

February

Wonder

Activity Packet

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?

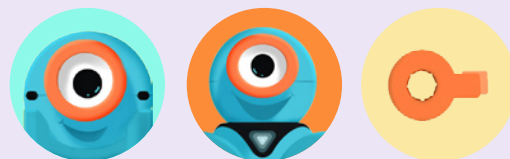




Deliver a Special Message

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!

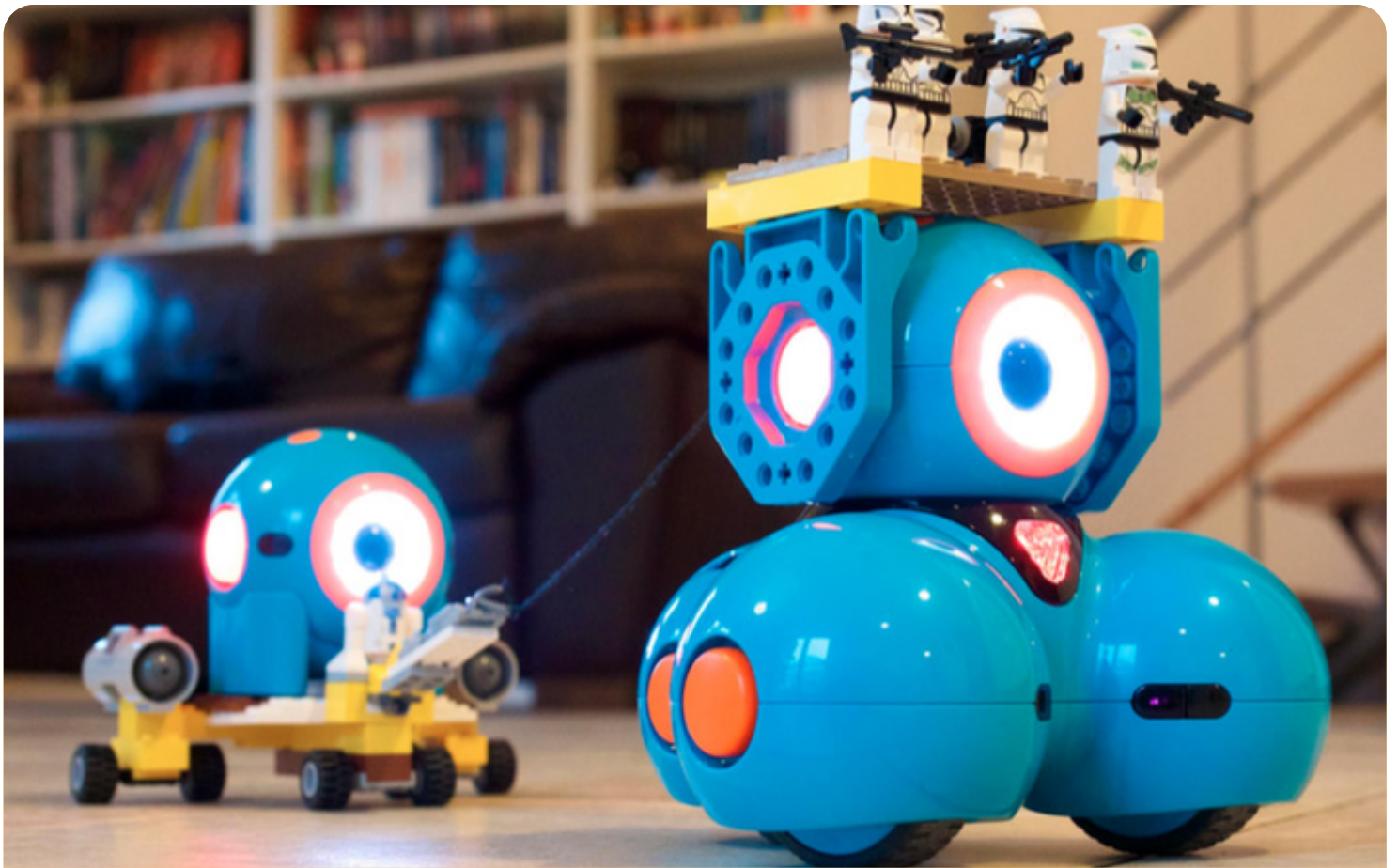
4 What **obstacles** might Dash & Dot encounter along the way? Be sure to navigate around furniture, doors, and other things between you and your friend.

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!





