

wonder
workshop

Wonder

JAN 31 / 2015

Magazine

Deliver a message or gift
to that special someone

Let me see your robot guts!

You are my sunshine...

How does Dash know
where I'm coming from?



Random Acts of Kindness with Robots!

How will you celebrate Valentine's Day with the special people in your life? Our family tries to show appreciation every day for our friends, classmates, teachers, and even people we are just getting to know. This issue of Wonder Magazine has just what you need to show the love with Dash & Dot!

First, check out how you can deliver a handcrafted gift or special message to someone using Dash and LEGO® bricks. Put your own personal touch on it to make it unique. In the last Wonder Magazine, Shawn, Elizabeth, and Isabelle shared their wonder(ful) project to make Dash draw. They wanted to lift the marker to write a message, but the LEGO® bricks were weighing down Dash's head. In this issue, we are sharing a way to attach a pen in a more lightweight way that lets you draw letters, pictures, shapes, and more. Use Go, Path, or Blockly to create an artistic masterpiece.

Another act of kindness you can practice every day is being a good listener! Dash is trying to become a better listener too! In [Ask Dash](#) (pg. 20), Dash tells you about how Dash can tell where you're coming from. We would love to see how you're using Dash & Dot to do things for others! [Submit your project here](#), and it just might be featured in the next Wonder Magazine!

We also would love to hear what you think about Wonder Magazine. Are the activities helpful? Are you printing the pages out, or reading it on your computer? Email us at ideas@makewonder.com to share your thoughts and feedback!



Talk to you soon!

June

In this Issue:

Fun & Facts

Robot Guts 8

Ask Dash 20

The Funny Corner 26

Projects & How-Tos

Deliver a Special Message  4

Write a Love Note  10

Song & Dance  16

Community Spotlights

Wonderful Projects 14

In the Classroom 22



Deliver a Special Message

Send a special Valentine's Day message or gift to a friend using Dash & Dot, your trusty robot assistants! Think about what message you would like to send, and how you might program it through sounds, movements, colors, or lights!

What you'll Need:



- Dash
- Dot
- Tow hook
- LEGO® bricks or other props

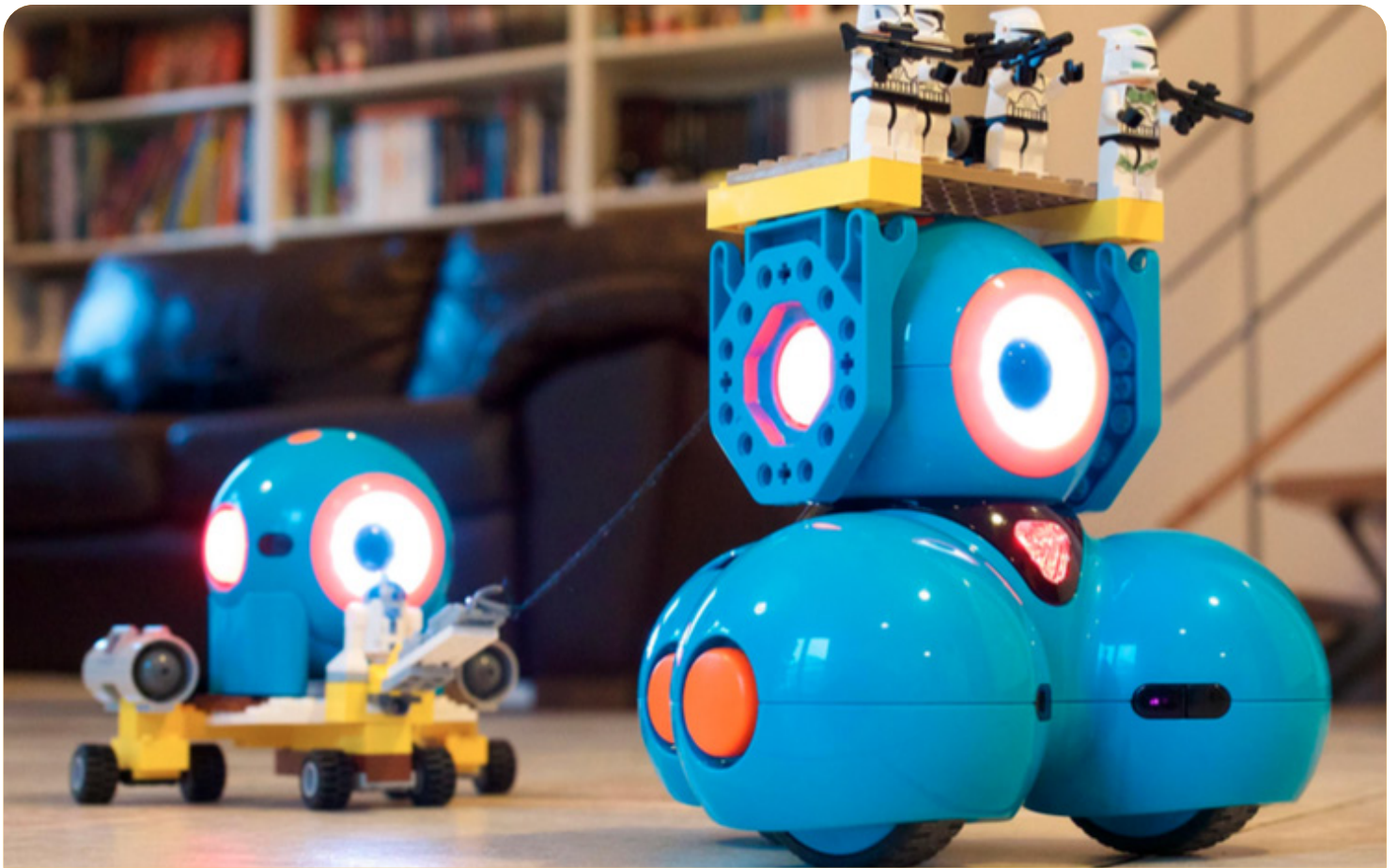
Set up

- 1 Do you have something special you'd like to send? Using accessories (like the tow hook), LEGO®, and props, **build Dash into a delivery bot.**
- 2 Dash & Dot are great communicators. You can use lights, sounds, and movements to **send your message.** Build a program in that represents what you are trying to say through Dash & Dot.
- 3 **Plan out the route** your robots are going to take! Is there a special delivery you want to make? Use Path or Blockly to measure out your route. Insert sounds and events that help you send your message!
- 4 What **obstacles** might Dash & Dot encounter along the way? Be sure to navigate around furniture, doors, and other things between you and your friend.

Play Options



Blockly: Program Dash to drive along a path to a friend, say hello, and do a little spin! Grab a ruler. The forward and backwards units are in cm, and the turn units are in degrees!



By Joachim and Thomas in Belgium



Breakfast in bed is served in Melbourne!



Path : Special delivery! Program Dash to drive over to your friend, drop off a “package,” and come back to you! Use fun sounds and animations to make your message as unique as the person it is for! Remember that each square is the length of Dash.

