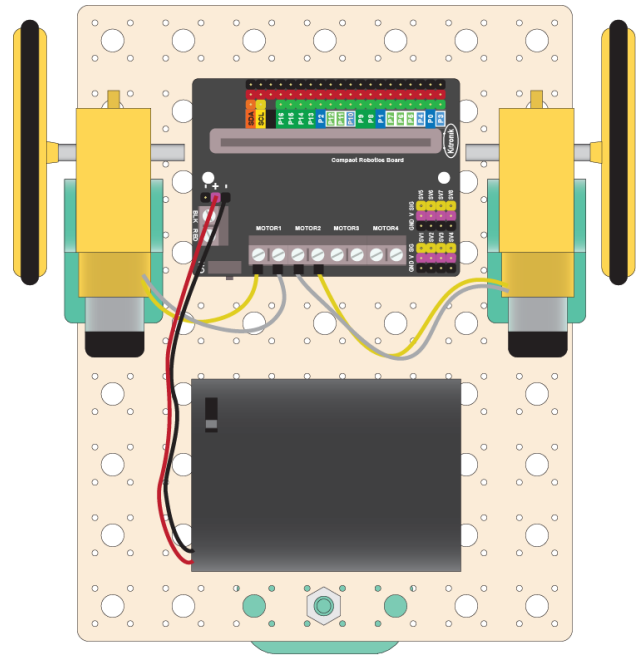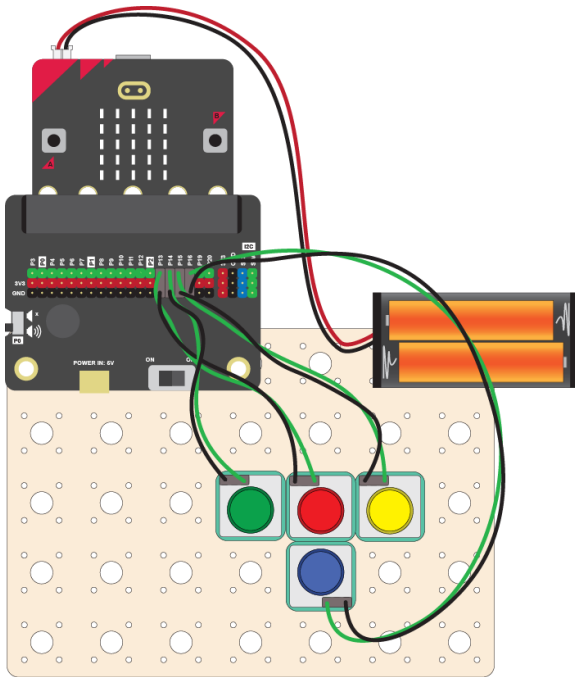# 1.06 Add a Remote Control for your Robot

In this workshop you will make a remote controller which can be used to control the robot you built in a previous workshop.

For the remote control you will need another Microbit. So you will have two microbits, one in the controller and one in the robot. We will use the radio feature of the Microbit to send messages from the controller to the robot:

Controller Microbit
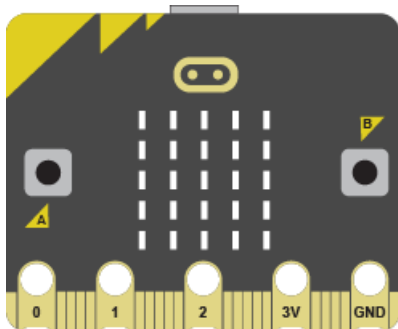
Messages:

F for Forwards
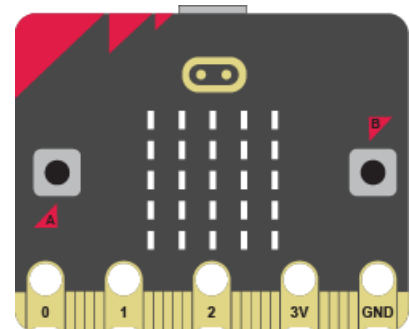
L for Left

R for Right

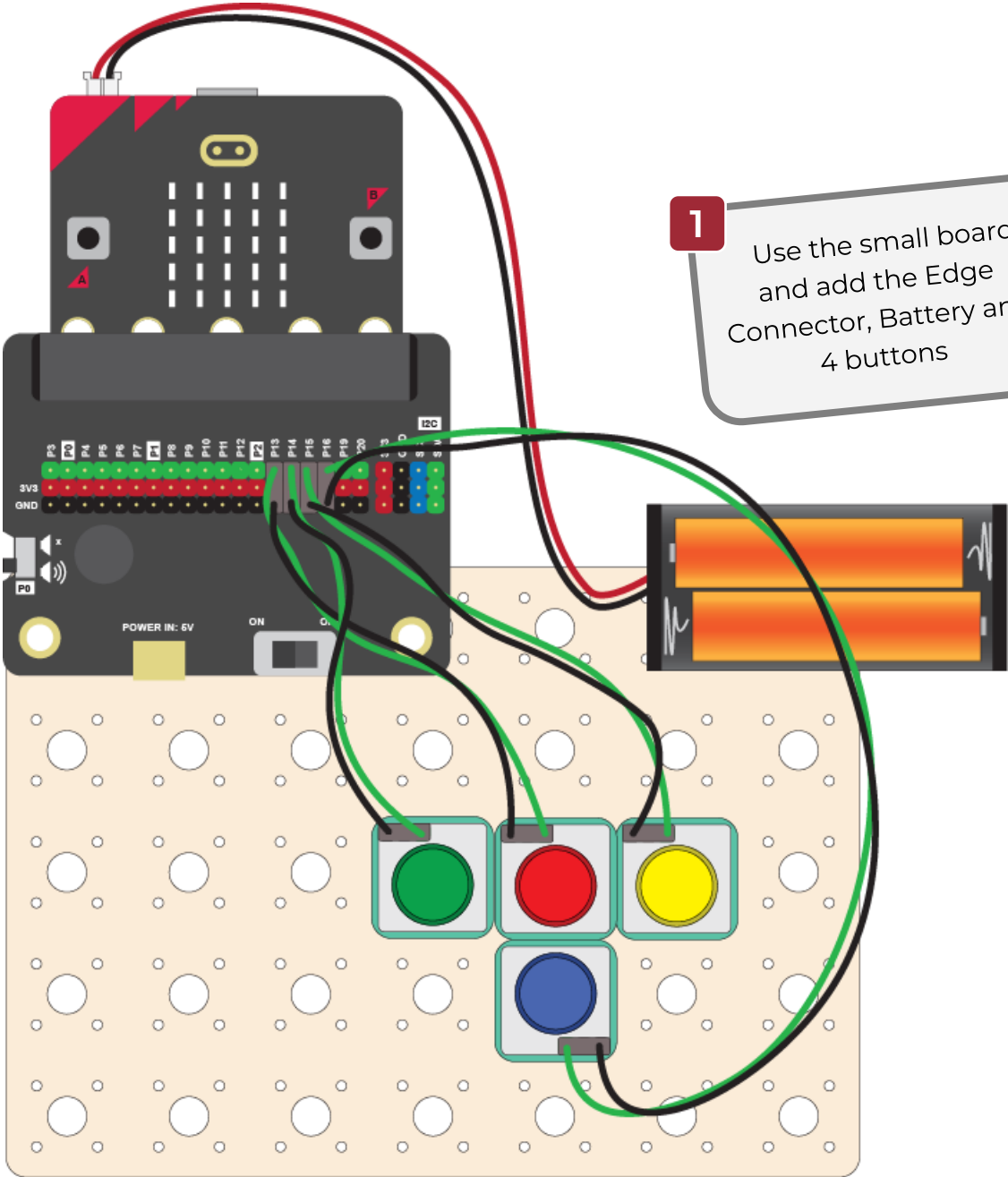B for Backwards

Robot Microbit

What to do

- If you haven't already done so, build the robot by referring to the previous worksheet (just build it, don't code it).

- Then follow this worksheet to remotely control the forward movement of your robot.

- Finally, attempt the coding challenge to get the left, right and backwards movements of your robot working.

