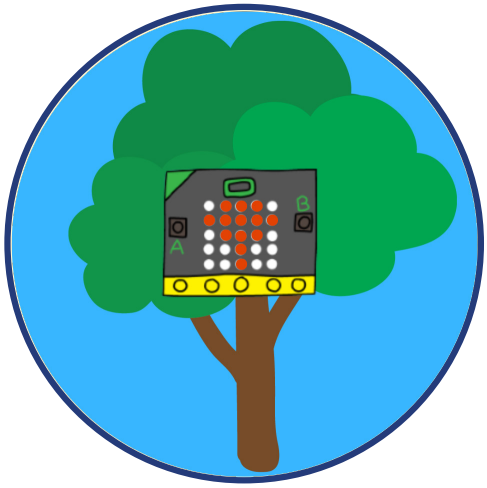
MOONHACK 2022



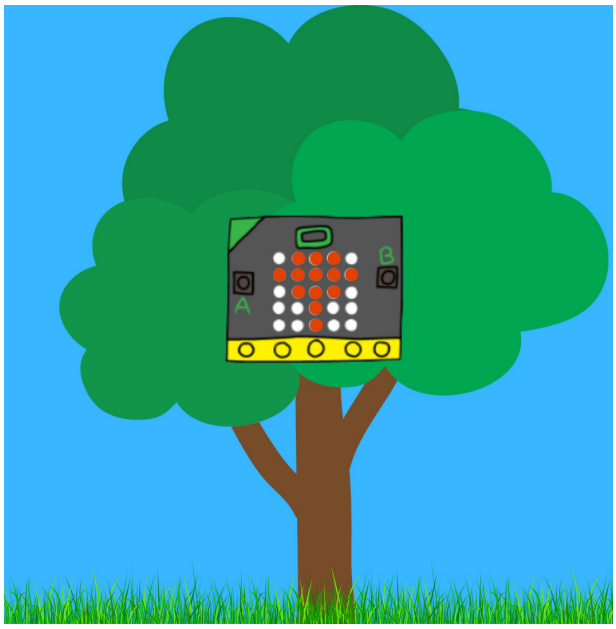
Save the Trees

Use Micro:Bits to alert rangers when large trees fall in forests.

INTRODUCTION

What you will make

You will create a tree alarm that will alert forest rangers when a tree falls over, either naturally or from being cut down by humans. In the real world the devices on trees would use satellite communication to send the alert to the forest rangers.



What you will learn

- How to use radio blocks to make Micro:Bits communicate with each other
- How to create variables
- How to use loop blocks

What you will need

HARDWARE

2 BBC Micro:Bit and power sources (optional)

SOFTWARE

MakeCode Editor

Additional notes

Check out our blog post for this project with tips, curriculum and supporting material at medium.com/@codeclubau

Hardware is optional. The project can be completed using only MakeCode Editor.

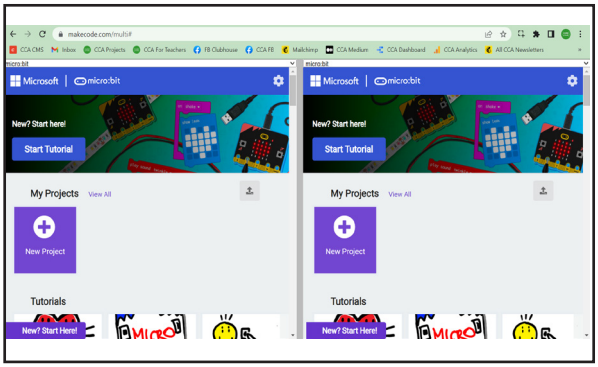
Project can be made with multiple Micro:Bits.

Code Club Australia acknowledges the Traditional Owners of Country throughout Australia and their continuing connection to land, sea and community. We pay our respects to First Nations people and their living cultures and to Elders past and present.

STEP 1 - CODING THE TREE ALARM.