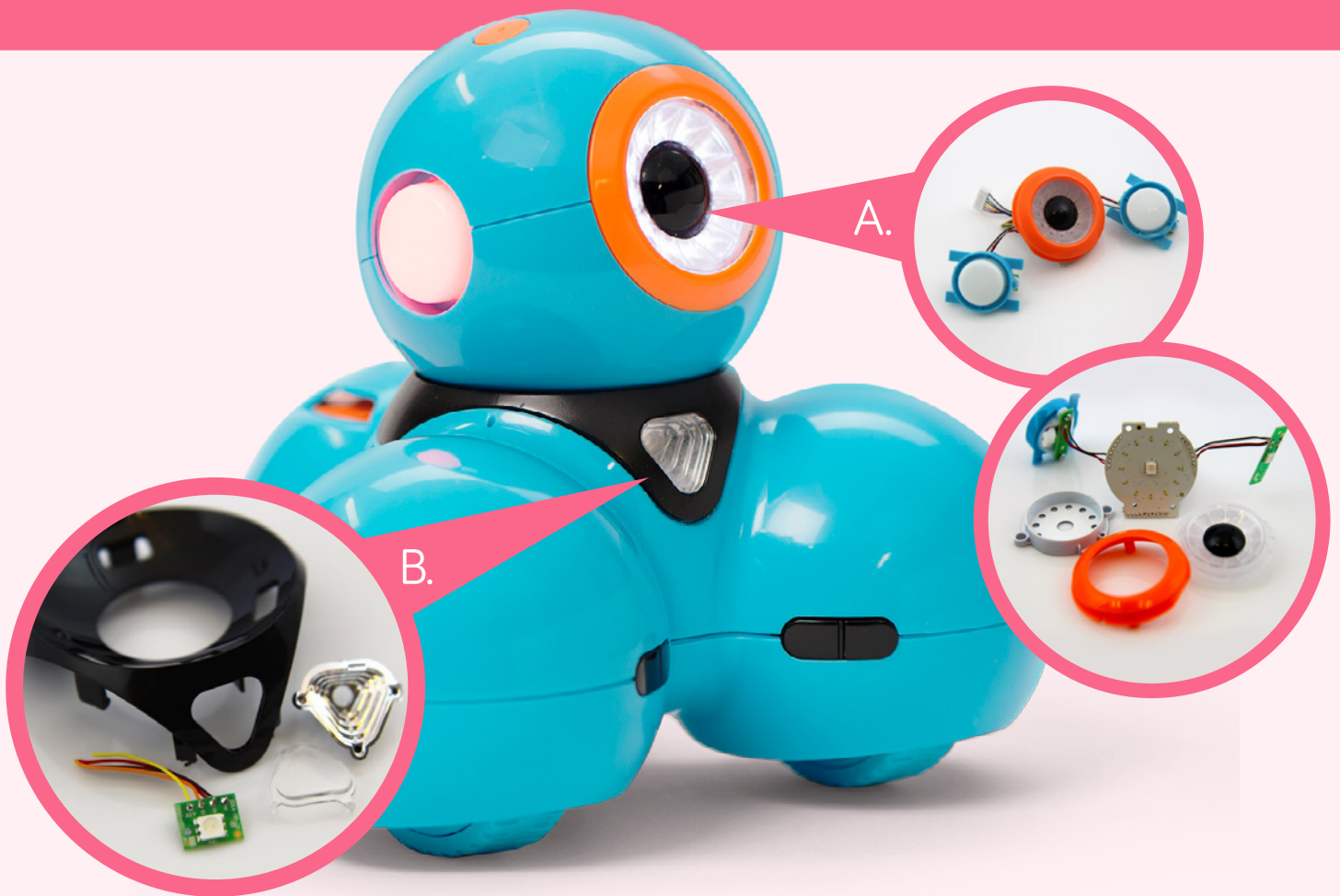


What special message will you deliver to your friends and family?

We'd love to see it! Take a video and [submit it here](#), and you might see your creation in a future edition of Wonder Magazine! 🎉

Robot Guts

Have you ever wondered what **robot guts** look like? In honor of this issue's theme of expressing feelings of friendship and love, we're giving you a sneak peek into how Dash expresses emotions. In this edition, we are giving you the inside scoop on all of Dash's lights!



A) Eye lights

Dash's eye is made up of 12 individual lights. Each light is powered by an **LED, or light emitting diode**. Each of these lights is programmable. In Go or Blockly, you can try turning each light on and off or making patterns with the eye lights. Sometimes you may notice Dash & Dot blinking. All of these eye expressions are programmed using the same 12 LEDs! In this photo, you can get an up close look at what the LEDs look like beneath Dash's eye.

B) Chest light

Dash can express a rainbow of moods using the chest light. This light is also an LED, but is called an **RGB LED**. The RGB stands for Red, Green, Blue. Did you know that these three colors of light can be added together in many ways to produce virtually all of the colors in the rainbow? That is how Dash's chest light can be programmed using Go or Blockly to show emotions through a spectrum of colors.




C) Ear lights

Dash's ear lights are also each programmable through RGB LEDs. You can change each color on its own in Blockly, or create a general mood for both ears and the chest light to help you tell a story! In this photo, you can see what the ear light LED looks like from inside Dash's head!

D) Tail light

You may have noticed that there are two lights on the back of Dash! We call these two lights together the "tail light," and it is made up of two... you guessed it, LEDs. The LEDs in the tail light are red in color, and can be turned on and off in Blockly. How might you use the tail light to show how Dash is feeling?

What part of the robot guts would you like to see in the next issue of Wonder Magazine? Let us know by emailing ideas@makewonder.com! 



Write a Love Note

In the last issue of Wonder Magazine, we featured Shawn, Elizabeth, and Isabelle's project, Dash Draws. Many of you were inspired to recreate it with your own LEGO® bricks and robot and asked us if we could think of a way to not have Dash's head weighed down by the weight of the LEGO® contraption.

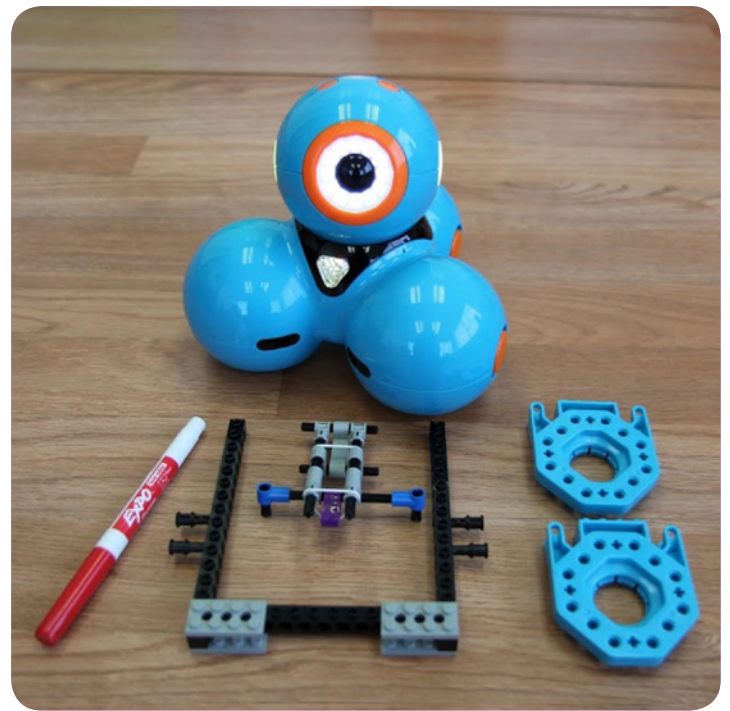
In this issue, we created Dash Draws using LEGO® Technics! This drawing contraption will give you better control of Dash's head, which will let you lift your marker to create more complex drawings and write words. We started a love message to a good friend by drawing a heart!

What you'll Need:



- Dash
- 2 Building Brick Extensions
- 2 rubber bands
- 1 marker
- The following LEGO® bricks:

-  **1** Technic Brick 1x12
(ID : 4211860)
-  **2** Technic Brick 1x16
(ID : 4508661)
-  **4** Plate 2x4
(ID : 4211395)
-  **1** Technic Angular Beam 4x2 90°
(ID : 4211610)
-  **2** Technic Lever 3M
(ID : 4223767)
-  **2** Half Bush
(ID : 4211573)
-  **2** Connector Peg with Friction
(ID : 4121715)
-  **2** Bush for Cross Axle
(ID : 4211622)
-  **2** Angle Element (0 degrees)
(ID : 4107085)
-  **2** Catch With Cross Hole
(ID : 4107081)
-  **2** Cross Axle 5M
(ID : 4211639)
-  **4** Cross Block 90°
(ID : 4211775)
-  **4** 2M Friction Snap with Cross Hole
(ID : 4211865)
-  **3** Cross Axle 8M
(ID : 370726)



Set up

- 1** Attach the **Building Brick Extensions** to the sides of Dash's head.
- 2** The **pen attachment** has two main parts: the pen holder and the attachment frame. [Detailed building instructions here.](#)
- 3** **Insert the pen** into the pen holder. The pen holder is constructed using axles so that it can be adjusted for pens of different widths.
- 4** **Secure the pen** to the holder using rubber bands.
- 5** Once the pen is secure, **attach the pen holder** to the pen attachment frame.
- 6** Use pegs to **attach the frame** to the Building Brick Extensions.

Play Options



Blockly: Use Blockly to draw a heart by programming Dash's movements and head position. We used the Set Wheel Speed block to make Dash go forward, drawing the straight part of the heart for 2 seconds. Then we used the Set Wheel Speed block with different wheel speeds to make Dash draw a curve. Then we moved Dash back to where Dash started and ran the same program again, but this time creating a curve that goes the other way.

