

Marty Teacher Guide – Lesson 1.15

Second Level

BUMP SWITCHES

Up until now, students have had to guess roughly how many steps it will take Marty to get from A -> B. With bump switches, we can add on a sense of touch to let Marty know when he has reached the goal. Just like we can reach out and feel when there is something in front of us blocking our path, bump switches allow for thing kind of thing for Marty.

- Imagine you are blindfolded; how would you know if there is something in front of you?
- What would you use?
- Which of the five senses?

RESPONDING TO AN OBSTACLE

Whilst monitoring the value of the bump switch, we can check whether it is 0 or 1 meaning off or on respectively. When we see that the switch has been clicked, the value will change to 1 and we can then use this as a guide to stop walking! By talking through in English how you would solve this problem with the whole class, let students then have a shot at translating that into code blocks in Scratch.

DIFFERENT WAYS TO ATTACH THE BUMP SWITCHES

It isn't just Marty's feet that we can attach the bump switches to, we can also attach them to other body parts to give them some sense of touch. For example, we could attach them to his hands to notice when someone goes to give Marty a fist pump or handshake or we could place them facing downwards on his feet to notice when someone picks Marty up.

- Think about what body parts we use to feel for obstacles when we walk around
- Encourage students to try moving the bump switches around and seeing what they can create!

Marty Teacher Guide – Lesson 1.16

Second Level

DESIGNING AND BUILDING AN OBSTACLE COURSE

There are some obstacle course designs provided that can give a guide as to how to set up your obstacle course, however, you may want to give students a chance to design their own ideas for an obstacle course. They should try to take into consideration Marty's design and functionalities so to design something that Marty would be able to complete.

- What kind of obstacles do you think Marty could tackle?
- How would he use bump switches to do this?
- Were there any ideas you wanted to include but didn't? Why?
- Can you explain the obstacle course you designed to the person sitting beside you?
- Can you give the person beside you some feedback on their obstacle course design based on whether you think it has been designed for Marty?

USING LOGIC TO GO AROUND AN OBSTACLE COURSE

Upon creation of the obstacle course, it is then time to program Marty to go around it. Students should not get the chance to use a remote-control program to walk Marty through the obstacle course and should also be reminded not to use exact number of steps but to use sensing to work out when to stop walking or do certain things. Given a time limit to create a small program, see which group can get the furthest along the obstacle course.

- What was the hardest part of the obstacle course to program Marty for?
- What did and didn't work?
- Did any other teams take a different approach that you thought was good and might like to try out yourself?

Marty Teacher Guide – Lesson 1.17

Second Level

READING MOTOR VALUES

Marty sensors on some of his servo motors that help his different joints and body parts to move. Motor current sensors in the servos can detect when there is some force on the joint meaning that when we push down lightly on one of Marty's arms, the motor value changes because it can feel that force on the part.

We will use this mechanism to explore what these values are and how they change depending upon interacting with someone or moving around independently. By getting students to read the values and place them in variables so that they can be displayed whilst Marty is on, they can see how they change and by how much.

PROGRAMMING A SECRET HANDSHAKE

Now that we know roughly what these values change to when we apply a little bit of pressure onto the body parts, we can program Marty to respond to this change in motor current. Starting off with a basic handshake, students can then move on to creating their own small secret handshake with Marty.

- Do you have any secret handshakes with friends?
- What makes up a secret handshake?
- What different moves could you include in your handshake?
- Are there are other body parts you could put some force onto? Such as both arms at the same time?

Marty Teacher Guide – Lesson 1.18

Second Level

ACCELEROMETERS

Accelerometers are used to measure movement in a device and can be found in many devices that we use every day. Marty has an accelerometer which keeps track of his movements and can also help with balancing and understanding when he could be close to falling over.

- What is an accelerometer? What does it measure?
- What devices do you think have accelerometers in them?
- What kind of movement do you think accelerometers can measure?
- How do you think we could use accelerometers in Marty?

CREATING A SMALL GAME

In this lesson, we will be physically moving Marty around to control a sprite's movement on the screen in Scratch. We can do this through keeping track of the accelerometer values and then responding to this by moving the sprite either left, right, up or down on the screen.

Students should start off with something simple, like a small game where you have to move the sprite left or right to avoid or catch items falling from the sky.

- Who is going to be the main character in your game?
- What will they be doing?
- What kind of movements can your sprite make? Just left and right or up and down?
- Which of the accelerometer values would you use? X, Y or Z?