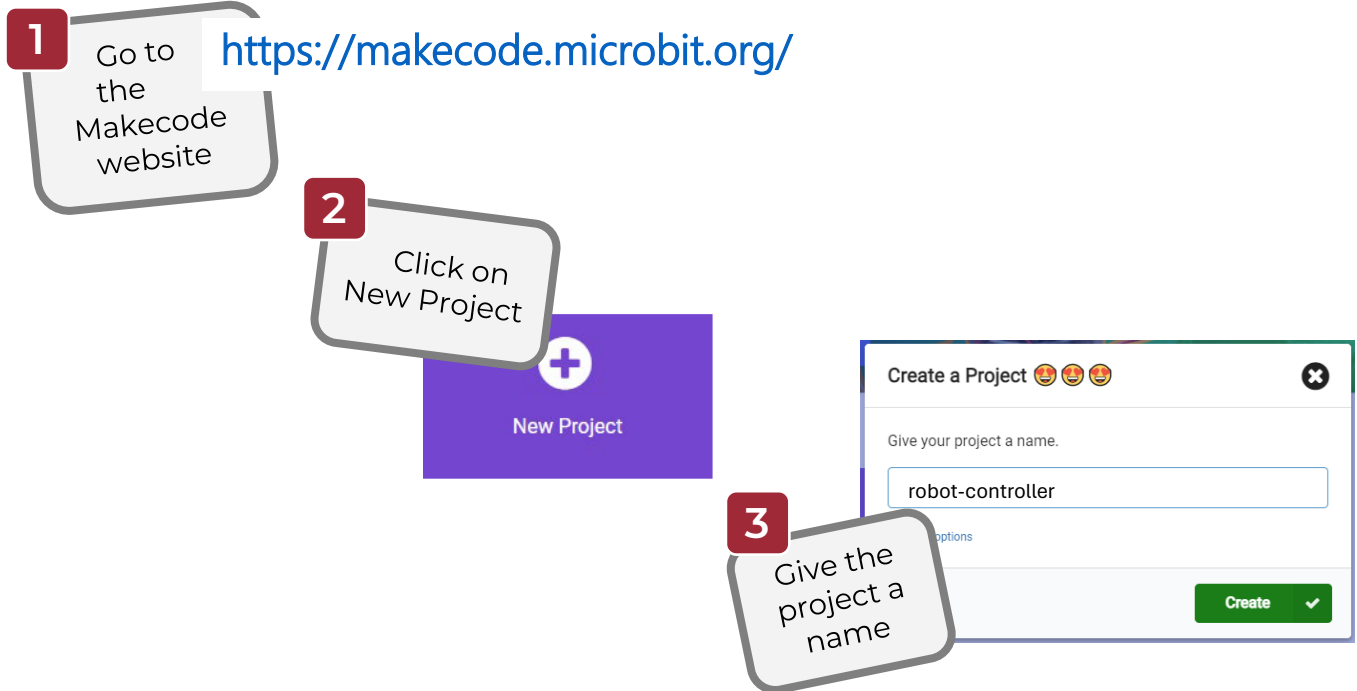# Assemble the Controller

Assemble the Parts

1 Use the small board and add the Edge Connector, Battery and 4 buttons

2 Wire up the buttons as follows using GS wires

Component	Microbit	Purpose
Red button	P13	Forwards
Green button	P14	Left
Yellow button	P15	Right
Blue button	P16	Backwards

Code the Controller 1

Create a Project for the Controller

1 Go to the Makecode website

https://makecode.microbit.org/

2 Click on New Project

+

New Project

Create a Project 😍😍😍 ✕

Give your project a name.

robot-controller

~~options~~

Create ✓

3 Give the project a name

Set up the Radio Channel and Buttons

First set up the radio channel and the buttons on your controller. The Microbit's radio will be used so your controller can send messages to your robot.

1 Add this code

```
on start
    radio set group 9
    set pull pin P13 ▾ to up ▾
    set pull pin P14 ▾ to up ▾
    set pull pin P15 ▾ to up ▾
    set pull pin P16 ▾ to up ▾
```

Change your radio channel number to one that no one else in the room is using. Otherwise you will control someone else's robot!