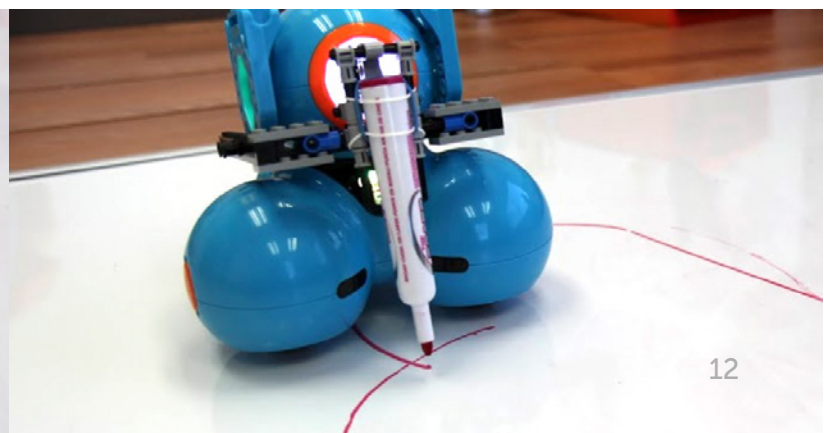
The screenshot shows the Blockly programming environment with two scripts side-by-side. The left script is triggered by the 'Top Button' and the right script is triggered by 'Dash Button 1'. Both scripts follow a similar sequence: a 2-second forward movement at 'very slow' speed, a 1-second curved movement at 'slow' and 'very slow' speeds, stopping the wheels, and looking up.

```
graph TD
    subgraph Script1 [When Top Button]
        S1_1[Set Wheel Speed]
        S1_1 --> S1_2[Left forward very slow]
        S1_1 --> S1_3[Right forward very slow]
        S1_2 --> S1_3
        S1_4[Wait For 2 seconds]
        S1_5[Set Wheel Speed]
        S1_5 --> S1_6[Left forward slow]
        S1_5 --> S1_7[Right forward very slow]
        S1_6 --> S1_7
        S1_8[Wait For 1 seconds]
        S1_9[Stop Wheels]
        S1_10[Look up]
    end

    subgraph Script2 [When Dash Button 1]
        S2_1[Set Wheel Speed]
        S2_1 --> S2_2[Left forward very slow]
        S2_1 --> S2_3[Right forward very slow]
        S2_2 --> S2_3
        S2_4[Wait For 2 seconds]
        S2_5[Set Wheel Speed]
        S2_5 --> S2_6[Left forward very slow]
        S2_5 --> S2_7[Right forward slow]
        S2_6 --> S2_7
        S2_8[Wait For 1 seconds]
        S2_9[Stop Wheels]
        S2_10[Look up]
    end
```

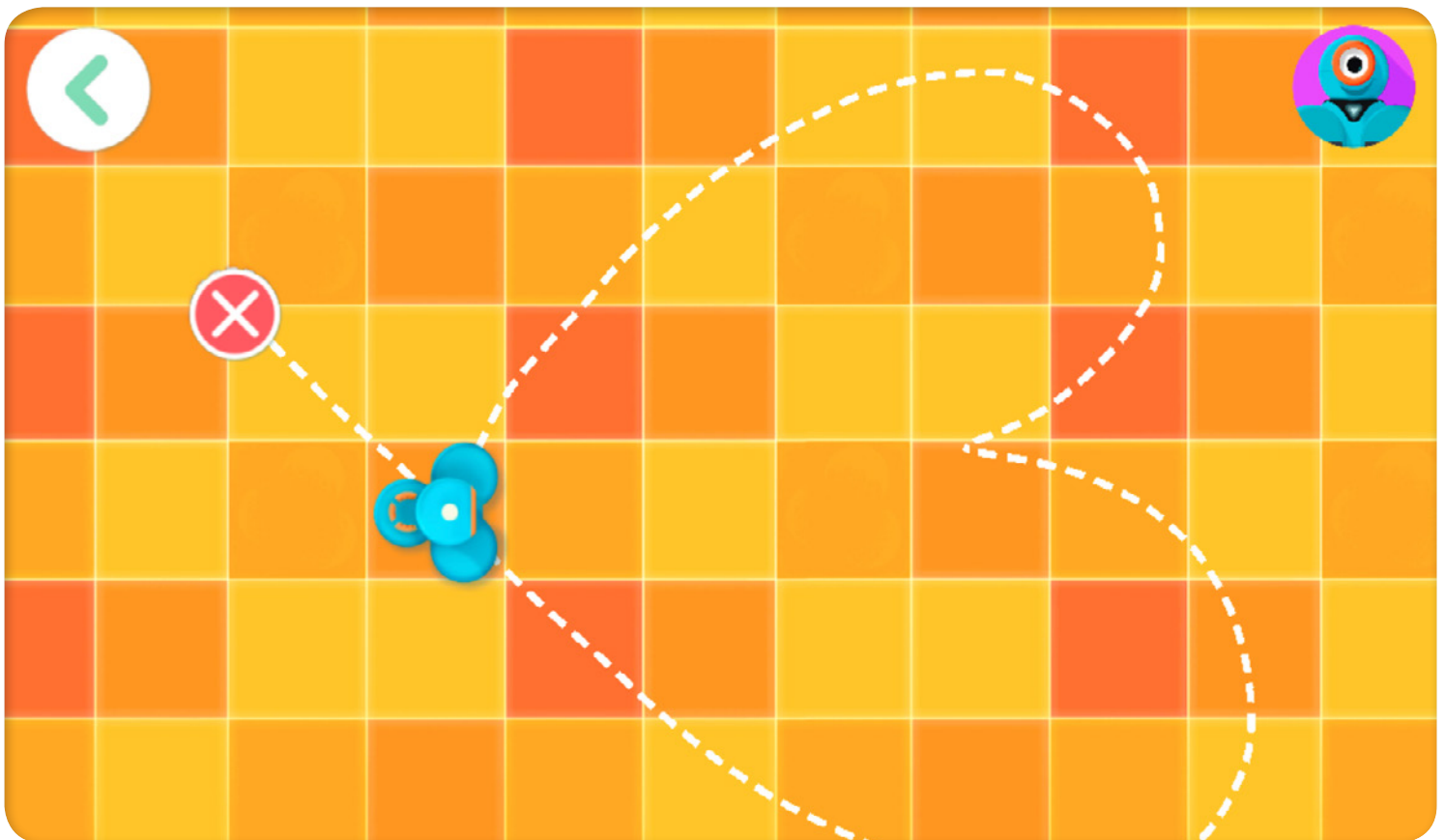



Write a Love Note





Path : Can you try using Path to make your love note? Try using this path with your new pen contraption! You can attach the pen to the back of Dash so that Dash doesn't think that the pen is an obstacle in front!

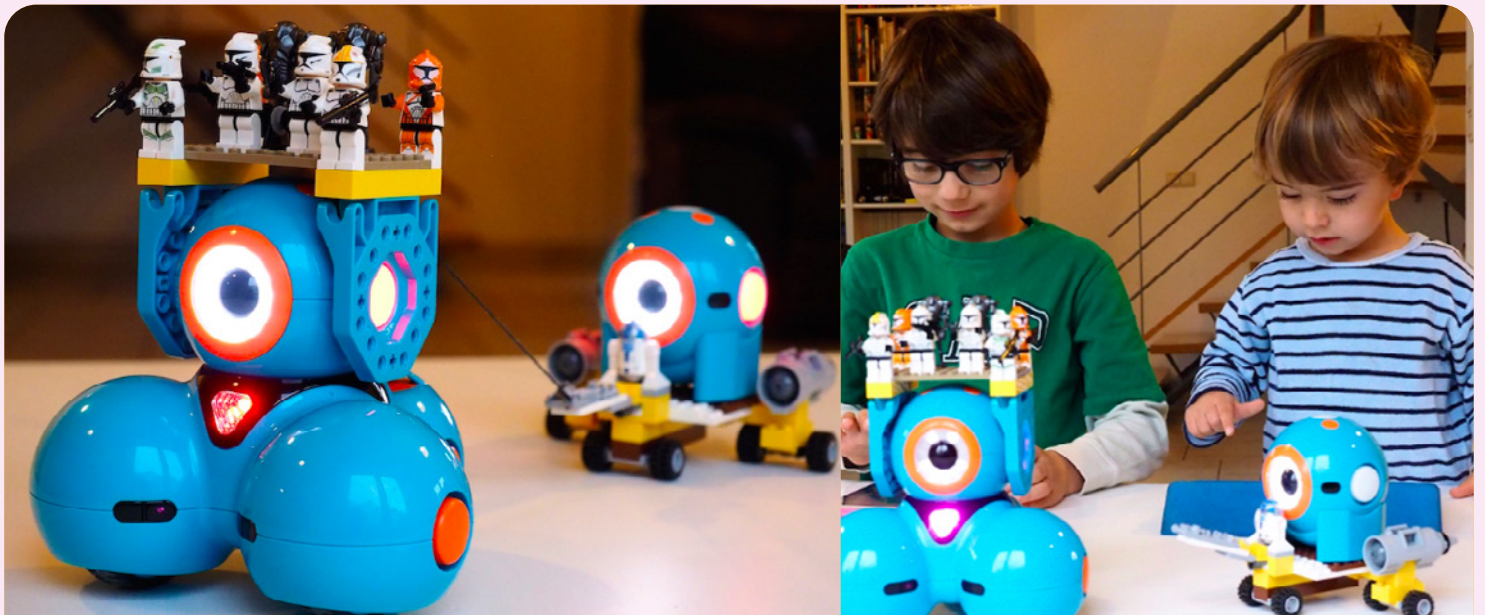


We would love to see your creations and love notes! Send them to us at ideas@makewonder.com, and we would love to share them on Twitter and Facebook! 