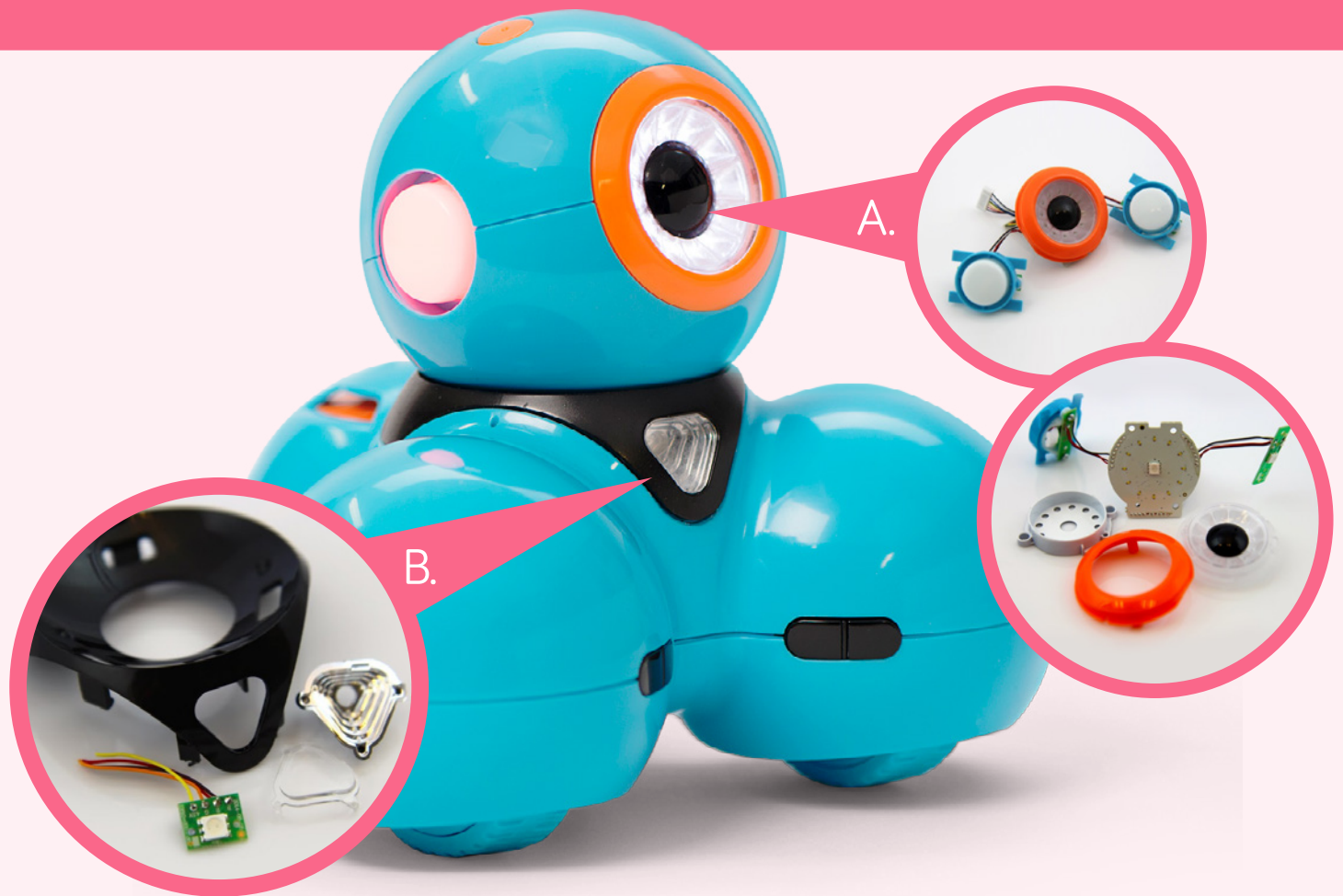
By Joachim and Thomas in Belgium



Breakfast in bed is served in Melbourne!

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.



