

Western Engineering Outreach

Micro:bit Frustration

Grade 3-5

Meet Today's ENG HERO!



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Dr. Capretz is the Associate Dean in the Faculty of Engineering and a Professor of Software Engineering at Western University. Dr. M. Capretz has been involved with software development and research and teaching in software engineering for more than 30 years. For more information about Dr. Capretz please visit:

https://www.eng.uwo.ca/electrical/faculty/capretz_m/index.html

Learning Goal:

- Explore software & electrical engineering
- What is coding?
- Learning about basic coding terms
- Curriculum connections: Grade 3- Forces Causing Movement, Grade 4- Light and Sound, Grade 5- Forces Acting on Structures and Mechanisms

Materials Needed

- Computer
- Internet Connection



Engineering and Science Connections:

What is coding?

Code is a set of instructions that a programmer gives to a computer to tell the computer what they want it to accomplish.

Why do we need this set of instructions?

Computers cannot think for themselves, they can only read what they are being told. We must communicate with computers to be able to make them function.

Can we tell a computer what to do out loud?

No, computers only speak very specific languages, that must be given to them through text.

Programming Languages that Computers Understand

- Drag and Drop
- Scratch
- Hour of Code
- Java
- C++
- C#
- Python
- HTML
- Etc.

What is Microbit?

A Microbit is a tiny handheld programmable computer. It's used to power cameras, write words in lights, control musical instruments and game consoles as well. They also have small LED lights to flash messages, motion sensors and Bluetooth technology.

The advantages of Microbits

Microbits have many different sensors and features. They have accelerometers that measure the speed at which the Microbit is moving. This is useful for measuring human inputs into the Microbit, such as shaking the Microbit, applying certain forces, or changing the direction it's moving. Microbits also have temperature and light sensors.

Activity:

Today you will be designing your Frustration game, where you will be coding your Microbit to generate random numbers and you want your Microbit to help you in guess what is the number. You can play this number guessing game with yourself or with a friend. Write your score somewhere to keep track of it!

Step 1: Go to <https://makecode.microbit.org/>

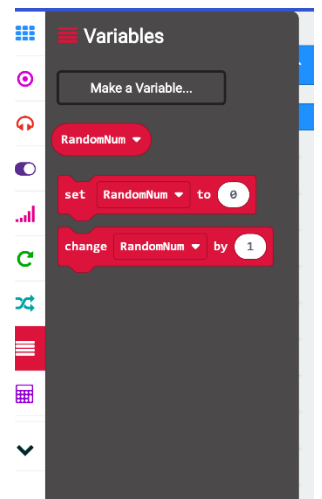
Step 2: The On shake block

- From the menu on the left go to the input section that's bright pink and select the on shake block.



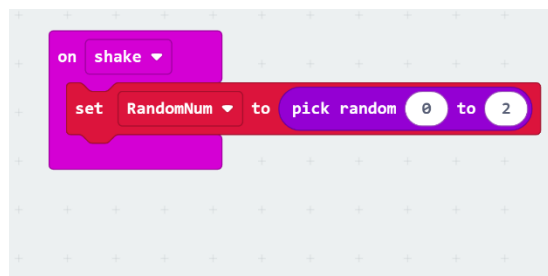
Step 3: Creating a variable

- Go to the red section on the left menu called variables and click on "Make a Variable" to create a variable named "RandomNum". From the variables, section choose the block which says set RandomNum to 0 and place it inside the "On Shake" block.



Step 4: Create a random number generator

- Go to math which is in purple from the menu on the left and choose the block which says "Pick random 0 to 2". Then place this block inside the set RandomNum to 0 blocks.