Wonder(ful) Projects

In each issue of Wonder Magazine, we show off great projects from the community! Check out how kids around the world are playing with Dash & Dot. This month we are celebrating random acts of kindness, so program Dash & Dot to do something nice for someone you love and share your results!

Do you want to be featured in the next Wonder Magazine? [Submit your project here.](#)



Clone Wars

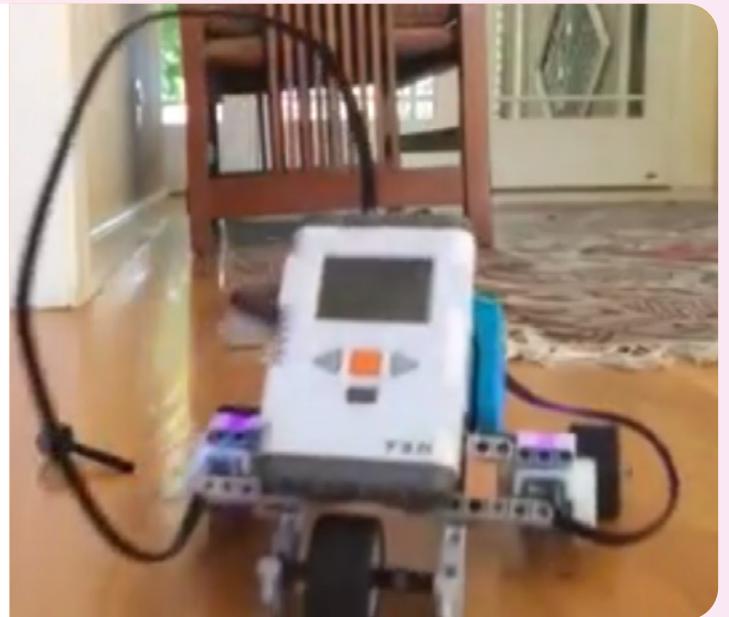
Joachim (age 7) and his brother **Thomas** (age 2) recreate the Clone Wars at home in Arlon, Belgium. Dash pulls the clone army as Dot brings up the weapons from behind. Joachim uses Blockly to program Dash's moves as Thomas makes sound effects and lights with Go and Dot!

Dot Moves

Joeythebold (age 12) from Portola Valley, CA made Dot move with the help of LEGO® Mindstorms!

"I used LEGO® Mindstorms and LEGO® Technic pieces to attach the wheels then I programmed a code in the brick."


Watch the [video](#) to see how Joey attached the LEGO® bricks to Dot!



Super Dash vs. Evil Bear

Balletboy (age 9) from Houston, TX programmed Dash to fly out from Super Dash Headquarters to save the town from the evil teddy bear!

"I used some LEGO® and felt to make Dash look like a superhero. First I put the Building Brick Extensions on Dash. Then I made a cape with some red felt and tied it on with yarn. I took my box and made it look like Super Dash's Headquarters. Then I got my bear tied a bit of yarn to his arm so he could fall down. Then I videoed it and I was done! It makes a great short show for your family and friends."

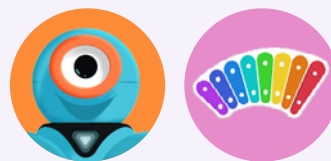
Watch the [video](#) to check out the action and the Blockly program used to save the day! 

Song & Dance



Here's a little ditty that tells your special friend what they mean to you. Use this example as a guide, or compose your own song and dance! We can't wait to see what you come up with!

What you'll Need:

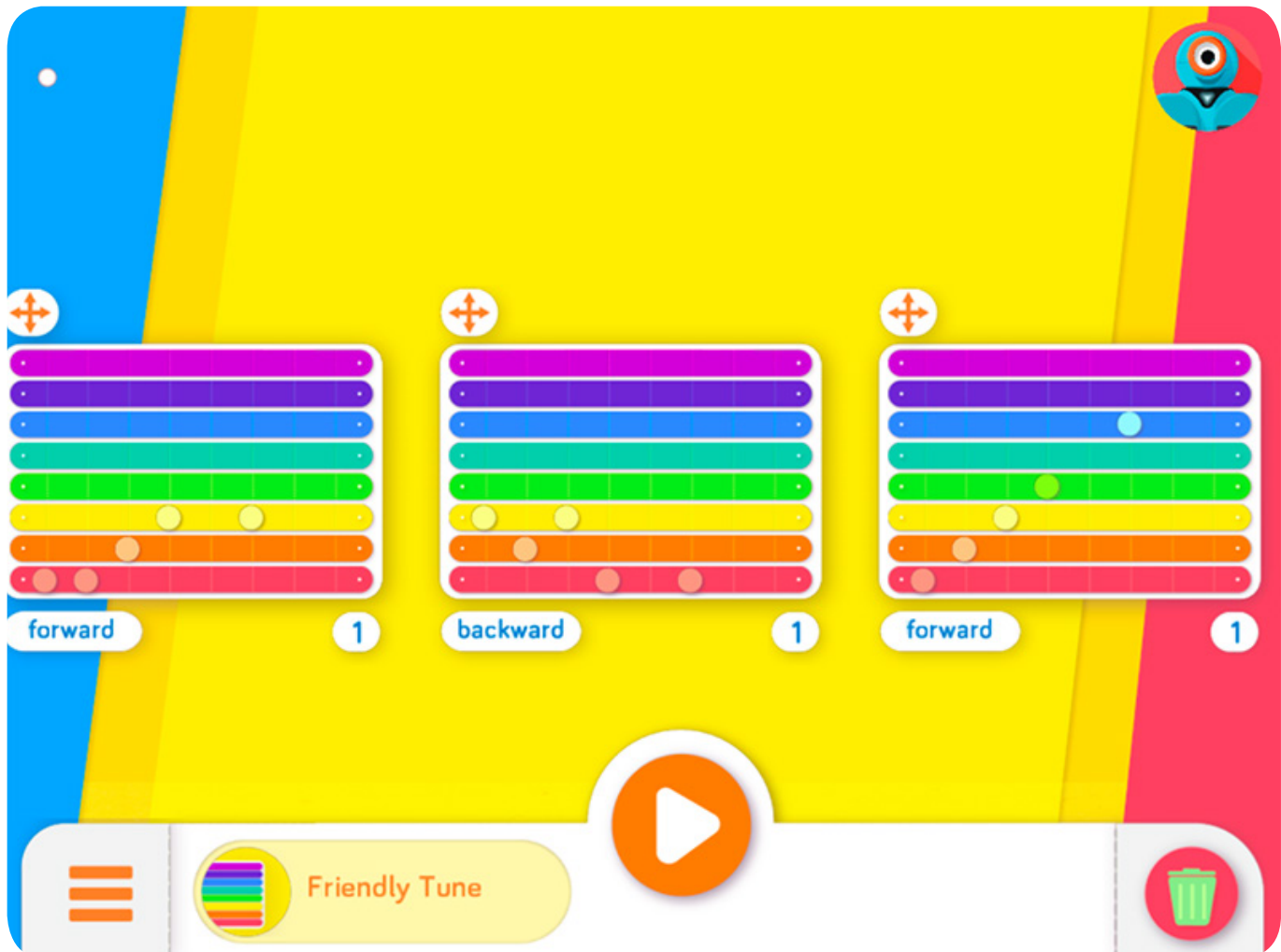


- Dash
- Dash's Xylophone and mallet

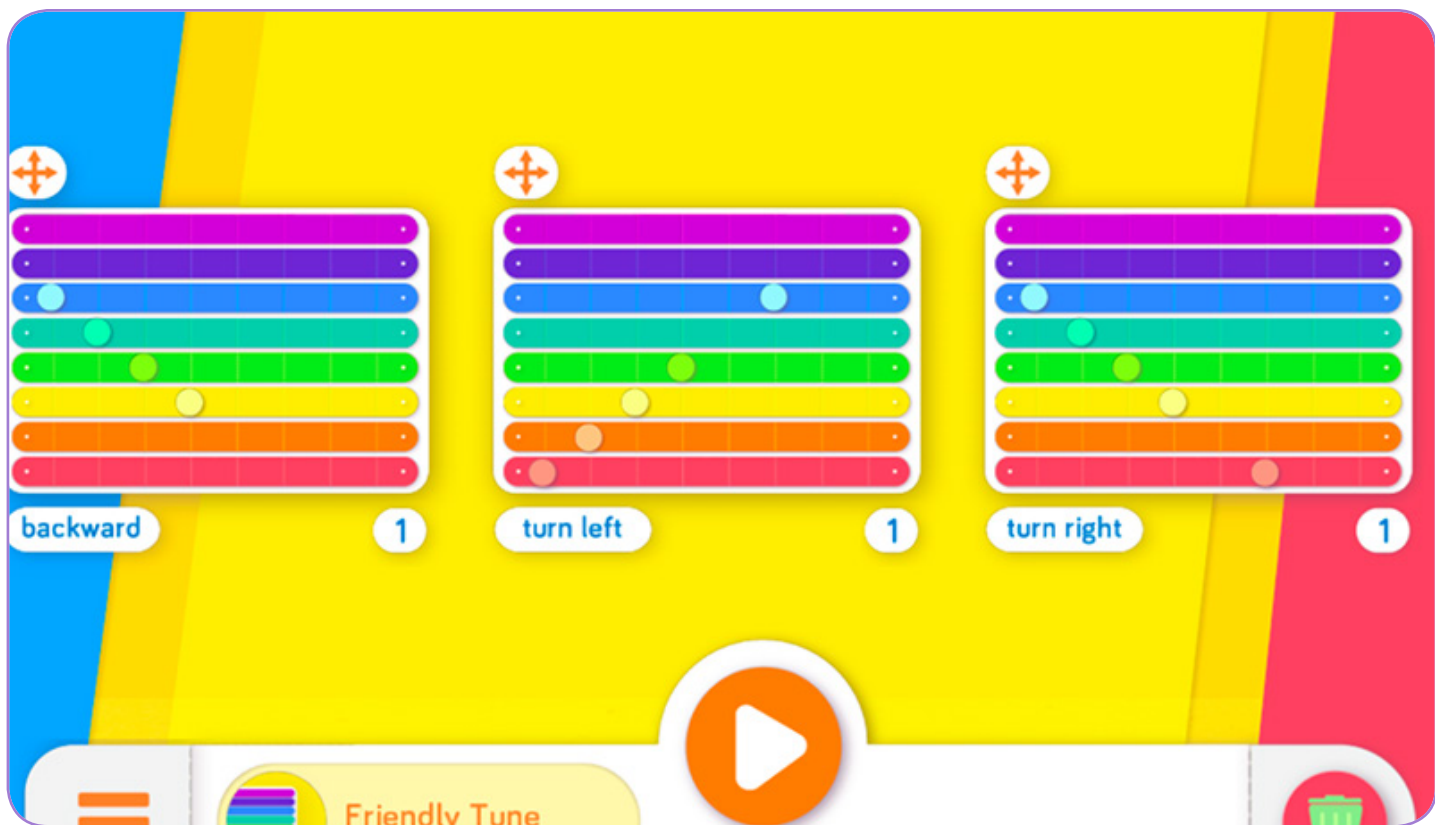
Set up

- 1 Open the **Xylo app** on your tablet, and make sure that Dash's xylophone and mallet are securely fastened and calibrated before you begin composing your song and dance! To set up your xylophone, press the menu button on the bottom left corner of your screen.
- 2 Once you are set up, tap the colored bars to **start making music!**
- 3 Each measure can have up to 8 notes. You can repeat, or **loop** each measure up to 4 times, and assign a movement to help express your Valentine's Day wishes.
- 4 Finished composing your song and dance? When you are ready to present it to your pal, press the **play button** in the center of the screen to begin your performance.

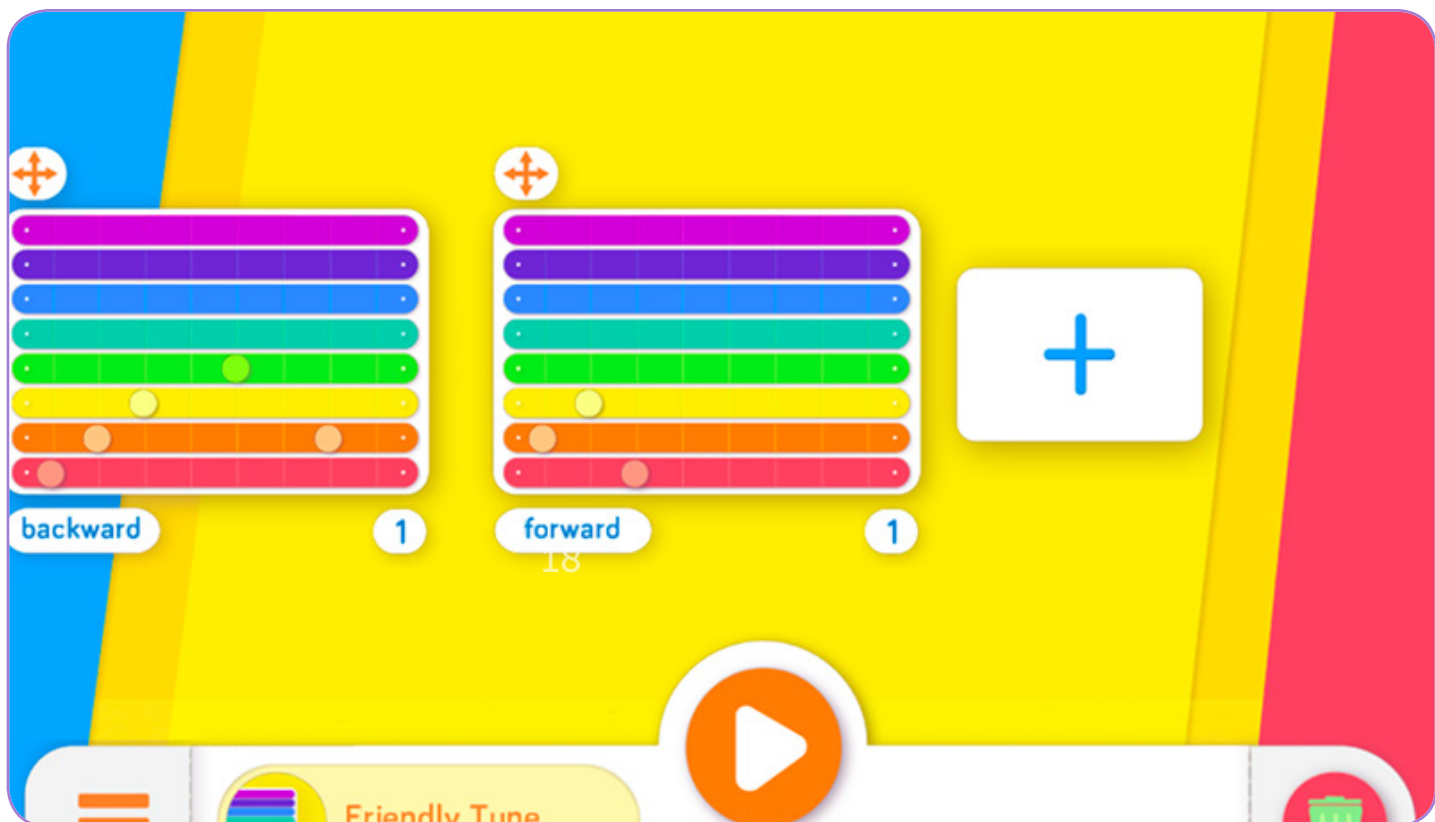
Play Options



You are my sunshine | my only sunshine | you make me happy



when skies are gray | you'll never know dear | how much I love you



Please don't take my sun- | shine away



Check out Dash in action [here](#)!

