match them up with the pictures and
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descriptions on the handout. Bricks vary in shape and size but each play an important role in specific builds, so using the corresponding bricks is vital to have a complete and functioning robot. You will also find a “mini figure which” is a favorite of most builders, which comes with interchangeable heads, hair and a hat, as well as, various gears, cams, axles and other essential pieces.

*Assist participants in identifying and matching up parts with the handout.*

**Trainer Note:** Ask the group if they know how to identify the correct piece in the kit that matches the one in the guide.

*Answer:* When identifying specific bricks you must count the number of circular studs on top of the brick make sure that they correspond to the diagram in the guide.

*Emphasize to the group that it is important that they follow the directions exactly. Many times participants glance at the book and haphazardly place the part—this often happens when builders rush!*

Now that you’ve found all the pieces, you might be wondering what to do with them! Included with each kit are Building Guides.

*Hold up building guides for audience to see as a visual, flip through pages, refer to the ones in front of participants*

When you first get started with WeDo, you will probably want to utilize the building guides. This will make the teaching process very straightforward, and since these full color pictorial building guides are similar to most LEGO build kit instructions; young people will probably recognize them and be comfortable with them quickly.

Each WeDo kit comes with four building guides, which have four separate themes. They are:

- Amazing Mechanisms (book with spinning top, dancing birds, and drumming monkey),
- Wild Animals (book with alligator, lion, and bird),
- Play Soccer (book with goal keeper, kicker leg, and cheering fans)
- Adventure Stories (book with airplane, sailboat, and the giant)

So each WeDo kit comes with a total of 12 projects laid out in the building guides. Since you may not be familiar with how the guides work, let’s take a look.
Open up the guide that has the alligator on the cover - it also has a bird and a lion. Turn to the first page of the alligator build. You will see a completed alligator on this page. This shows you what the finished build will look like.

_Hold up or display a building guide showing the appropriate page._

Turn to the next page for a break down of the building guide. You will see a large white number for each step. These numbers illustrate the order of the steps needed for the build. For each step the guide shows what the finished build will look like (this can be seen in the upper most left corner of the page, for each step.) In the case of the alligator it shows the alligator partially built.

Directly below the partially built alligator is a key identifying the pieces needed to complete the step. In the case of step one, you see four round lime green pieces, and four rectangular green pieces. Once those pieces have been located, assemble them according to the diagram in step one.

Each step follows the same format. Some builds require only parts of the robot to be built at a time, and then combined later on in the process.

_Trainer Note: You may wish to give participants a short break before starting the next section._
STEP 5: WeDo Build (45 minutes)

**Trainer Note:** Steps and strategies for building differ according to the build chosen. This is the reason why practicing a build before presenting it to youth is strongly encouraged!

Remind groups that it building is not a race! Suggest that each group check at each step to be sure their build matches the guide. Placing parts incorrectly may lead a robot which doesn’t function.

Be aware that each group may finish their build at a different time.

Now that the kit and the guide have been introduced it is time to turn into your eight year old self and build!

Instruct each group to build the alligator. Allow 30-45 minutes for participants to complete the build. As the build begins remind participants to be careful when choosing parts. Some are similar; the only difference is the length.

Once a group is finished, look over the build and make sure the following are correct:

- The gear is facing the correct direction
- Rubber bands are placed on the appropriate spot
- Motion sensor lines up in the right location
- Test the gears - the mouth should open and close
- All sensors are secure
- All LEGO bricks are secure
- Look over entire build and make sure it is identical to the guide

There are a few common trouble spots to be aware of as you wrap up your build. As I list them, check that your group has used each piece correctly.

- Are the green rectangular feet are facing the right way?
- Is the correct length of white brick used for the body support?
- Is the longer axle used for the mouth of the alligator?
- Is the mouth aligned correctly according to the build guide?
- Is the gear facing the correct direction?
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If some groups finish early and wait for others to complete the build, distribute cards with the following questions. Groups can discuss and prepare for a reflection at the end of this module.

- Have you built with LEGO before?
- How did that experience contribute to your knowledge today?
- What did you like about the build?
- What were the challenges?
- Where there any surprises?
- How do you think young people will approach this activity?
- In what ways could this type of activity be used in a 4-H club program?

Before beginning the LEGO Curriculum Overview, you may wish to give participants a short break.
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STEP 6 - WeDo Activity Pack Introduction (15 minutes)

An important feature of the WeDo platform is that it provides a teacher’s guide, curriculum, and software add-on called the Activity Pack.