These blocks pull the pins for the buttons to HIGH (1). When they are pressed they will change to LOW (0)
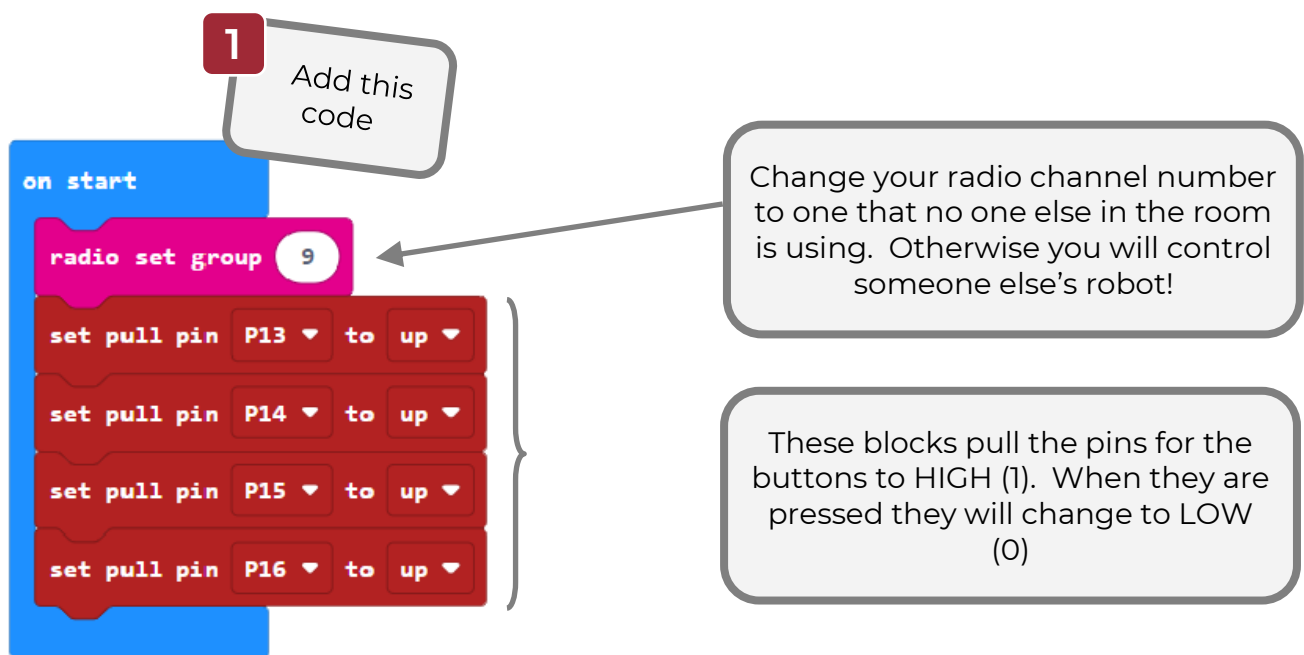
Code the Controller 2

Respond to the F Button

Now get your controller to send a message "F" when the forward button is pressed.

1 *Add this code*

```
forever
    clear screen
    if  digital read pin P13 ▼  = ▼  0  then
        radio send string "F"
        show leds
    else                                              ⊖
        radio send string "S"
        ⊕
    pause (ms) 100 ▼
```

This block checks if the button connected to pin 13 has been pressed

This block will send the message "F" to your robot

This block will display a dot showing that you pressed the forward button

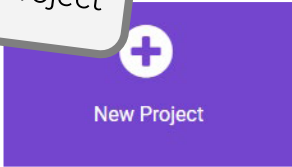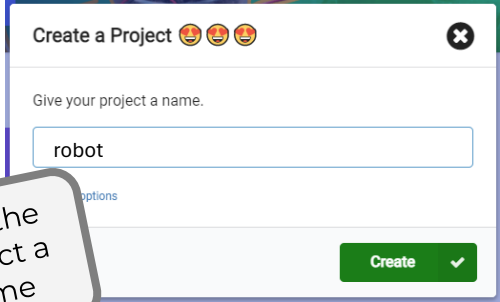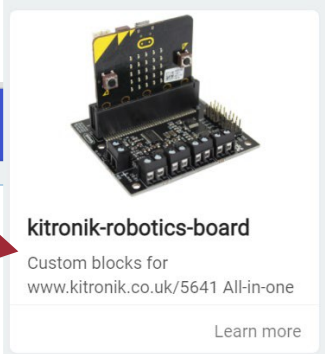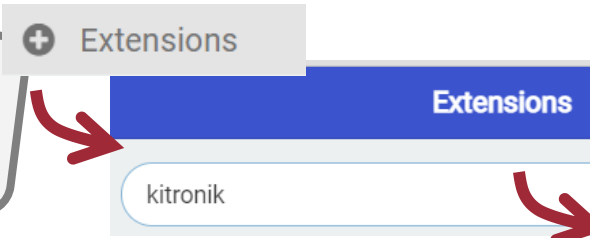If no button was pressed send an "S" to your robot to ask it to stop moving