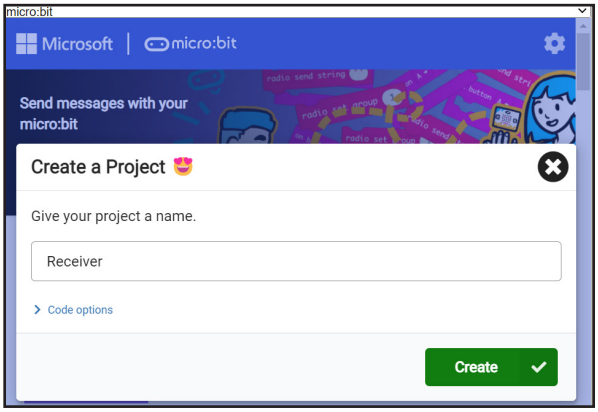
Open up the multi editor for Micro:Bit - MakeCode Multi Editor

On each editor page click on New Project



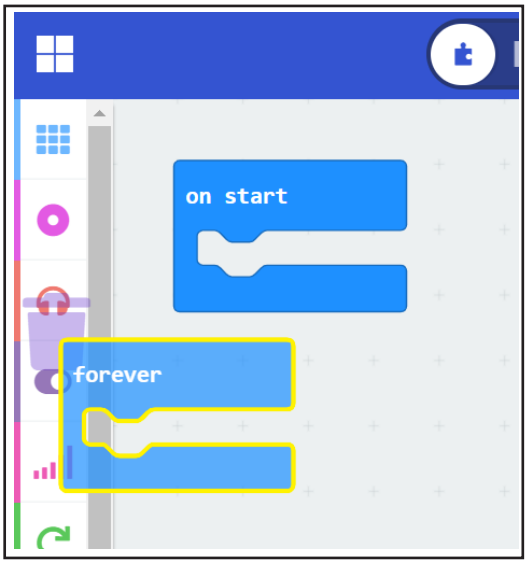
Name the first project Tree Alarm.

Name the second project Receiver.



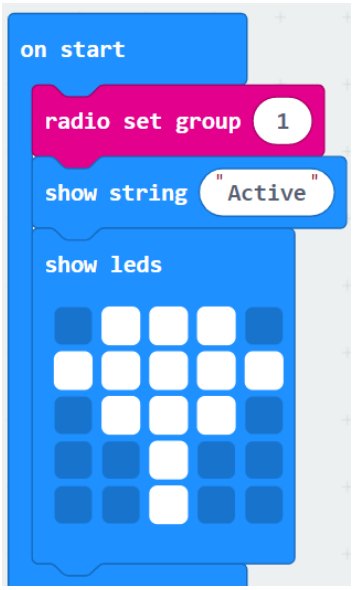
STEP 2 - TREE ALARM

Delete the forever block as it won't be needed. Drag it to the left until you see the bin.



Inside the start block add in radio set group 1. Both programs will be set to group 1 so the Micro:Bits will know to talk to each other.

Add in a string that says 'Active' and shows leds to look like a tree. This will let the user know that the alarm is ready to go.



SETTING UP COORDINATES AND MESSAGE

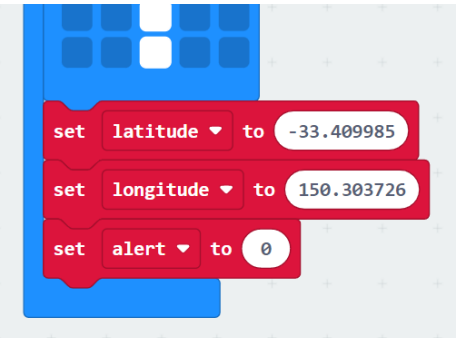
If a tree falls we need the Micro:Bit to sense this and send its GPS coordinates to the forest rangers. Use a website to look up the GPS coordinates of a specific location such as a forest near you.

Create a new variable and call it latitude.

