Transcript - What Do Computer Coders Do? With Shane Mitravitz

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(Jess) You're listening to What Do Scientists Do? a show where I talk to a different guest each episode and they teach us all about their favourite science topic.

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Along with each episode we will also be posting activities that you can do at home!

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You can find those at bit.ly/whatdoscientistsdo or @scientistsdopod on Twitter and Instagram.

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My name is Jessica and today I got to talk to Shane who talked to us all about computer coding,
tinkering, and making his own Minecraft server. Today I'm joined by Shane. Shane how are you? (Shane) I'm doing very well.

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Jessica thanks for having me on the show. (Jess) Thank you for coming on the show.

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So what is your name and what are your pronouns? (Shane) My name is Shane and I use the pronouns he.

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and him uh and today I'd love to talk to you all about uh my favourite subject in stem and that's everything computer related. Um so maybe we'll get a little bit into

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some coding and some of my favorite projects. (Jess) Yeah for sure so what is computer coding?

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(She) So coding is just a fancy word for talking to computers. Now computers are pretty dumb.
um. I mean that's not really even a joke like they kind of just do what we tell them to do when you think about it. And even when they do things by themselves it's because we told them to.

So you know it when you think about it that way they don't really have much by themselves but when we get involved and we start providing those instructions to the computer then we can really control what happens. Anytime we want to do a simple action, even moving a file from our desktop to our downloads folder or back and forth, all of those little step-by-step actions can be done using code. Which means that everything we do on a computer when you think about it can be done with code. But it's not always easiest to do it that way. Most of the time we prefer to use a mouse and keyboard. So code is really just the language that we use to tell computers what we want them to do.

And so there are many different languages that we can use for different jobs the good analogy is like if you have a tool belt you have different tools for different jobs. And that's why there's different languages in code.

(Jess) Yeah so is it like human languages?

(Shane) They can look very different.
um I wouldn't say it's exactly like human language. They use different formats and the word for formatting is syntax in computer speak which just means that there's different ways that we can express our ideas to a computer. And there are some languages where I would say they're much harder to use. They're more picky, there's more punctuation like little marks that we need to use here and there to indicate the structure of the language. But there are other languages that are very very simple by comparison, ones that are very user-friendly. And so those are especially the ones I want to focus on today, talking about mainly Scratch and another favourite of mine is Python. Which is very different from Scratch but they both follow that idea of simplicity is best. Yeah so they both keep it they keep it simple so that um maybe even some of our listeners could try them out?

(Shane) Oh absolutely this is really the um why I'm so passionate about this subject is because anyone with the willingness or the interest to discover some new ideas can do it. So I really believe it's something for everybody. I acknowledge that coding and programming, the way it's talked about a lot is made to seem like it's inaccessible or it's out of reach for
people that aren't in the know, they haven't been told about how it works or what it is. And so I just wanted to take this moment to say that's not true it really is something that anybody no matter your age can learn about and interact with. So just a little background for myself I grew up using computers mostly just to play video games. I never really did much coding or actually no coding just to be to be accurate - I didn't do any coding - but I always was interested in computers. And then when I was 20 years old I started to learn how to code in university and it really felt like a whole new world. I just couldn't believe it had been under my nose the whole time and that I didn't know it was something that I could just start at any time. So many of these programs that we use and the tools we use in computers are made by everyday people that said "whoa, I have a problem but I don't really like all of the tools that are being offered to solve this problem. So I'm going to make my own." (Jess) Yeah it sounds like there's a lot of people making really useful tools just for each other, not necessarily for you know a company or anything like that, though you definitely can do that. They're just making things for themselves and
for each other and that sounds lovely. If I wanted to start learning computer coding today and I did

not know anything about it where should I start? (Shane) I would with um you know parental

guidance - I know a lot of our listeners may not um have access to a computer because you know the

internet is a very um turbulent that means uh unpredictable place at times - so it's always

important to make sure you have your parent's or guardian's permission to be on the computer and

searching things. You've always got to be safe and be thoughtful about that side of things. But

where I would start to learn about programming is on the internet I would go on to a search engine

such as google or any search engine and just type in "top scratch projects." And just explore and

see what other people have done. You can also go on Youtube or any video platform if that's

your preferred learning style. There is so much video content where people will speak and walk you

through all of these um intro topics for coding. So that's where I would start. I would maybe go

on youtube or on google and just start exploring scratch projects. And I would especially recommend
scratch for um starting out. And to draw attention to one of the things I love the most about scratch

is that it gives you a visual right away. So when you start out on the right side you have a cat

and you can add different characters. You can add a background and then you can use your code

blocks to make them do things like move around or follow your mouse pointer anything like that.

That is a big difference from a language like Python that I mentioned earlier where

you're only going to really have text. The one thing I would say about Scratch is that there is

a little bit of a learning curve in terms of where things are. So on the left side of your

screen when you open up scratch there will be a lot of different categories of types of
code. You won't need to type a single thing you just use your mouse click on the block you want

and then drag it over into the main section and let go. And so that's called drag and drop coding

and you'll be able to use that same process to make unbelievably interesting programs.