Wait a little bit so that your robot doesn't get sent too many messages!

2 *Download the code to the controller Microbit*

Download •••

Code the Robot 1

Create a Project for the Robot

1 Go to the Makecode website

https://makecode.microbit.org/

2 Click on New Project

+ New Project

3 Give the project a name

Create a Project 🤩🤩🤩

Give your project a name.

robot

...options

Create ✓

3 Add the motor driver extension

⊕ Extensions

Extensions

kitronik

kitronik-robotics-board

Custom blocks for
www.kitronik.co.uk/5641 All-in-one

Learn more

Set up the Radio Channel

Set up the radio channel (so your robot can receive messages to your controller).

1 Add this code
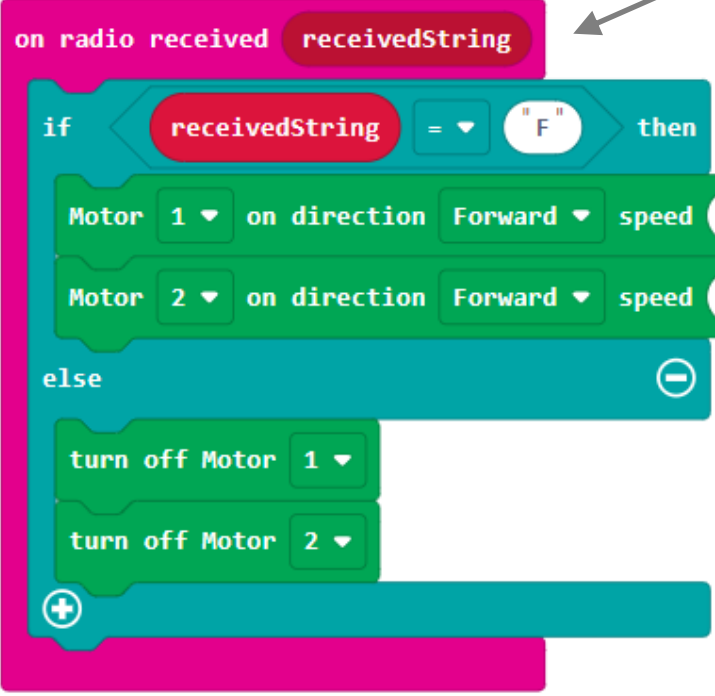
```
on start
    radio set group 9
```

Change your radio channel number to the one you used for your controller, so that the messages from your controller are received by your robot

Code the Robot 2

Respond to the F Message

Now get your controller to receive the "F" message from the controller and move forwards.

1 Add this code

This block is only run when your robot receives a message from the controller

This block checks if the message received was an "F"

```
on radio received    receivedString
    if    receivedString  = ▼  " F "    then
        Motor  1 ▼  on direction  Forward ▼  speed  50
        Motor  2 ▼  on direction  Forward ▼  speed  50
    else                                              ⊖
        turn off Motor  1 ▼
        turn off Motor  2 ▼
    ⊕
```

Move the robot forwards

If any other message is received, stop the robot

2 Download the code to the robot Microbit

Download •••

Your challenge!