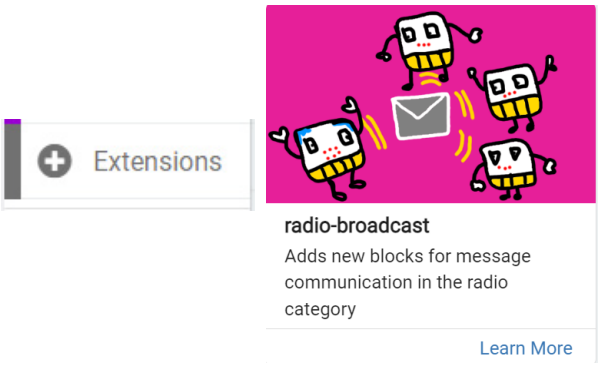
Change the 0 to the latitude coordinate.

Create another new variable and call it longitude. Add in the longitude coordinate for your location.

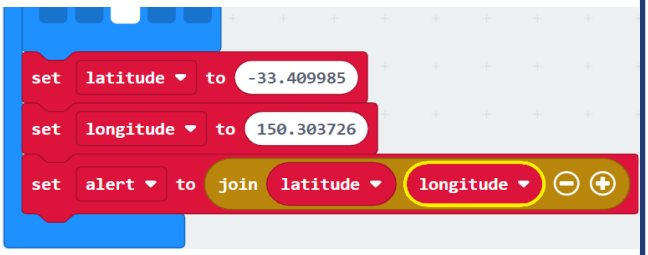
Create a 3rd new variable and call it alert. We want the alert variable to join the latitude and longitude together.



Click the Extensions button in your menu bar and add the extension blocks for radio-broadcast.



Click Advanced in your menu to get to the text menu to add in the join block. From the variables menu add in latitude and longitude.

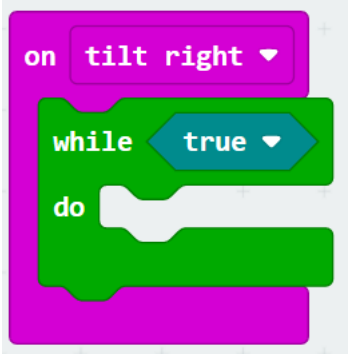


STEP 3: TRANSMITTING DATA

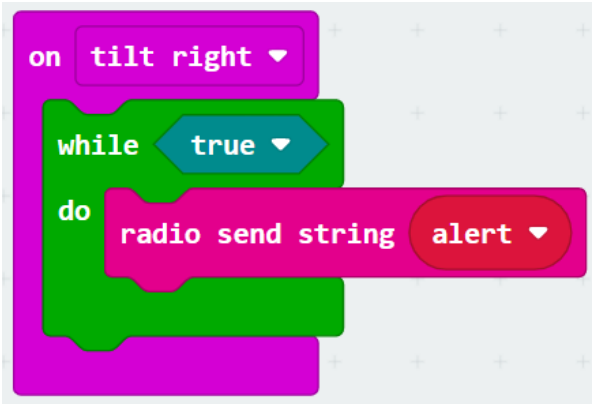
Set up the Micro:Bit to detect a tree falling and to send the radio broadcast.

From the input menu select on shake. Change shake to be tilt right. If you are going to program physical Micro:Bits you could select free fall, however to see the program in the editor window, use tilt right.

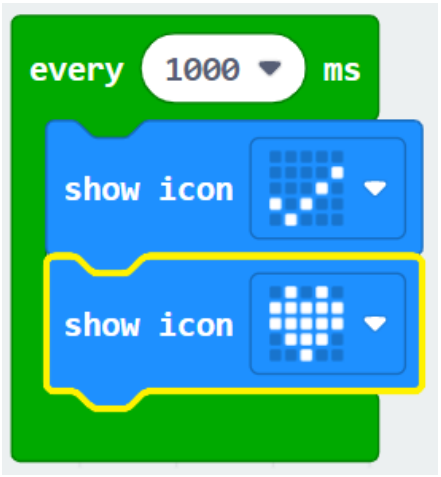
Add in a loop while false do, and change false to true.