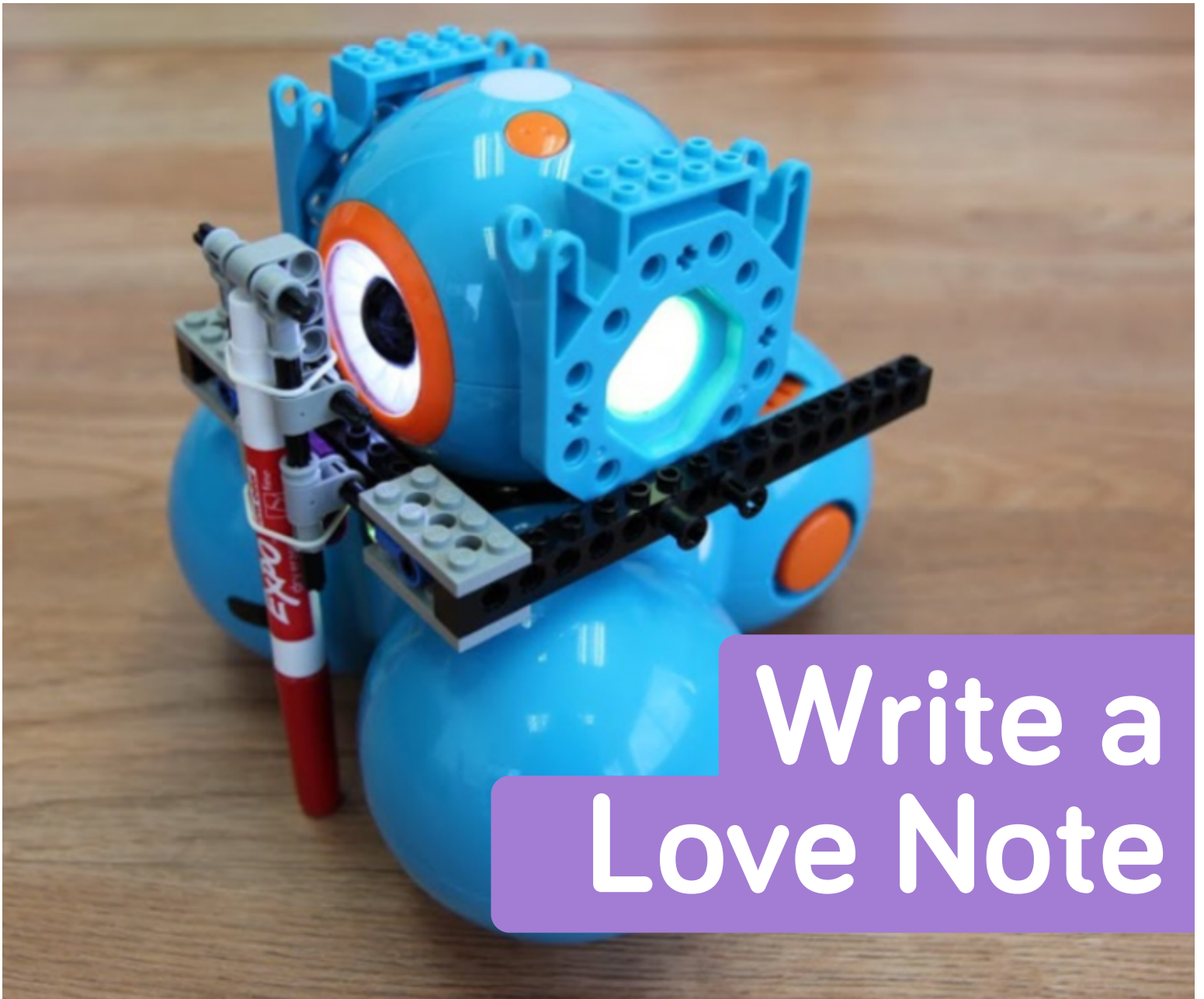
C) Ear lights

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?

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Write a Love Note

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)



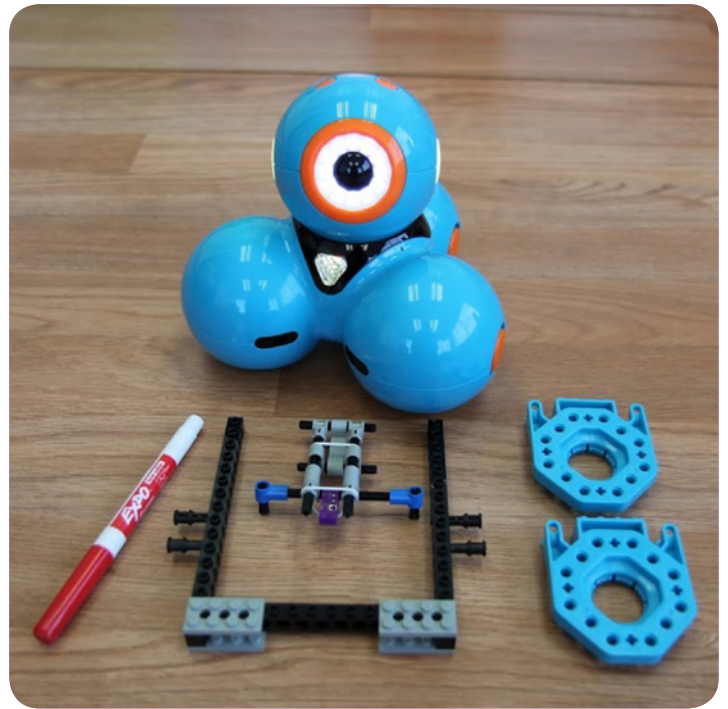
4 Cross Block 90°
(ID : 4211775)



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

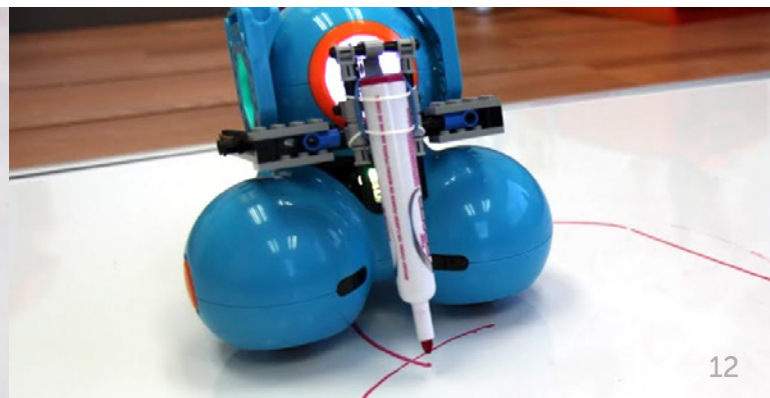
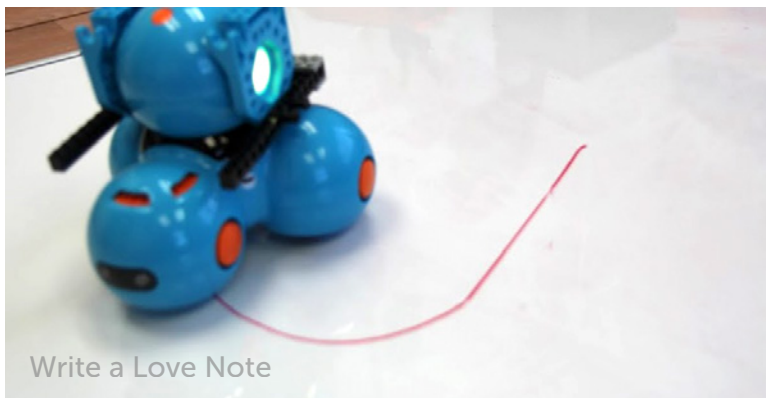
Use pegs to **attach the frame** to the Building Brick Extensions.