The code you have on your controller and robot allows you to only control the forward movement of the robot. That's not very useful!
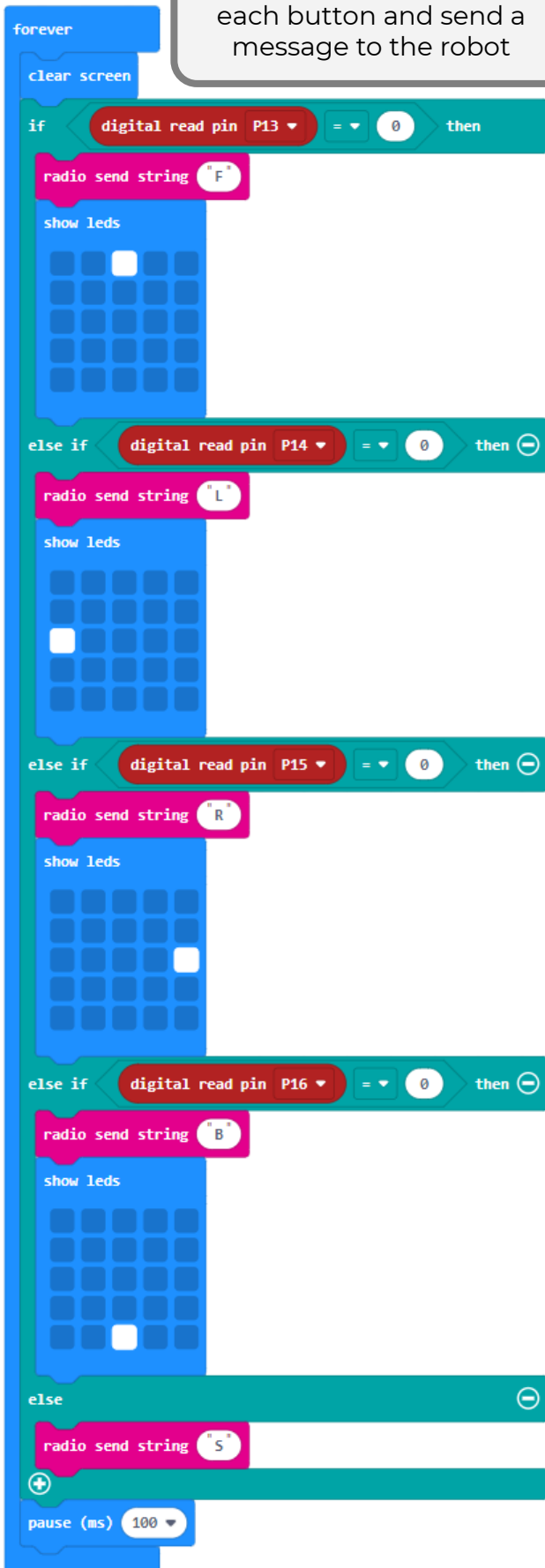
Can you get other movements working: left, right and backwards?

Hint: You will need to change the code on both the controller and robot. The controller must send different messages, such as "L", "R" and "B" for left, right and backwards. The robot must then respond with the correct movement.

Solution

Controller

> You need to respond to each button and send a message to the robot

```
forever
  clear screen
  if  digital read pin P13 ▼ = ▼ 0  then
    radio send string "F"
    show leds
    [led pattern]
  else if  digital read pin P14 ▼ = ▼ 0  then
    radio send string "L"
    show leds
    [led pattern]
  else if  digital read pin P15 ▼ = ▼ 0  then
    radio send string "R"
    show leds
    [led pattern]
  else if  digital read pin P16 ▼ = ▼ 0  then
    radio send string "B"
    show leds
    [led pattern]
  else
    radio send string "S"
  pause (ms) 100 ▼
```

Robot

> You need to respond to each message and move the robot accordingly

```
on radio received receivedString
  if  receivedString = ▼ "F"  then
    Motor 1 ▼ on direction Forward ▼ speed 50
    Motor 2 ▼ on direction Forward ▼ speed 50
  else if  receivedString = ▼ "L"  then
    Motor 1 ▼ on direction Forward ▼ speed 0
    Motor 2 ▼ on direction Forward ▼ speed 50
  else if  receivedString = ▼ "R"  then
    Motor 1 ▼ on direction Forward ▼ speed 50
    Motor 2 ▼ on direction Forward ▼ speed 0
  else if  receivedString = ▼ "B"  then
    Motor 1 ▼ on direction Reverse ▼ speed 50
    Motor 2 ▼ on direction Reverse ▼ speed 50
  else
    turn off Motor 1 ▼
    turn off Motor 2 ▼
```