

CODE, BUILD, CREATE, COMPETE



# WELCOME TO EP 5

Over half a centuryold today! Can you believe it?

do. In my case, one of those was learning to code

The teacher tried to teach me to code in **binary** as the wonderful languages you learn to code in today didn't exist way back when (do you know what the 'wayback-

A combination of **binary** being detailed rows of

need to be able to do and understand some level of coding in the future when you enter the workplace. It's good to learn whilst you are young and I hope that you will find this Camp helps you on the road to being able to do that. It's also a world where Open Source is a very popular way to develop code.

halfway through once you complete Episode 5.

Amanda

Amanda Brock is CEO at OpenUK



GUESSING

PHASE ONE WINNER

**KEEP IN TOUCH** 

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 Femi

Diversity and inclusion are so important. especially in technology.

Technology is going to be a massive part of our future and so the tech that we create needs to represent the diversity of all of us – we are its creators and will be its users.

#05 CHECK IT!

When you create projects, create them with diversity and inclusion in mind.

CHECK This means ensuring that images have alt text, videos have subtitles, you use accessible colours and fonts and most importantly, that you ensure any data used in your projects is diverse and has a good representation of gender, neurodiversity and Black, Asian and Ethnic Minorities.

This is particularly important in the AI field, because if you don't train machines on diverse datasets of images then they will not be able to detect certain people or skin colours as well and so will not be fully inclusive.

Our population is diverse and so our technology must be too.

Femi Owolade-Coombes, age 14



## micro:bit MIZARD

Your micro:bit questions answered by micro:bit expert **David Whale**!

> How can I convince my parents to buy me a micro:bit? Gabrielle, Cambridge





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You could start by showing your parents some videos of projects on YouTube that other people have built using the micro:bit – or maybe even this course! Then use the online **simulator** built in to the MakeCode editor to build and demonstrate some projects to them. Explain how computing and STEM subjects are in high demand and lead to rewarding and well-paid jobs as we see from the Open Source Heroes Column in the Ezine. Computing is a general purpose skill used in all industries today. Also, tell them how much fun you're having while learning about it all!

How does the micro:bit differ to a Raspberry Pi or an Arduino? Murat, Essex



he micro:bit is both similar and different to other single board computers. It is programmed by using another computer (unlike the Fi) and it has many built in **sensors** – whereas with the Pi and Arduino you have to add the **sensors** on after. You can't easily connect to the internet or use complex devices like a large screen, like you can with a Pi. Finally, the micro:bit runs for many days from a set of AA batteries (but the Pi needs a much bigger battery).

David Whale is a Software Engineer

## SOURCE CODE IS KING!

PLEASE

et's start this Episode with a little more Computer Systems learning.

The mathematician, Ian Stewart famously said "there are 10 kinds of people in the world: those who understand binary numerals, and those who don't".

Why do Computer Scientists love this quote so much when it doesn't seem to make grammatical sense?

The answer lies in **source code** and **binary** files which you were introduced to in this Lesson. The **source code** is the list of human readable instructions that a programer writes using a coding language, or in this case English.

If this quote was **source code**, then we would see English language words, "ten kinds of people". The file would then be converted into machine code (1's and 0's) that the micro:bit can understand using a special piece of software called a **compiler**.

In machine code 10 is the equivalent of the number two in English language, so the quote once **compiled** becomes "two types of people" to the computer. Suddenly, the quote makes sense!

Now back to our learning on code.

The first concept is the ability to create random numbers. These have been used for many thousands of years. Whether it's flipping a coin or rolling a dice, the goal is to leave the end result up to random chance. This is very important for creating unpredictable results in a computer game and randomness is important for **cryptography**.

It's been a busy Lesson with system knowledge and learning about random numbers. To further your learning, why not try researching some uses of random numbers or how computers convert numbers to **binary**?

Pamela Boal is an Educationalist



Pamela







The first **Machine Learning** programs are quite old, they appeared back in the 1950s. However, a new discovery in 2013 drastically changed how we use them.

## The new idea is directly inspired by our brains!!

The neurons (cells in our brain) allow us to think and solve problems. The new **Machine Learning** program directly simulates these neurons. Therefore, this program can solve problems with its neurons just as we do with ours!

There are 2 differences between human and **artificial intellgence.** 

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Firstly, our neurons are living cells – while the program neurons are just 0 and 1, bits in a computer!!