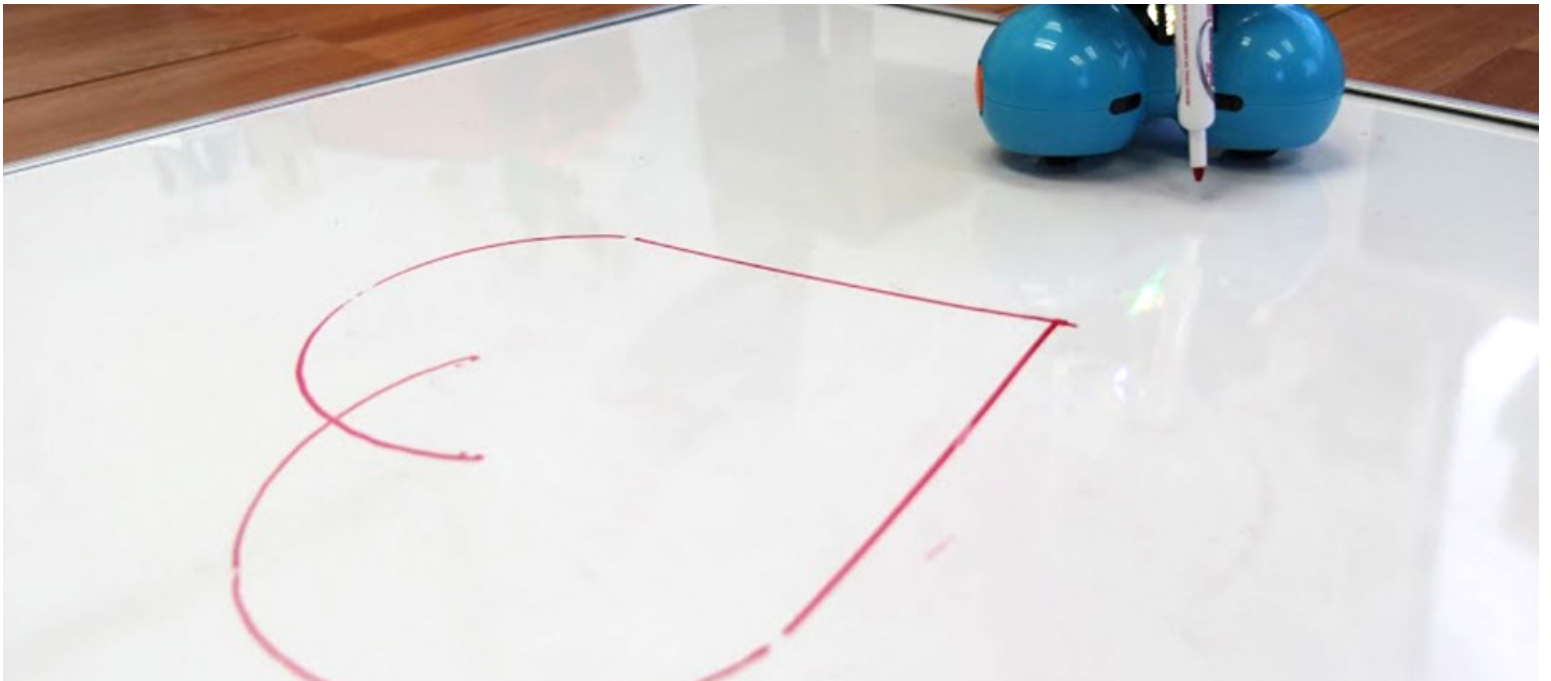
Play Options



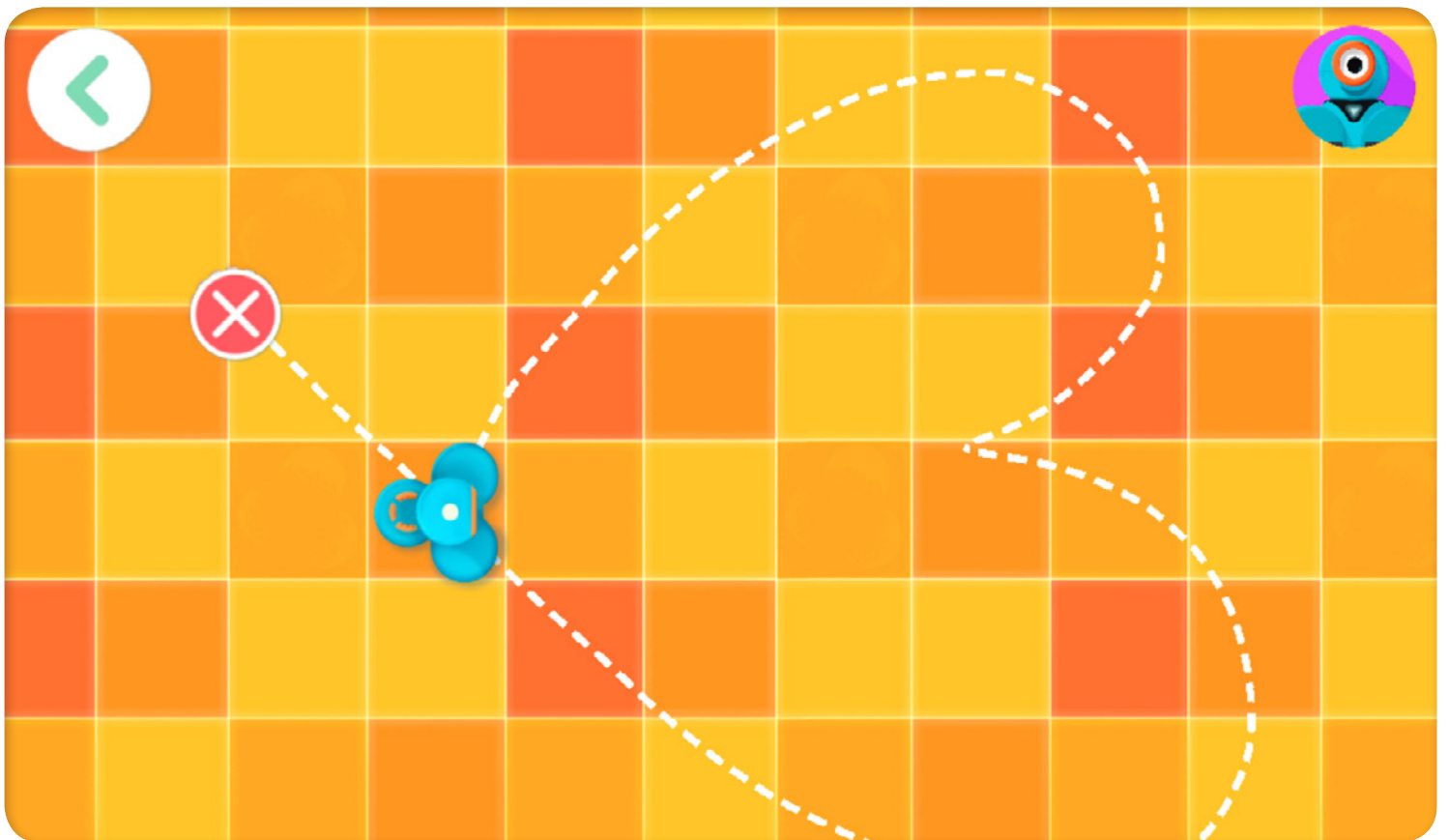
Blockly: Use Blockly to draw a heart by programming Dash's movements and head position. We used the Set Wheel Speed block to make Dash go forward, drawing the straight part of the heart for 2 seconds. Then we used the Set Wheel Speed block with different wheel speeds to make Dash draw a curve. Then we 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 for Dash. On the left is a sidebar with categories: Start, Drive, Look, Light, Sound, and Control. The main workspace contains two parallel code blocks. The left block is triggered by 'When Top Button' and consists of: 'Set Wheel Speed' (Left: forward, very slow; Right: forward, very slow), 'Wait For 2 seconds', 'Set Wheel Speed' (Left: forward, slow; Right: forward, very slow), 'Wait For 1 seconds', 'Stop Wheels', and 'Look up'. The right block is triggered by 'When Dash Button 1' and consists of: 'Set Wheel Speed' (Left: forward, very slow; Right: forward, very slow), 'Wait For 2 seconds', 'Set Wheel Speed' (Left: forward, very slow; Right: forward, slow), 'Wait For 1 seconds', 'Stop Wheels', and 'Look up'.