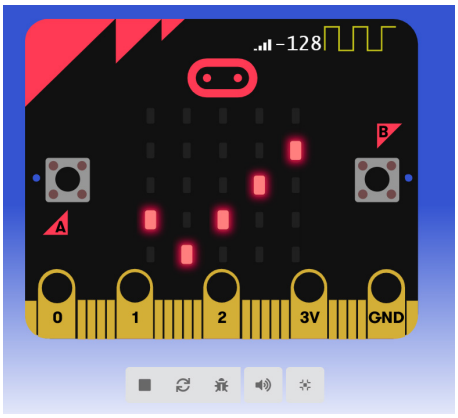
Place inside the radio send string block and drop in the alert variable. This tells the Micro:Bit if it tilts right send the alert that shows latitude and longitude.



For the last code add in some leds that will repeat every 1 second. Choose your own symbols or design your own that can keep repeating while the tree remains standing tall.



Test your code. If you click the play button you should see the word Active scroll across and then it will show the symbols you added in.

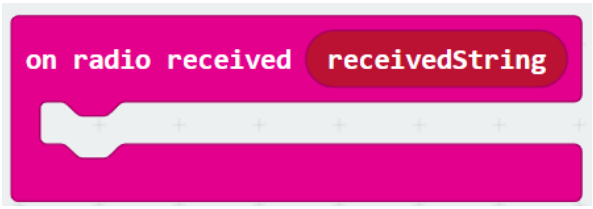


STEP 4: CODING THE RANGER'S RECEIVER

Now it is time to code the 2nd Micro:Bit to receive the GPS coordinates if a tree falls. Go to your program called Receiver.

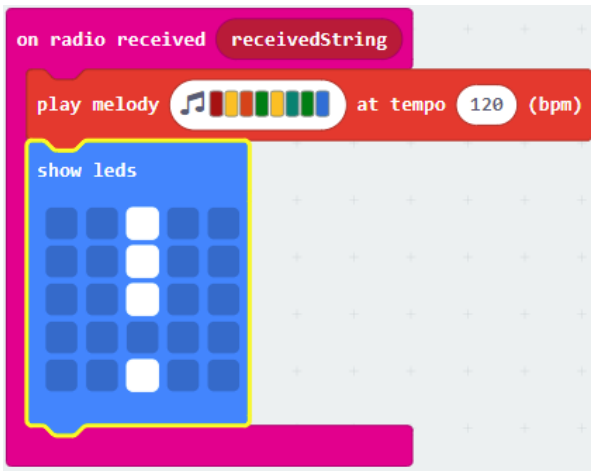
Delete the forever block. Inside the start block set the radio to group 1.

Start a new piece of code using the radio block on radio received, receivedString

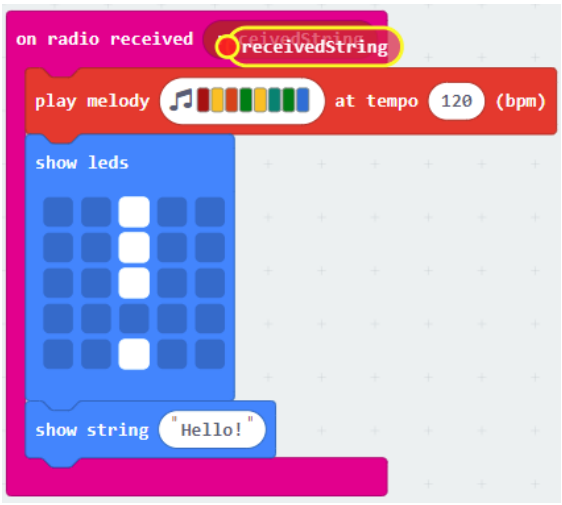


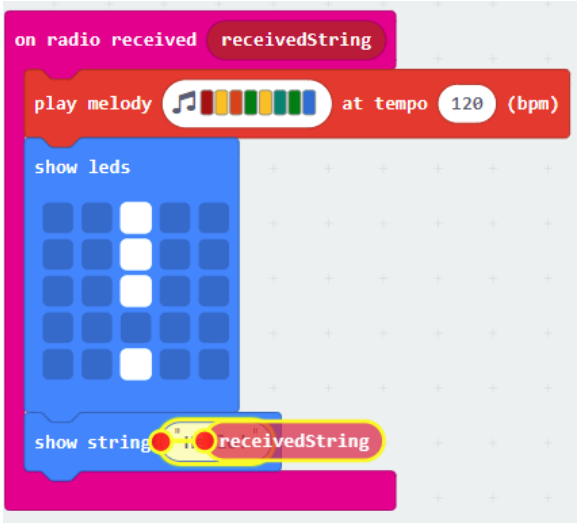
From the music menu add in the play melody block. Click on the music note and choose the gallery tab at the top. Select a melody to play when the alert is received.