Mihail

Secondly, our brain connects neurons in a much more advanced way than a program.

This allows us to focus on many different tasks while each **Machine Learning** program can only do one specific task.

Today, **Machine Learnin**g is transforming society in many ways such through **search engines** – for example, Google, as well as social



networks and autonomously driven cars. We do not know yet what will further changes will come. It should be interesting to see!

Mihail Popov is a Software Researcher

## **OPEN** Source Hero

Sometimes things don't go quite as you expect. I found out I had a heart condition when I was young and had to get a pacemaker/defibrillator.

I started asking lots of questions about the device I was getting and realised that I wasn't getting great answers. I thought it was so weird

that while I was a technical person, I couldn't see the **source code** of the software to be implanted in my body.

At first, I was really depressed about it – until I realized that getting the device would make me a **cyborg**! I decided I'd turn the experience of getting the device into an opportunity to make things better.

Once I got it, I researched software safety. I learned so much that I wanted to make a difference with this knowledge and became an advocate for software freedom – software we can control, software that is in the service of us, the people who use it, and not in the service of any particular company.



We're at a critical time in the history of technology, creating so much important infrastructure from software that we'll rely on for years to come.

You're an important part of that story. You can learn about software and choose to make technology that



respects the people who use it in the future. You can effect powerful change just through the choice of technology you use and support, including using software that is free and Open Source.



Karen Sandler is the Executive Director of Software Freedom Conservancy



...and philanthropist, (including hosting £250k rock, paper, scissors competition)

10 years ago, the idea of a 21-yearold hosting a rock, paper, scissors competition, giving away \$250k to the winner, and making money from this stunt would have sounded crazy.

However, YouTube and other platforms have opened up incredible ways to make money and have fun – no matter what your age is.

This particular competition was hosted by Mr Beast, known as YouTube's biggest philanthropist with over 27 million subscribers to his channel. He is famous for his massive giveaways and viral videos.

He has also raised \$20million to plant trees (campaign #TeamTrees), with donors including Tesla CEO Elon Musk, Twitter CEO Jack Dorsey, and over 600 major influencers.

How did he create this career?

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Like most things, it wasn't overnight. In fact, Mr Beast (real name Jimmy Donaldson) has been making videos since 2013 (aged 13), starting with video game tutorials. Whilst doing this, he was constantly studying how to 'game' the algorithm, i.e. how to make sure it worked in his favour.

By 2015, he started to get some traction, as he continued to innovate, spending more time and creativity on content. By mid-2016, he had around 30,000 subscribers.

To get there, he tried numerous phases and strategies: offering tips and tricks in games, funny compilations, and then 'counting to 100,000' (which was his first viral video) and the rest is history.

With enough persistence, he learned the system.

The lessons from Mr Beast are to always continue learning, be creative and keep going.

Matthew Springer is a Founder



## INPUTS AND OUTPUTS

micro:bit

**Inputs and output**s are an important part of any computer system. As a very small computer, the BBC micro:bit has plenty of. **inputs and outpu**ts to learn about and use. Watch this video to learn about how computers like the micro:bit interact with the world using **inputs and output**s.

Wise words from the bit brain

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micro:bit



Click here to view the film

<u>openuk.uk</u>



#### Across

- 4. What is it called when you enter instructions into a computer program?
- 5. What is an official document called that clearly defines how a company's employees should behave in the workplace on a day-to-day basis? (Three words, 4, 2 and 7 letters)
- What is the purpose of the 'U' variable in the Guessing Glove game? (Three words, 6, 6 and 9 letters)
- 10. What is the name of a sequence of instructions your computer can understand, but that is difficult for humans to read or understand? (Two words, 6 and 4 letters)
- 11. What is a block of organised, reusable code that is used to perform a single relatable action called?
- 14. What is something that happens called (that can either be user generated or not)?
- 15. What is a word that means that everybody, regardless of their differences, has the right to be appreciated as a valuable member of their community or workplace?
- 16. What is the result of the computer following the instructions called?17. What is something that is offered free
- of charge called?