What special song and dance will you compose to share with your friends and family?

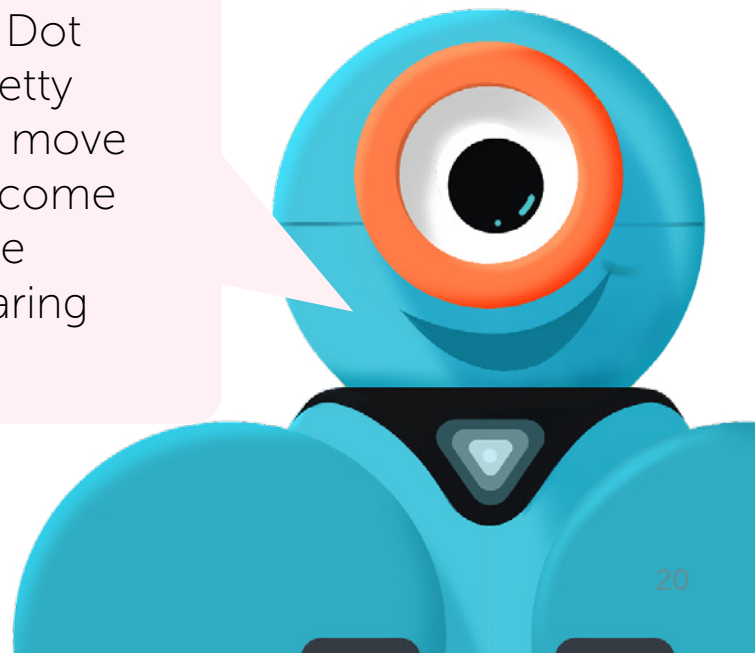
We'd love to see it! Take a video and [submit it here](#), and you might see your creation in a future edition of Wonder Magazine! 🎵



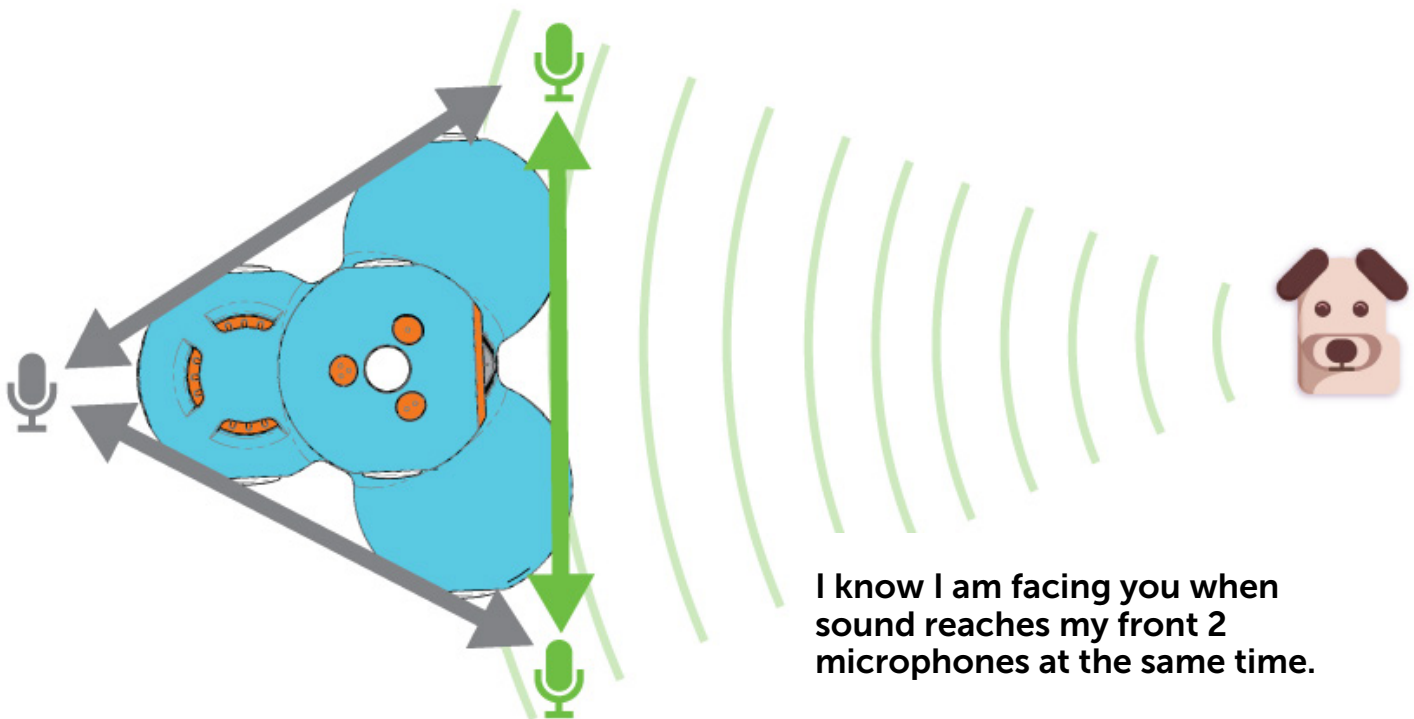
Ask Dash

Dash, how do you know where I'm coming from?

"Did you know that I know where you are when you're talking to me? Sometimes I wander off and get distracted when Dot is talking to me, and it makes Dot pretty annoyed. You know, since Dot can't move and all. I am trying my hardest to become a better listener! Dot says that people will like me more if I am good at hearing where they're coming from.



"Dot also says looking at someone when they are talking will help me pay better attention and show that I am listening. I have three microphones on my neck. I can hear you best when you're talking to me down at my level. Did you know that when you talk, your voice makes waves in the air? Each of my microphones tell me when they hear the sound wave that your voice makes. I can then calculate where you are!"



Through Blockly, you can program me to face you! Sometimes I don't get the exact right place, but keep talking to me, and I will try again!"