Add an led block to show an exclamation mark.

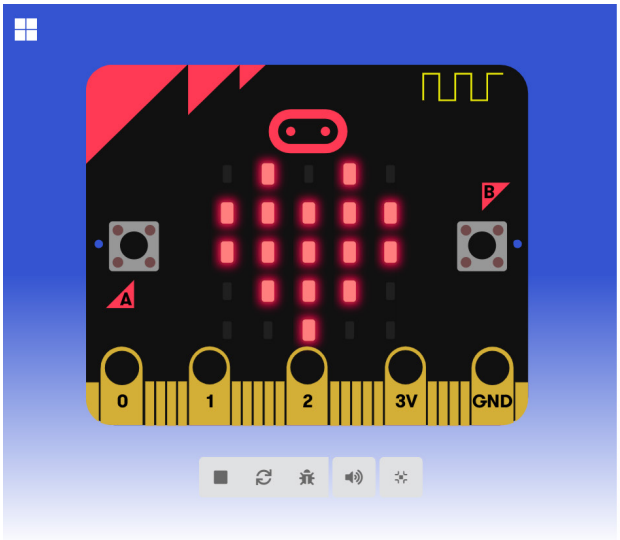


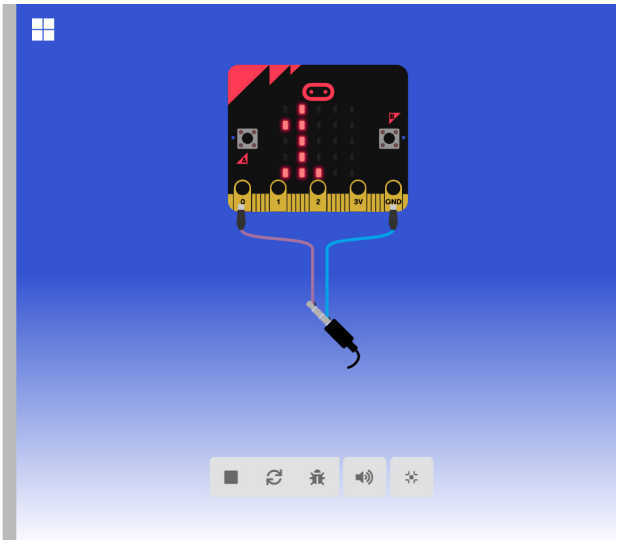
Add in the show string block and inside it add the radio block of received string. To do this click on the receivedString at the top of your code and copy it down to the show block.





Run your code on both screens to make it work. Allow Micro:Bit 1 to start it's program and then make it tilt right. You will hear your melody and see the GPS coordinates come across the 2nd Micro:Bit.





Challenges:

Better output message

Can you improve the way that the receiver shares the information with the forest rangers?

Low battery

If these were placed in forests, rangers would need to be alerted when a battery is running low so it can be changed. What ideas do you have for this?

Use physical Microbits and test your tree alarm.

Download your hex file onto your Micro:Bits. You will need to design how the tree alarm will be attached to a tree to be put to good use. If trialling in an outdoors environment you will also need to develop a prototype that will withstand rain and house the battery compartment.

Not sure how to download your project? Click on the purple download button. Attach your Micro:Bit to your computer using theUSB cable. Drag the hex code from your downloads folder into the Micro:Bit folder. Once the light stops flashing you can unplug it from your computer and your code is ready to run.

Congratulations you're a Moonhack changemaker! You can try one of our other projects or try one of the challenges.

Don't forget to talk to an adult about registering your participation and downloading your certificate at moonhack.com