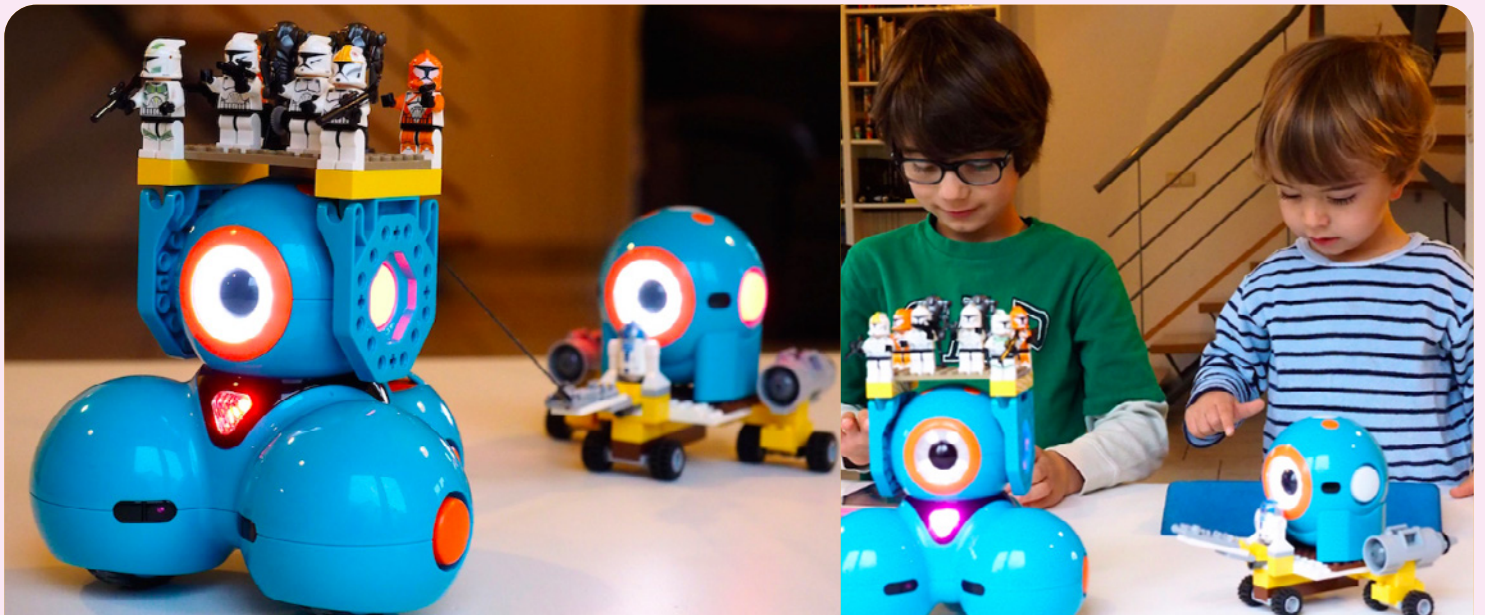


Path : Can you try using Path to make your love note? Try using this path with your new pen contraption! You can attach the pen to the back of Dash so that Dash doesn't think that the pen is an obstacle in front!



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!



Clone Wars

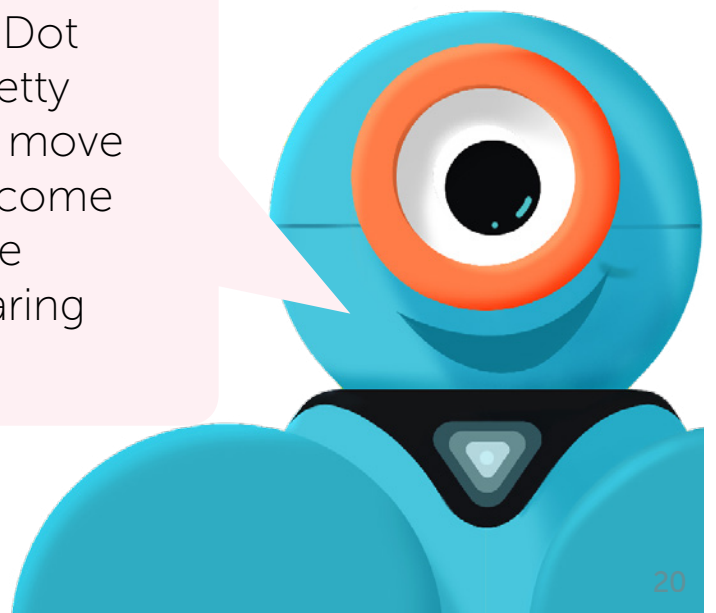
Joachim (age 7) and his brother **Thomas** (age 2) recreate the Clone Wars at home in Arlon, Belgium. Dash pulls the clone army as Dot brings up the weapons from behind. Joachim uses Blockly to program Dash's moves as Thomas makes sound effects and lights with Go and Dot!