Show or display the Activity Pack.

The Activity Pack is used to guide leaders, volunteers, or staff through lesson plans and programming specific to the builds. This additional resource material is available for purchase and is highly recommended.

The activity pack CD-Rom is a software add-on that works with the program provided with the initial WeDo kit. It provides step-by-step on screen instructions identical to the builds in the building guide books and includes 12 activities based on four themes: Soccer, Adventure Stories, Wild Animal Park and Mechanical Toys. Activities are introduced with animations that compliment the programming software. Teacher notes and a glossary are also included. The Teachers Guide contains notes for the activities as well as management ideas, curriculum support, software overview and examples for building and programming.

**Trainer Note:** Pricing for this material varies. If your state or region has a LEGO sales representative, a purchasing program or plan, or any other assistance available, share that information with participants. A sales representative can also provide information on solutions for programs that require multiple computers to run the WeDo Robotics Software.

For the next segment of the training, make sure that each group has a Teachers Guide.

Since you are working on the Alligator build, we can review the Teachers Guide for that build. You will see on the first page (page 80) that the objectives for the build, and details on what participants will accomplish, are clearly stated.

The next page (page 81) covers the animated movie that accompanies the build, and lists discussion questions that you might ask after youth view the movie. We will view the movie in a few minutes when we review at the software.

This page also suggests other ways to interact with the group through a series of questions relating to the alligator. It recommended that you do a little research on your own about the subject area you will be teaching, so you are able to answer unexpected questions from the group.
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The following page (page 82) is titled Construct. This part of the guide instructs participants to build the model through the step-by-step on screen instructions. As a facilitator, you can determine if you would like to use the on-screen instructions or have participants use the build guide.

**Trainer Note:** This may depend on how much room the participants have to build. If a group is working with laptops and has plenty of table space, then the on-screen directions may work best.

Some computer labs may not leave room for building at the computer station, so building in one room and transferring your robot to the computer may be something to consider. Also, some learners may find working from the book easier than reading the screen.

As participants learn more about the youth in their programs, they may find that a variety of presentation styles work for different individuals. They should feel free to mix and match to make the experience a positive one for everyone in the program.

This section also gives a brief overview of the mechanisms and the process behind the robot’s function. Introducing this information prepares you to answer questions, and expands on the concepts that youth can learn when taking part in each project.

*Page 83* starts to introduce participants to the basic functions of the software and things to remember when programming. We suggest using an LCD projector to lead first-time participants through an on-screen software introduction, which we will experience in the next step.

*Pages 84 through 86* are the continuation of the lesson plan and suggested modifications to programming. The modifications allow the participant to activate the motion sensor and initiate its functionality.

The Activity Pack Curriculum also includes building instructions based on the mechanism for those who would like to introduce those concepts first, or use them during a theme based build.

*Before beginning the next step, you may wish to give participants a short break.*
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STEP 7 - WeDo Programming (45 minutes)

**Trainer Note: To demonstrate programming,** you will need to set up a computer that is running the LEGO WeDo Software.

Connect the computer to a projector and display your screen for everyone to see.

Walk through the information in this step* while participants watch.

After you have completed the introduction, have participants try the program on their own, with the individual kits and laptops at each table.

This process allows the participants to give their full attention to your demonstration before they attempt to do the programming themselves.

* There are two ways to introduce the WeDo programming software. You can choose to have participants watch the WeDo Software Demonstration Video, or you can give a “walk-through” demonstration of your own.

If you choose to show the video, the following script serves as a resource for you, and you may move on to having participants program their robots after the video. If you choose to demonstrate the software, the script of STEP 7 will be your guide.

At this point you have built your LEGO WeDo robot and ensured that all connections are secure and that the robot exactly matches the diagram in the build guide. Now, you’re ready to bring your robot to life with programming.

The LEGO WeDo software is a drag and drop icon based software that provides an intuitive and easy-to-use programming environment suitable for beginners and experienced users alike. The software automatically detects motors and sensors when they are attached to the LEGO USB Hub.

**Trainer Note: USB means Universal Serial Bus. USB connections are found on all types of electronics, including smart phones and cameras. Most computers have one or more USB ports.**

It also includes a digital Getting Started Guide with simple building tips and programming examples.

Point out what the LEGO WeDo software icon looks like on the desktop of the computer. Explain that double-clicking the icon will launch the LEGO WeDo software.
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After launching the program, continue as follows:

At the bottom of the screen, there is an icon palette featuring many different task icons. Each one has a specific function and will allow participants to make their robot builds come alive.