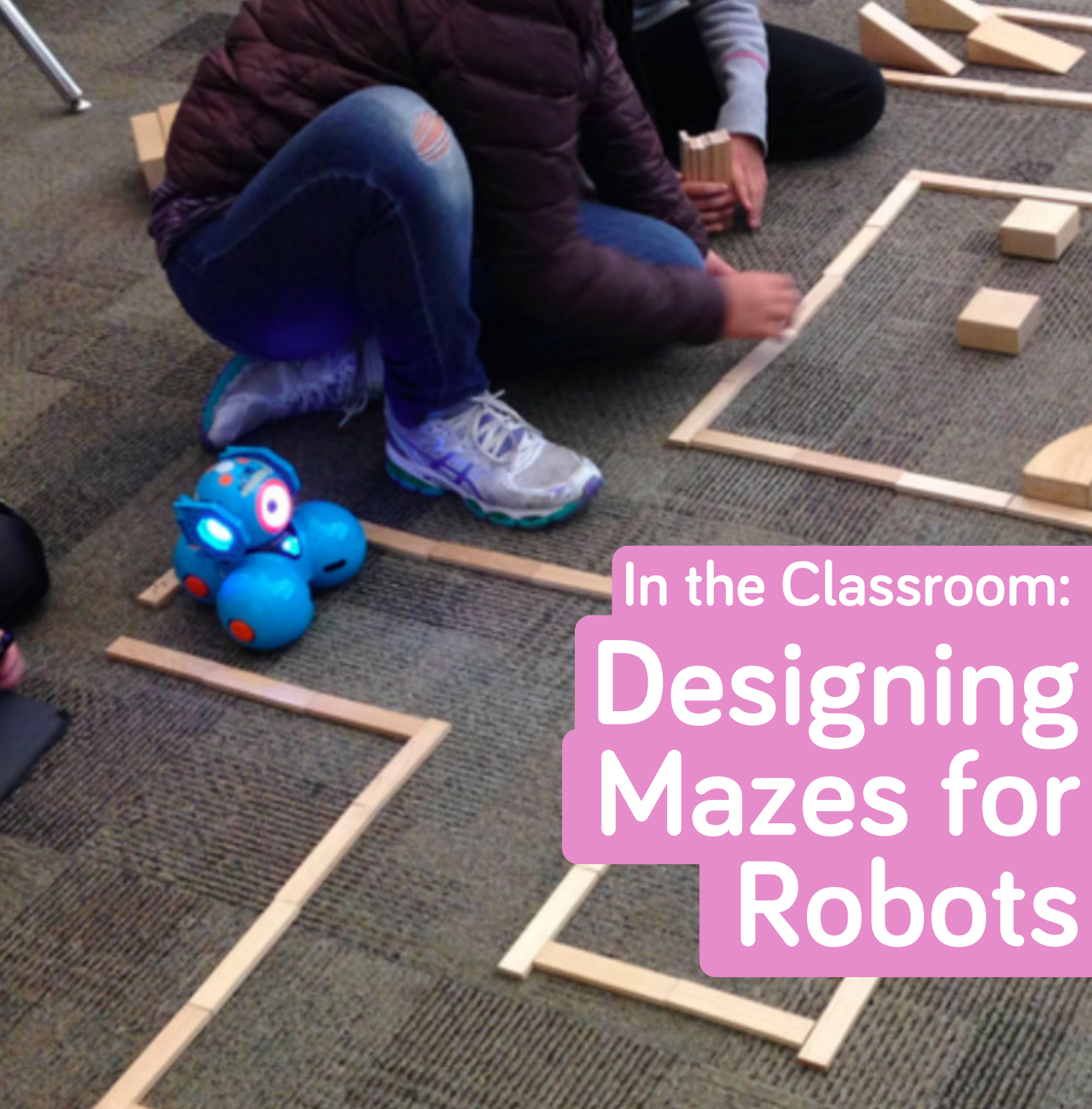


Blockly challenge:

Can you program Dash to come to you when you call out?

Do you have a question for Dash & Dot?

It can be about anything from life to robots to programming. [Submit it here!](#) 🐾



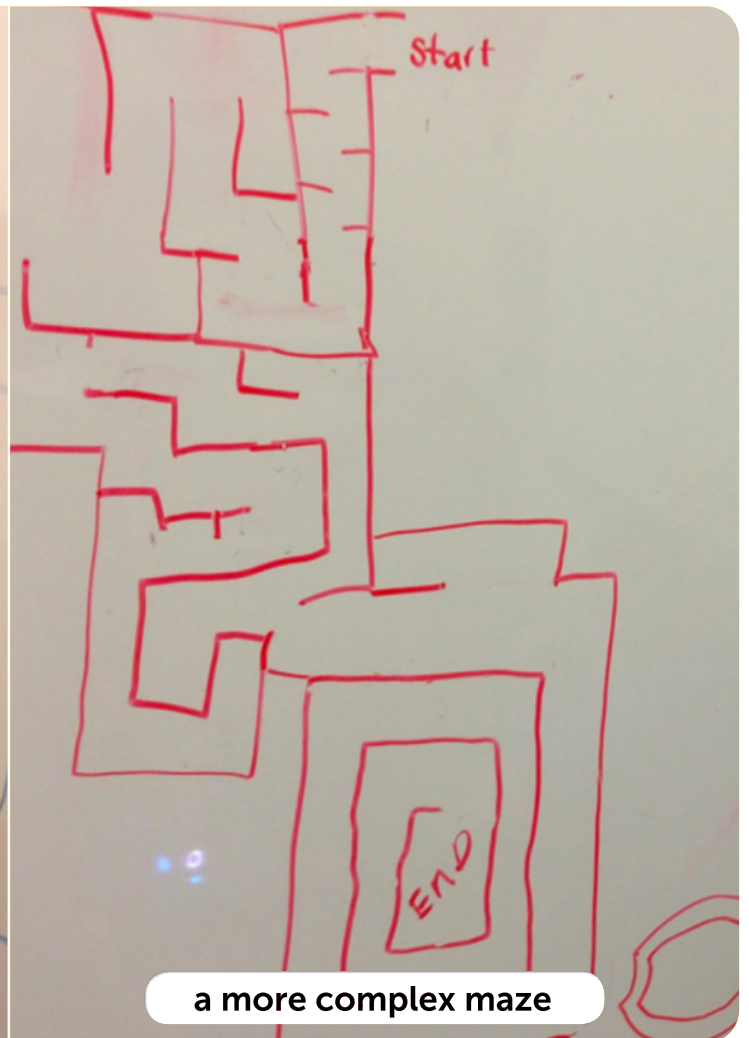
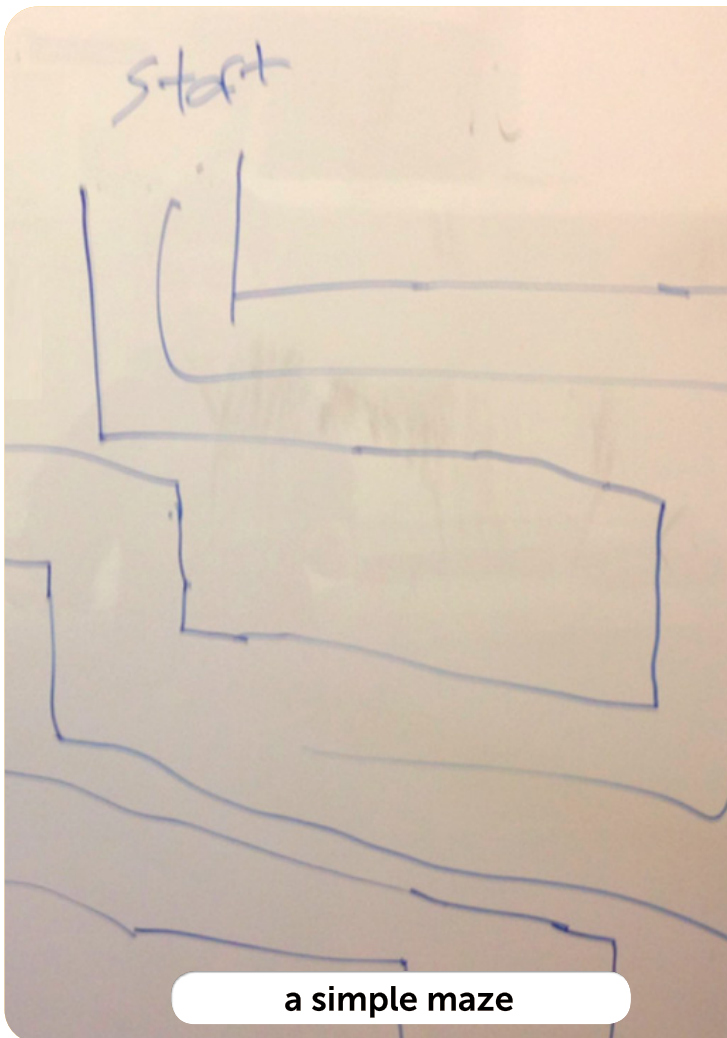
In the Classroom: Designing Mazes for Robots



Smita, a technology coordinator in Palo Alto is using Dash & Dot in her makerspace at Barron Park Elementary School. She shares an activity that involves design thinking, algorithms, problem solving, and most importantly collaboration!

“The combination of the blocks, the mobile whiteboards, the space, and the robots was one awesome learning experience for all grades 1-5.”

1 Individual Brainstorming



The students first designed mazes, drawing their mazes on the mobile whiteboards. Every student knew what a maze was. Depending upon the grade level, they talked about the complexity of the maze and what would be practical, feasible and doable to program the robots.

2 Working in Groups

They then worked in groups to design those mazes. They talked about strategies on how they would agree upon the design of the maze for that group. It was fascinating to see every grade level collaborating, discussing, strategizing and being engaged in this task.

3 Building the Maze



The next step was getting the blocks to build the mazes. Here, some groups found that they couldn't quite match the blocks to the designs. Or that they preferred using the larger wooden blocks to build their mazes. Some got more creative and added aesthetic appeal to their mazes. Again, cooperation was needed as well as conversations and strategies. In addition, there were engineering aspects in this phase to balance the mazes as well as to bring in other aspects like bridges, and, in one adventurous case, a ramp!


4 Trial and Iteration

Now that the mazes were ready, the robots had to be programmed. Some groups realized at the time of building the mazes that they needed to check out the robot widths to see if the robots could go through the mazes. Others didn't figure it out then and came to change the widths once they realized their mistake



The programming and testing was the most fun for the students, needless to add. The thrill to see the robots navigating the mazes successfully was just so worth it to observe the students. They learned that the robots wouldn't listen to them the first time necessarily or even the second. That they had to reprogram and keep trying till they figured out their mistakes. They had to figure out obstacles, sensing other objects, turns, and so much more.