Step 5: We now want the Microbit to tell us what number it generated. From the logic section in teal chose an if-statement and place it inside the on shake block under the previous block. And then from logic grab the equals block and place it inside the if-statement. From variables grab the "RandomNum" block and place inside the =

block and make it equivalent to 2. Have the following code. Then grab the show string block from basics and write yes.

```

on shake
  set RandomNum to pick random 0 to 2
  if RandomNum = 2
  then
    show string "YES"
  else if
  then
  else
  
```

Step 6: Modifying the if-statement if the random number is 1

- Press on the plus sign on the if statement to make room for another if-else statement. Choose again the equal block and place it inside the if-statement and make the RandomNum variable equals 1. Then grab the show string from basic and write “No”.

```

on shake
  set RandomNum to pick random 0 to 2
  if RandomNum = 2
  then
    show string "Yes"
  else if RandomNum = 1
  then
    show string "No"
  else
  
```

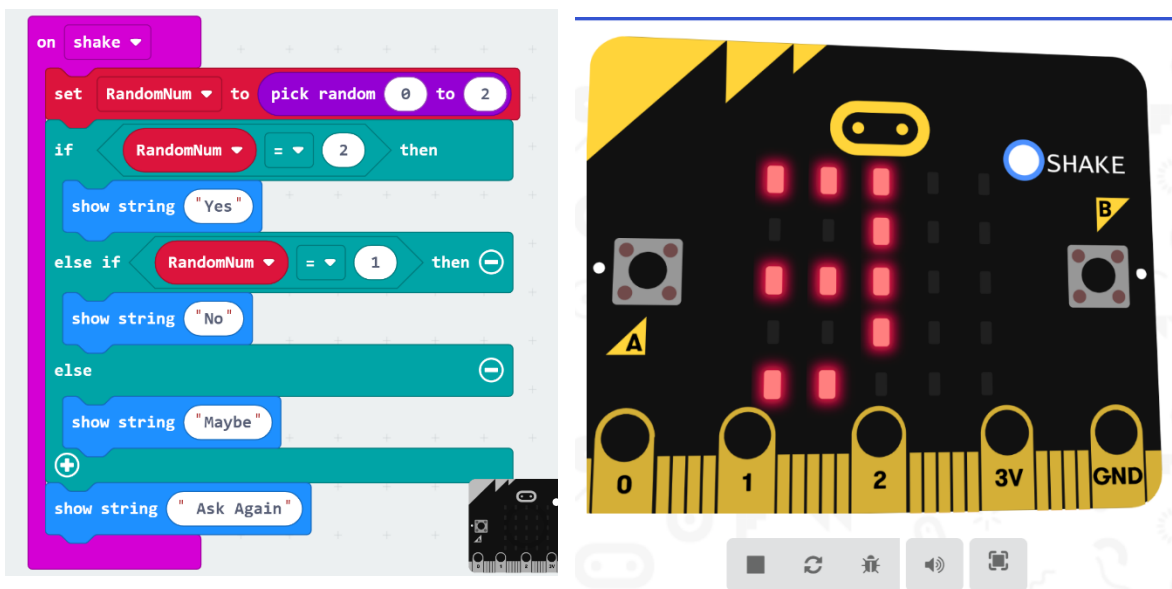
If the first value is true, then do the first block of statements. Otherwise, if the second value is true, do the second block of statements.

Step 7: Modifying the if-statement if the random number is not 1 or 2.

- On the else part of the if-statement add a block of show string Maybe.

Step 8: Ask again

- To make the Microbit ask Again place a show string "Ask Again" block outside the if-statement. Now you can play the Microbit Frustration game and try to guess the number. Press on "Shake" to make the Microbit work.



Recommended Video:

Watch the following video to learn more about the invention of programming languages.

<https://www.youtube.com/watch?v=Wchru8alhaE>



What Did You Learn?



- What is coding?
- Programming Languages
- What is Microbit?
- The advantages of Microbits
- Coding your own Microbit Frustration game

Future Learning



- Turn this activity into a design challenge. Your first challenge is to increase the number of responses the Microbit can give. How about 5 responses instead? Let's change the limit of pick random to 4 instead of 2. If you are all done with the first challenge your second challenge is to have the Microbit respond "Try again" if the random number is 3. Good Luck!

Share your creations!

We would love to see what you made. Email us at discover@uwo.ca or tag us on social media.

Instagram: @westernueng

Twitter: @westernueng

Facebook: @westernueng

Thanks for discovering with us!