The key to mastering these controls is experimenting! Encourage youth to add and change these icons after they have learned the initial programming for each build. A detailed list of each icon and the corresponding function is included in the Teachers Guide.

In the upper left hand corner there is a small yellow brick icon. Clicking on this icon will activate the Getting Started Guide and theme based builds.

In addition to the printed building guides, each theme based build has its own movie. Each movie leads into an on-screen building guide option. At the bottom of the newly opened window, you will notice a set of light grey arrows in the left and right hand corners. These arrows allow you to scroll through the build guide. This feature can be used in place of, or in addition to, the building guide books.

If time allows, click through the on-screen building guide option for the Alligator project so participants are familiar with that option.

When you have reached the end of the on-screen build, you are introduced to the initial programming that corresponds to that build. You will see an example program which you can replicate in order to program your robot.

Now that we have looked over the software, it’s time to try it out.

The first thing we need to do is plug our robot into the computer. This is done through the USB port. Once connected you should see an icon in the upper left hand corner that indicates which sensor you are using. This is important because it ensures your robot has all the proper connections.

You should see an indicator for the motion sensor, which was used when you built your alligator. If this icon is not present make sure all your sensors are connected securely to the USB Hub and that the USB Hub is connected to the computer properly.

**Trainer Note:** Depending on the knowledge level participants possess, you may or may not need to demonstrate how to connect the robot to the USB port. If you have a co-facilitator, they may need to circulate through the groups to make sure the robot is properly connected.
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**Trainer Note**: The next step can be performed using one of two methods: On-Screen Programming or Handout Guides. Review both methods before the training and choose one to demonstrate. You may wish to demonstrate both if time allows, or simply direct participants to a resource where they can learn about both methods. Scripts for both methods are provided.

*If you choose to present On Screen Programming, resume the script on this page.*
*If you choose to present Handout Guides, resume the script on page 16, at the headline “Handouts”*

**On Screen Programming:**

*You may wish to describe these steps while performing them on-screen for participants to watch. At the end of each step, guide participants to complete the same step at their tables.*

The next task to accomplish is finding the programming for the alligator. To do this, click on the small yellow brick in the top left hand corner of your screen. Once a secondary window opens up, click on the little yellow figure’s head. This will take you to the theme based builds, where you can find and click on the alligator icon.

When you click on the alligator icon, a movie will play that corresponds to the alligator build.

**Trainer Note**: These movies have sound, so you may need to remind participants how to control the volume or to use headphones while viewing. Controlling the volume will be important later on once participants start programming since there are sound icons that can be used.

After viewing the movie, click on the grey arrow at the bottom of the screen and scrolling through the onscreen build until the program screen appears. This screen shows an example of the program for the alligator.

Using the icons on the palette at the bottom of the screen, drag and drop icons onto the screen to create a replica of the example alligator program pictured. Once the complete program has been entered, press the letter A on the keyboard to initiate the first action. The alligator’s mouth should close and open when the letter A is pressed. This is a command based program and you are controlling exactly what the robot does by pressing the A button.
Now we will use the motion sensor.

The participants should now continue to skip through the program until they see the next program example. This one begins with the play button first instead of the letter A. Once participants have completed the program have them click on the play button.

The play button will initiate the motion sensor to activate. When an object is place in or near the alligator’s mouth it will cause the motion sensor to tell the alligator’s mouth to close and then open again.

When viewing the icon program stream (the row of icons, representing functions, that you have just created) you will notice that the program stream blinks as each icon’s function is performed, or waiting to be performed. In the case of the alligator the hourglass with the motion sensor under it will blink repeatedly until the motion sensor is activated by an object. Because a loop has been added this sequence will continue until the RED stop button (small red square button found at the bottom right hand corner of the screen) has been pressed.

Skip to Program Discussion on page 16.

Handouts:

Distribute handout containing programming examples.

Using the icons on the palette below drag and drop icons onto your screen creating a replica of the example alligator program provided on the handout.

Once the complete program has been entered, press the letter A on the keyboard to initiate the first action. The alligator’s mouth should close and open when the letter A is pressed. This is a command based program and that you are controlling exactly what the robot does by pressing the A button.

Now we will use the motion sensor.

Participants should now continue to the next program example called alligator motion sensor. This example begins with the play button.

Click on the play button. The play button activates the motion sensor. When an object is place in or near the alligator’s mouth, the motion sensor will tell the alligator’s mouth to close and then open again.