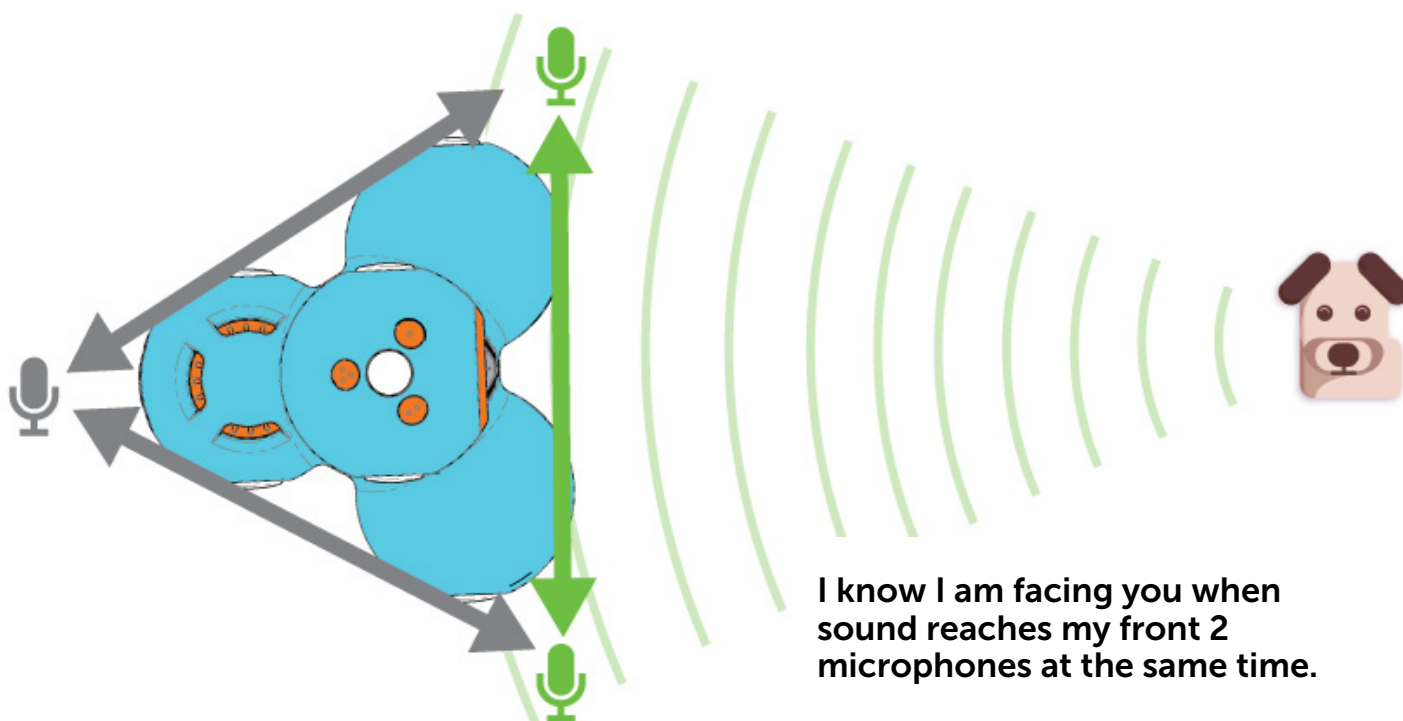
Ask Dash

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!"



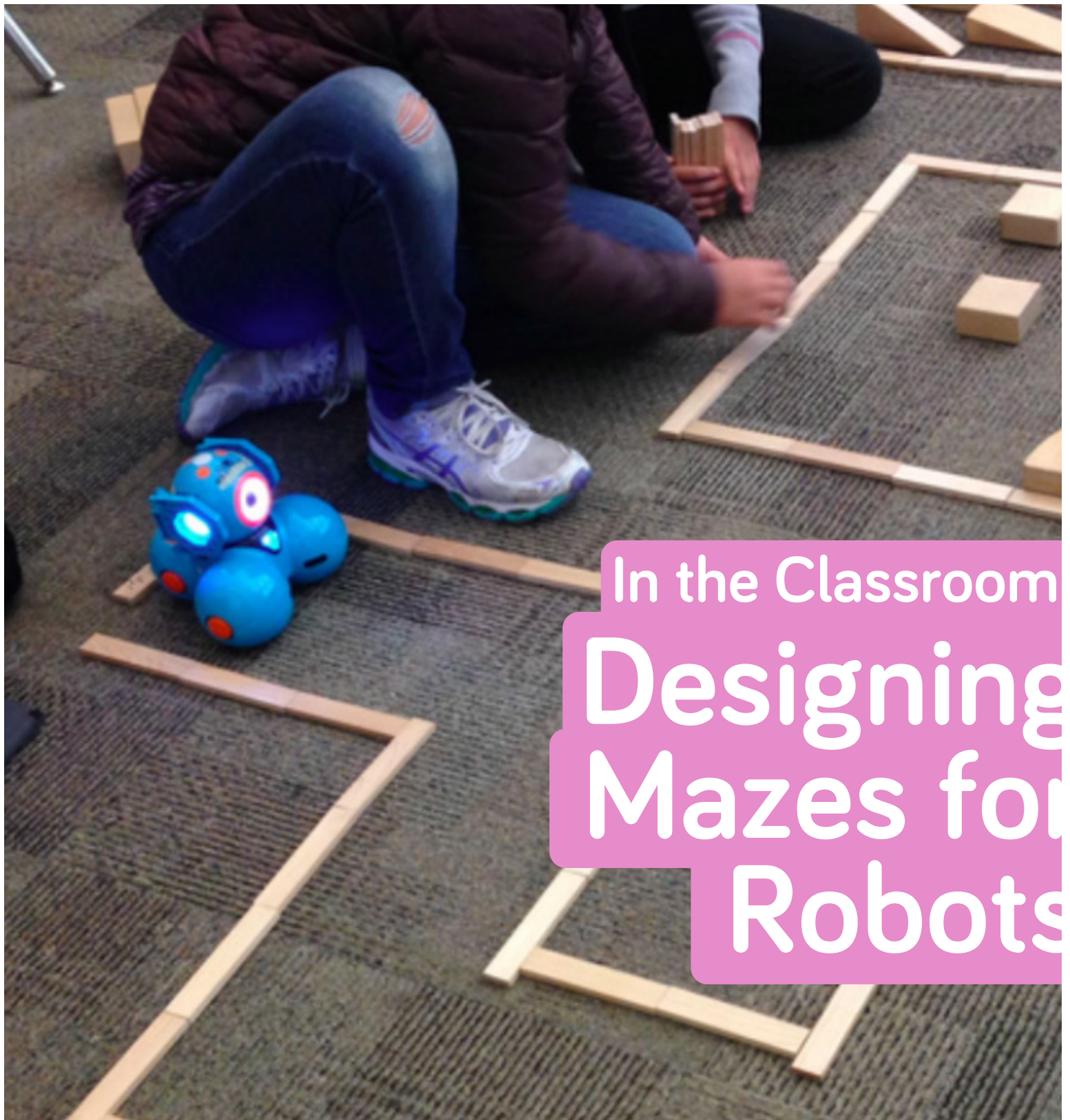
I know I am facing you when sound reaches my front 2 microphones at the same time.