This has been a rewarding exercise for both the adults and the students to see the number of skills tied in together to complete the task. Watch the [first graders test their robot](#) and [fifth graders](#) create a ramp that gave their maze a bit of a challenge. It has also been rewarding to watch the various age groups performing the same task based upon their developmental stage!

Check out Smita's [blog](#) and [Twitter](#) account of her adventures in designing a makerspace at her school and using Dash & Dot to teach coding. Are you a teacher using Dash & Dot in your classroom? Email us at teachers@makewonder.com to join our teacher community and say hello! 

The Funny Corner

A special Valentine's Day edition!

Q: Where did the robot couple go on their first date?

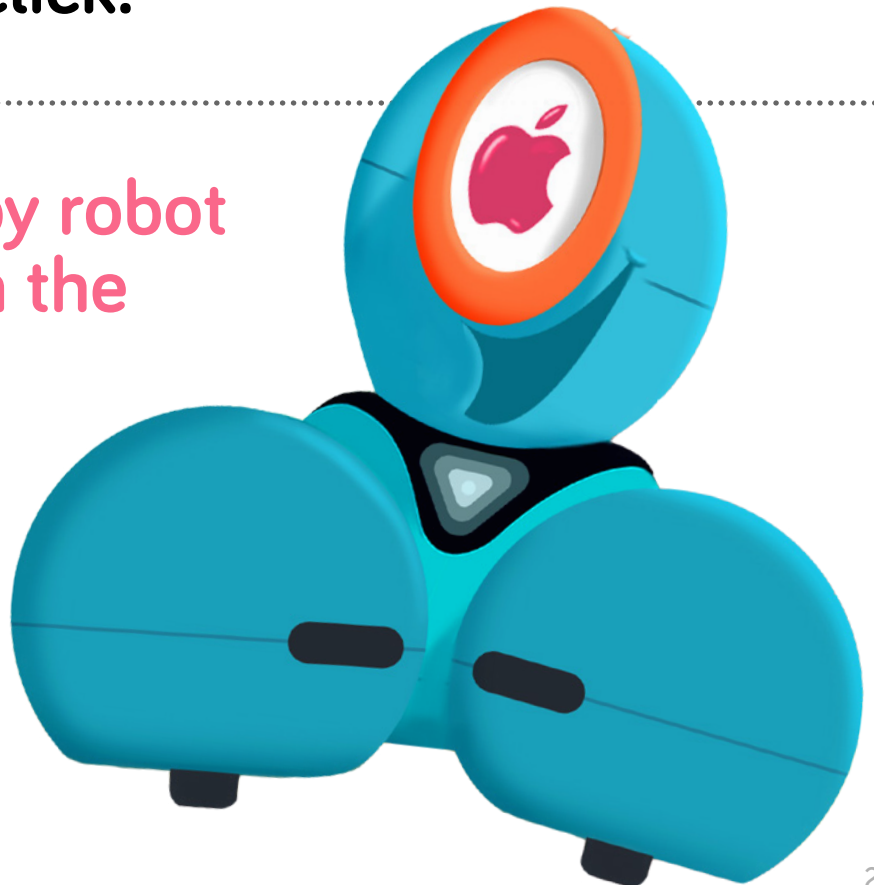
A: They went out for a byte.

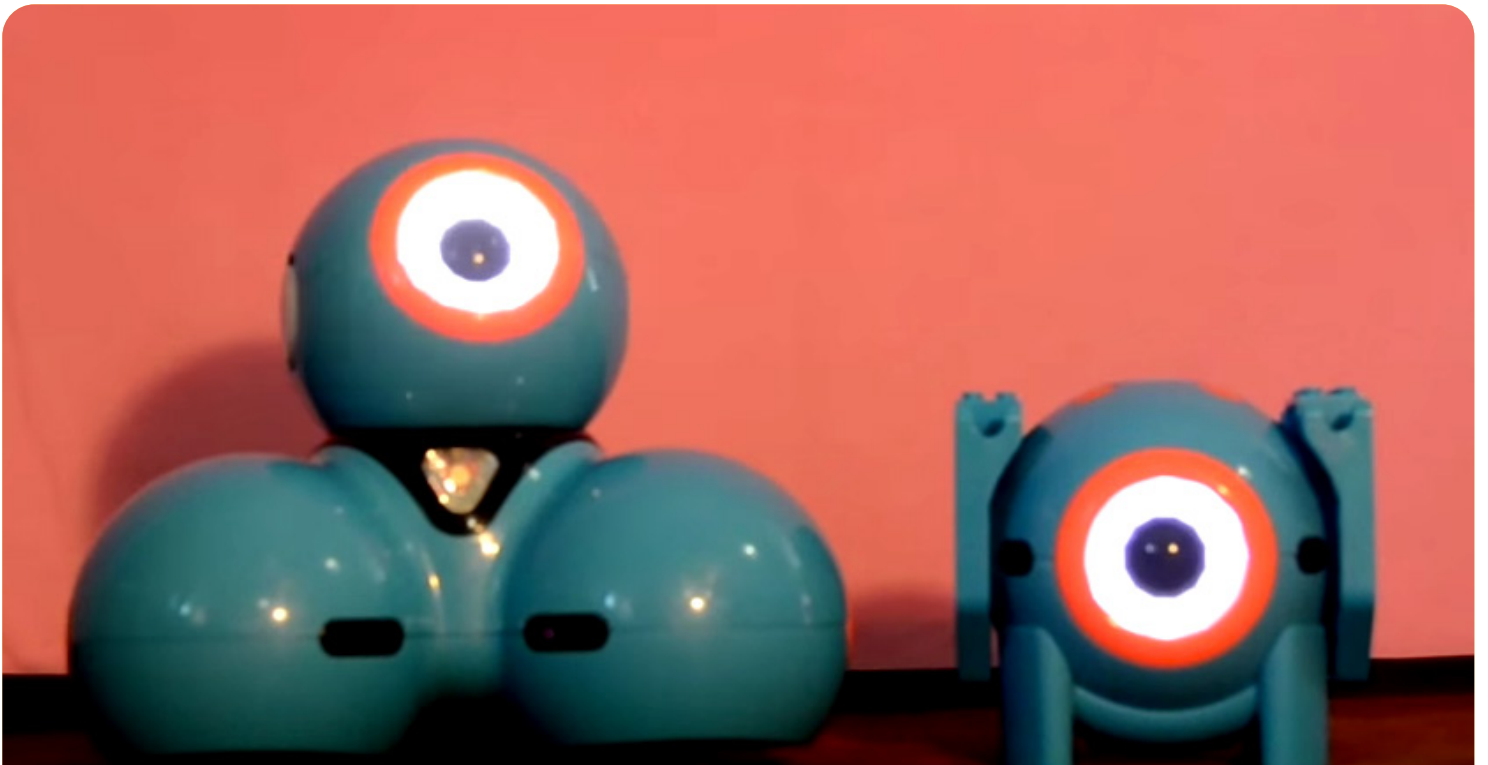
Q: Why do robots fall in love when they hug each other?

A: Because they click.

Q: Why did the boy robot fall in love with the computer?

A: She was the Apple of his eye.





Bo 'n' Nano's Comedy Minute!

What is Dot's worst fear? What lives under the ocean and makes an offer that you can't refuse? Jackson and James from Eugene, OR made a little comedy show on YouTube using Go and Blockly to program the facial expressions and movements! [Watch the video!](#)

Q.Why did the robot go to the river? **A.**To ro-boat.

Q..Why did the robot go to the bank? **A.**To become a ro-ber.

Q.Did the robot have sisters? **A.**No, It only has transistors.

Jokes from Neev

by Neev Jain (age 7) in Milpitas, CA

Want to submit your own jokes? Email us at ideas@makewonder.com! 

Thanks to:

Anthony Fudd - Lego Builder
Alicia Chang - Project Ideas and Robot Guts
Dag Haile - Graphics
Eric Pacenta - UX and Layout
June Lin - Editor

And from our community...

Smita Kolhatkar from Palo Alto, CA - In the Classroom
Jackson and James from Eugene, OR - The Comedy Minute
Neev from Milpitas, CA - Jokes
Joachim and Thomas from Belgium - Star Wars Delivery Bot
Joeythebold from Portola Valley, CA - Dot Moves
Balletboy from Houston, TX - Super Dash vs. Evil Bear

We could not have done it without you. To contribute to the next *Wonder Magazine*, send your project images and videos, jokes, and questions to ideas@makewonder.com. Be sure to include what you want to be called, your age, and your location!



makewonder.com