When viewing the icon program stream (the row of icons, representing functions, that you have just created) you will notice that the program stream blinks as each icon’s function is performed, or wait-
ing to be performed. In the case of the alligator the hourglass with the motion sensor under it will blink repeatedly until the motion sensor is activated by an object. Because a loop has been added this sequence will continue until the RED stop button (small red square button found at the bottom right hand corner of the screen) has been pressed.

**Program Discussion:**

At this point the alligator has been successfully programmed two different ways.

Encourage participants to experiment with the program by adding additional icons such as sounds, backgrounds, and text or to change the motor and directions.

When participants have successfully programmed and activated the alligator robots, and experimented with other program features, guide them in discussing the activity.

Ask any of the following questions (or add your own based on the particular experiences of the group):

- What challenges did you encounter while building?
- Where there any challenges using the software?
- Was this easier or harder than you thought it would be? Explain.
- What did you learn about robotics from this activity?
- What did you learn about in this activity, other than robotics? (For example, team-work, following directions, etc.)
- How do you think youth would approach this activity? What about other volunteers? Parents?
- What other information or training would you need in order to facilitate a similar LEGO WeDo activity for youth?
- How would you introduce this activity to youth? When might you offer this activity?
- How could you use LEGO WeDo activities in a 4-H club setting?
- What other information or assistance can I provide for you?

**STEP 8: WeDo Resources (15 minutes)**

As you may have guessed, due to the easy-to-use building guides and comprehensive Teachers Guide and curriculum support documents, LEGO WeDo kits are very popular not only in 4-H Robotics programs, but also in schools and other youth programs, such as FIRST. Plus, as we’ve just experienced, playing with WeDo robots is really fun!

With so many teachers and youth workers using the WeDo kit, it is not surprising to find that a wealth of additional lesson plans and resources are available. Many of these resources are available on the Internet, and you can download them and use them with youth in your program.
Share LEGO WeDo Internet Resources handout and review with participants. If you have a computer with an Internet connection available, you may wish to show participants a few examples. Consider using an LCD projector to share your screen as you visit any of the resource websites.

When your program is up and running, you may find that new contacts and volunteers are also great sources for new builds and projects that can be created with WeDo kits. If you have youth who stay with your program for several years, they may surprise you with new ideas for the WeDo robots as well!

**STEP 8: Youth Development Adaptations (10 minutes)**

While we have seen that WeDo kits lead to fun and interesting building projects, you might be wondering how these robots contribute to youth development, and how WeDo robots can become a part of your 4-H programming.

Consider the following skills that can be developed through WeDo projects and the Activity Pack projects (Quoted from LEGO WeDo promotional material, available on the internet):

- Youth are encouraged to use creativity, teamwork and problem solving = life skills!
- Youth develop language and literacy through narrative and journalistic writing, storytelling, explaining, interviewing and interpreting
- Youth experience mathematics when measuring time and distance; adding, subtracting, multiplying, dividing, estimating, and using variables.
- Youth experience science through working with simple machines, gears, levers, pulleys; and experimenting with transmission of motion
- Youth discover technology when programming; using software media; and designing and creating a working model.

And true to the tradition of 4-H, youth have the opportunity to learn these concepts through hands-on experiences, guided by caring and competent volunteers.

Guide participants in discussing other potential applications of WeDo projects in the 4-H club setting. Ask any of the following questions, or add your own:

- How could youth use LEGO WeDo robots to perform service learning? (eg, providing a WeDo workshop for younger 4-H members at a clover camp)
- How could a club use LEGO WeDo kits as a fundraiser?
- How could a 4-H member use a LEGO WeDo kit in a traditional 4-H activity, such as a
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county fair or communications contest?
• How could a teen leader use LEGO WeDo kits to do an activity with junior members?
• Are there any 4-H activities unique to your county/region/state that would be conducive to utilizing a LEGO WeDo activity?

TRANSITION

If you are presenting another module directly after Module 5, adapt the following to fit your training schedule.

You have just experienced the Module 8 of the 4-H Robotics Train-the-Trainer toolkit for 4-H faculty and volunteers interested in launching robotics club programs. This module introduced you to the LEGO WeDo Robotics platform.

We saw a demonstration of a completed robot and then had the opportunity to build and program a robot. We reviewed the building guide, the Teachers Guide, and the Activity Pack, as well as experiencing some of the multimedia learning aids that are included in the LEGO WeDo Education kit. You are now experienced LEGO WeDo builders, with experience in robotics engineering and programming!