Down 1. What is it called when you give a name to a code you want your glove to perform? (Three words, 8, 1, and 8

letters)

- What is it called when you tell your computer to run (or execute) that code? (Three words, 7, 1 and 8 letters)
- **3.** What is a person who influences others called?
- 6. What is the brand name of your glove kit?
- Who collaborated with Imogen Heap, MiMU and MiniMU creator Helen Leigh to bring you the MiniMU glove?
- 9. What is it known as when you understand that each person is unique and recognise our differences (such as race, ethnicity, gender, age, religious beliefs)?
- 12. How can you move text or data from one part of a document or to another? (Three words, 3, 3 an 5 letters)
  12. White is is call a decomposition.
- 13. What is it called when you examine something to make sure it's right?

#### Word Search

courtesy of puzzlemaker.discoveryeducation.com

om	В	М	Ν	С	w	0	х	С	L	E	Y	R	Q	R	A
.0111	С	н	U	D	т	G	w	I	w	0	D	Ν	I	w	L
	н	н	E	S	L	E	F	Ν	1	F	F	0	G	т	L
	U	В	E	F	v	х	М	v	L	В	L	0	с	к	I
	М	0	х	С	E	R	G	v	R	0	В	E	Ρ	т	N
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	Ν	В	т	с	0	М	Ρ	I	L	E	R	D	Ν	Y	0
	I	0	w	v	G	В	С	М	v	т	I	S	R	Y	D
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	w	М	U	U	М	С	I	Ρ	В	Q	х	А	R	U	N
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	D	Ν	т	м	L	Т	т	v	Q	J	А	G	С	D	R

P P C V D P E Y N E Z Y Z Q C

BINARY	BLOB	BLOCK
BUG	CALLING	CHECK
CODE	COMPILER	DOTHEXFILE
DOWNLOAD	EDITOR	ELSE
GLOVE	HUMAN	NUMBER
RANDOM	RUN	WINDOW

### Win a Huawei MatePad T8



To enter the prize draw you must submit the completed Crossword and Word Puzzle from Ezine1, by email to **ezine5@openuk.uk**. All entries are subject to our terms and conditions which you can read **https://openuk.uk/ezine-5-comp-terms-and-conditions/** By entering you agree to them and confirm that you have parental or guardian permission if you are under 16 years of age. One winner will be drawn from completed entries received by 10 September. No cash alternative. UK residents only. Judges decision is final. No correspondence will be entered into. Surname and county of prize winners will be made available on request. Promoter, OpenUK.

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## OpenUK MiniMU INSTRUCTIONS LESSON FIVE



### 

Kim has played the 'Rock Paper Scissors' game on the micro:bit website, and wondered if it would be possible to play a similar game on the MiniMU glove. But she is not sure how to do this and would like your help.

The problem she has is that the display on the micro:bit is hidden in the glove pocket. Now, she could get a pair of scissors and cut a hole so she can see the screen; but having seen the excellent projects you have already built with your glove, Kim wonders if it would be possible to make a similar game entirely driven by sounds and gestures.

In today's lesson you will help Kim to design a program for the 'Guessing Glove' game.

By doing this you will learn about:

- events;
- □ if statements;
- variables;
- defining a function;
- □ calling a function;
- □ random number generation.

You will also learn about the difference between source code and binary files.

#### You will need:

□ your assembled MiniMU glove;

the MakeCode web coding editor.

## **OpenUK MiniMU INSTRUCTIONS** LESSON FIVE

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Figure 1: The MakeCode web coding editor.



Figure 2: OnStart and OnLogoUp event handlers; start the game.

## **OpenUK MiniMU INSTRUCTIONS** LESSON FIVE



Figure 3: The 'check' function is defined.



Figure 4: Three gesture event handlers, calling function 'check'.

## **OpenUK MiniMU** INSTRUCTIONS LESSON FIVE



## **OpenUK MiniMU** INSTRUCTIONS LESSON FIVE

#### Further Information about binary files and .hex files



Figure 6: The micro:bit .hex file contains hexadecimal numbers. It contains an encoded copy of *both* the source code that humans can read inside MakeCode, and the binary code that the BBC micro:bit device can run.

[1] https://www.mathsisfun.com/binary-number-system.html

[2] https://www.mathsisfun.com/hexadecimals.html

Because the BBC micro:bit and Microsoft MakeCode are Open Source, all of the information about how they work can be found on the internet.

[3] https://support.microbit.org/support/solutions/articles/1900005 3218-locking-and-unlocking-makecode-editor-hex-files

[4] https://tech.microbit.org/software/hex-format/

[5] https://github.com/microsoft/pxt/blob/master/docs/sourceembedding.md

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