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?



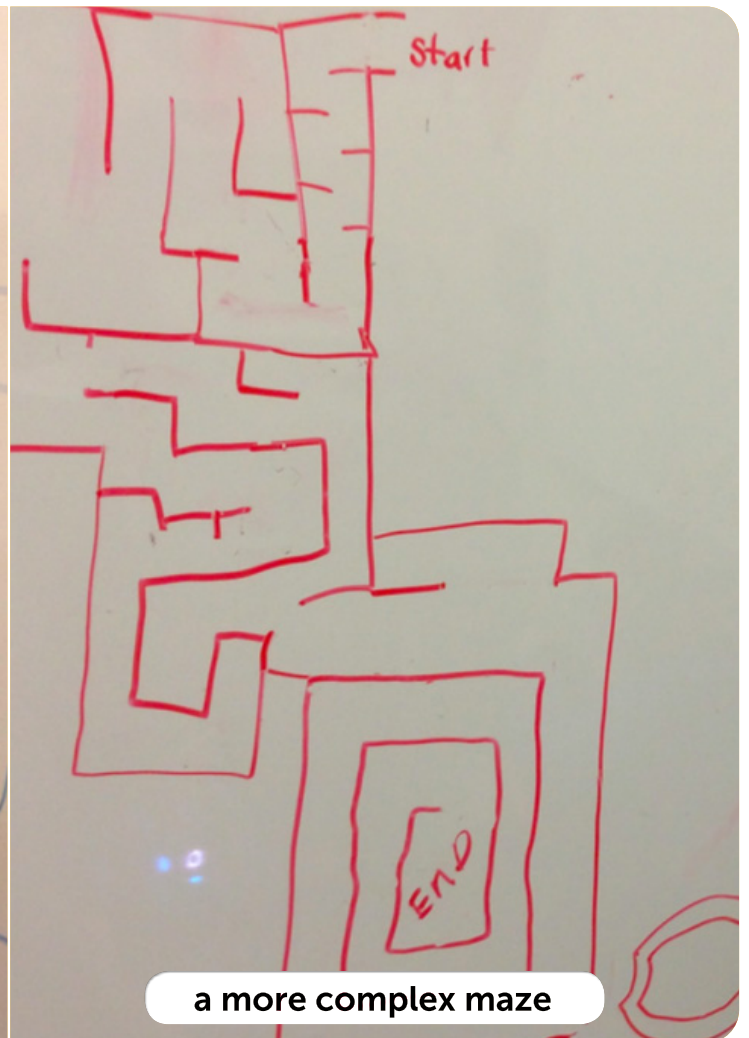
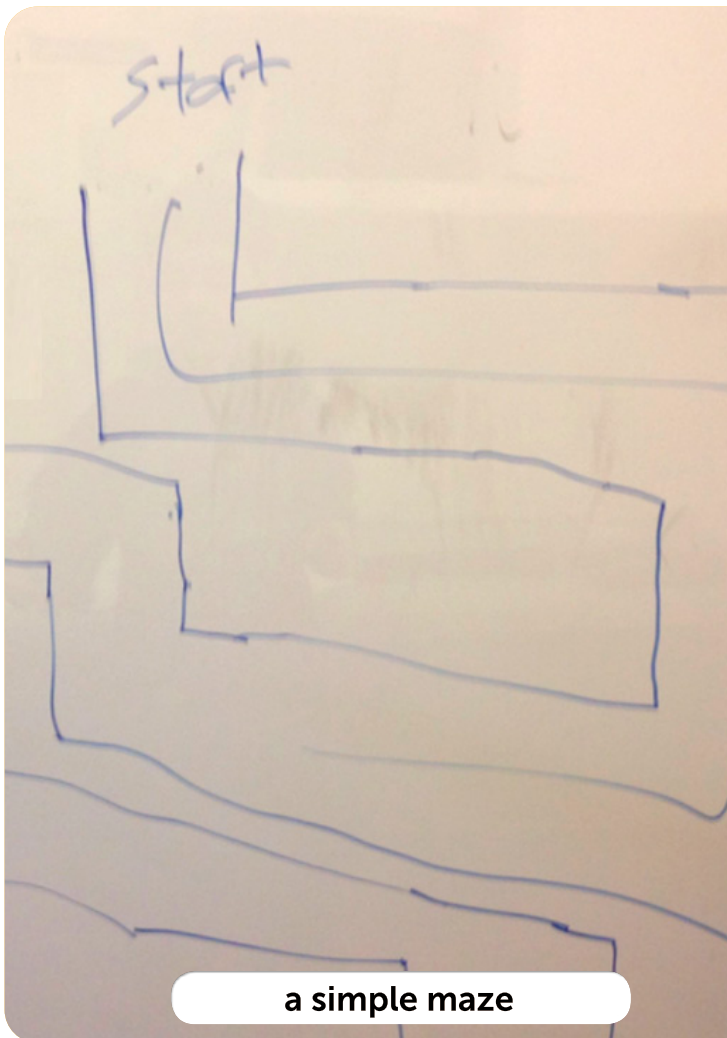
In the Classroom Designing Mazes for Robots



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.

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.