Are there any questions?

Answer any questions.

If you choose to develop a 4-H Robotics program in your area, there are eight other training modules available to you.

• Module 1: Comprehensive Robotics Overview
• Module 2: Recruitment and Partnerships
• Module 3: Community Resources Cultivation
• Module 4: Using Technology to Deliver a Robotics Program (Virtual Robotics Curriculum
• Module 5: Experiencing Engineering Design (Junk Yard Robotics curriculum)
• Module 6: An Experiential Model of Building Robots (Robots Platform curriculum)
• Module 7: Science Inquiry and Programming Robots (Exploring Robotics Platforms)
• Module 9: Expansion, Enrichment, Endurance: Your Year-Round Robotics Program

Provide participants with information about upcoming training opportunities and answer any remaining questions. This concludes Module 8: LEGO WeDo Introduction.
**LEGO USB Hub**

One of the electronic components is a USB Hub which will be used to connect the robot to the computer, once connected, special software will be used to tell the robot how to function through basic programming.

The two-port hub controls motors and sensors, transmits power and data to and from the computer, and is automatically detected by the software when connected to the computer.

When using this piece make sure all your connections are secure.

Replacement Cost Approx. $45.00  
Each Kit Contains 1

**Power Functions M-Motor**

Another important piece is the motor, it allows you to bring your robots to life. The motor connects to the USB Hub where the program from the computer activates the movement.

The motor can be programmed to turn in clockwise and counter clockwise directions and to move at different power levels.

Replacement Cost Approx. $8.00  
Each Kit Contains 1

**WeDo™ Robotics Motion Sensor**

The motion sensor is a small rectangular piece that looks like it has two lights on one end. When programed this sensor will activate when it detects an object within a range of 6 inches depending on the design of the object.

Replacement Cost Approx. $20.00  
Each Kit Contains 1

**WeDo™ Robotics Tilt Sensor**

The tilt sensor reports the direction it is tilted. It is a small rectangular piece that has curved double angled arrows on three sides.

Replacement Cost Approx. $20.00  
Each Kit Contains 1

Construction Set

The kit also includes 158 LEGO brightly colored elements that include axles, gears, rubber bands and even a LEGO figure with interchangeable hair and hat.

Important things to keep in mind:

All electronic parts are automatically detected by the software

Make sure all connections are secure or software may not be able to detect them. *This includes the connection to the computer.*

Sometimes the only way to distinguish between bricks or components is to count the circular studs on the top of the brick. The same concept applies when measuring axles - the bricks can be used as a measuring tool. The axles in the diagrams will have a number next to them (for example, a “4”.) To identify the correct axle, select a 4-count brick and hold it next to the axles. The axle that is the same length as the 4-count brick is also a 4. *Suggest including a picture of 2 or more brick sizes with captions to illustrate.*

WeDo Frequently Asked Questions:

**How long does it take to build and program?** This depends on the club leader and the youth, but typically each build can be completed in about 1 ½ to 2 hours.

**What are the recommended ages?** – WeDo can be used with youth ages 5–11, so Clover 4-H members can participate. Older youth are welcomed to become mentors. Some younger 4-H members may need assistance when it comes to building and programming so parent involvement is encouraged.

**Where can I buy a WeDo kit?** - Kits are available from LEGO Education and other sources on the internet. Check with your state 4-H Robotics contact to see if your state has a sales representative or a purchasing program/plan that you can use.

**How much does it cost?** – Kits vary in price according to quantity and package type. Suggested prices start from $140.
**LEGO WeDo Internet Resources**

For Inspiration and Recognition of Science and Technology (FIRST)  
http://www.usfirst.org/aboutus/content.aspx?id=34

Maryland FIRST  
http://www.mdfirst.org/

KISS Institute for Practical Robots: Robotics Laboratory: Wheels and Navigation Activity  
http://www.kipr.org/curriculum/wheels_nav.html

Redcliffe State High School (AUS) – Science of Robots (lesson plans and activities)  
http://www.smartred.eq.edu.au/Science%20of%20Robotics/Main%20Page.html

STOMP Sample Units, Activity Database  
http://stompnetwork.org/stomp-resources

Carnegie Mellon University – Robotics Academy  
http://www.education.rec.ri.cmu.edu/roboticscurriculum/index_to_robotics.htm

Lego Education Resource for Teachers  
http://www.legoeducation.us/global.aspx