And the sky is the limit. I've seen amazing developers create programs that are remakes

of famous games from the you know 80s and 90s and even more modern takes.

It was all done through this very simple process. So that's kind of the idea of
coding it's like we have really simple building blocks that when working together creates a really complex and interesting system.

(Jess) Yeah that sounds like it's a really cool way to start and it is easy to find lots of those scratch videos. And we will also be posting some on the podcast website and I'll give more details about that at the end of the episode.

So if you would like an absolute beginner introduction to Scratch you'll be able to find it with the resources that we post along with these podcasts. Shane,

you've talked a lot about beginning to code but what are some of the coolest things that you've ever done with computers or coding?

(Shane) Well that's an exciting question. Much of the most exciting things that I've done with computers have been do it yourself sort of projects where you're using a computer for a specific use and then you let that run in the background of your house to keep it really um into a section that I'm passionate about I love video games. Um I ran a Minecraft server on a really beautiful interesting computer called the raspberry pi. And many of you may have heard of it, many not. It's a full computer that is around the size of a credit card. And you can plug in a monitor, you can plug in a keyboard,
and you can plug in a mouse. And you can use it like a normal computer but you can also have it in

a setup where it's being told to do just one job and do that one job really well. And so through

all these amazing developers and - there's so many tutorials and walkthroughs about these kind

of subjects. Um you know I didn't invent the process of how to run a Minecraft server on a

raspberry pi. I just followed the instructions and and said, "wow, I really would like to leverage

this amazing solution that someone else has made and then have that benefit me in a personal way."

That's also a big part of the philosophy of what open source computers are all about is really

putting the power into the hands of the community so that everyone can share with each other and

improve each other's solutions. So with that said the raspberry pi isn't a super computer by itself

right. If you're using just one it's going to be a little strained at times when you want to do

jobs that are really hungry for - we call them resources. So a computer only has so much juice

that it can give to a certain job and we call that juice resources or how much energy can it spend

on any given kind of task. And the word resources includes different parts of the computer including
you know your processor, your ram, among others. So with that said, Minecraft is very intense on its requirements and what it needs to run really smoothly. And so it wasn't um it didn't seem like a high high-end server when you're in there you can see a fair distance. But you know there's - it's really foggy towards the edge because it can't render so far away.

But using that uh tutorial and that process and programming that server I was able to install Minecraft on a real um well you know it is a real server on the raspberry pi but i mean an actual server that is in a data center in a different city. And you can access that by going online and buying something called a vps which is like a monthly subscription for accessing a server that you can use for whatever you want. So I was able to run a Minecraft server using my raspberry pi um learning.

(Jess) If something happened to all the other Minecraft servers but you had your Minecraft server would you still be able to play Minecraft?

(Shane) Absolutely absolutely. And that's a - that's a great question.

So a lot of the motivation for - we call this term self-hosting, when you're hosting your own computer services - so that you know if there's power coming from the wall through the plug
into your computer that system will run and it will do what you have set it up to do. So that even if I didn't have internet at all I would still be able to log in to my Minecraft server at home.

(Jess) Well that sounds like a super cool project. Even if all the internet in the world goes down except for your little raspberry pi um you'll still be able to play Minecraft and I think that's a really funny idea. (Shane) But with that said I also want to mention one other little project that I did that I thought was really interesting. So I also have really loved just having access to information. If I want to learn about something, you know, I don't need to pop open the old encyclopedia you know. I can go on the internet and find excellent resources about these events throughout history or just general information. And so I thought to myself, "well you know this is excellent today and tomorrow and next year, but I don't know what the future holds, I really don't. And so how could I assume for sure that I will always be able to do that? So that led me to wondering, would it be possible to access Wikipedia without the internet? And the answer is yes, using raspberry pis.

(Jess) Really? (Shane) So yeah yeah it's fantastic. There's
This software called Kiwix spelled k-i-w-i-x and their whole mission statement is to bring access to information to communities without internet using affordable technology. There is a little bit of setup involved, but if you're willing to go buy a tutorial and be patient and not beat yourself up - it doesn't happen in a day, it may not, you may not be able to do it all at once or in one sitting and that's okay. But just sitting down and trying to think your way through a problem, saying "wow, I really want this outcome. I'm gonna keep on trying until I get there" and not giving up can produce such wonderful things. And so on one of the most inexpensive raspberry pis is called the pi zero and they have something called pi zero w for wireless. So you can connect to a wi-fi network using a very small computer and I just went on amazon and I bought a 200 gigabyte micro sd card because that's a lot of space and I'm going to need a lot of space for Wikipedia.

And yeah I downloaded the entirety of Wikipedia and put it on a micro sd card inside my raspberry pi so that even if my internet goes out, if I have electricity going into my router I can read wikipedia because the router yeah it will provide access to the internet when you're connected,
but another function of a router is connecting computers together inside your house. So that my phone can ping my laptop without the internet as long as they're both on the same wi-fi network which may not have access to the internet. So yeah it's it really opens the door to a lot of interesting ideas when you realize that, "wow I can just kind of stockpile cool tools and like have them ready for my enjoyment or you know a rainy day". And you know, realistically I don't really use that that as much as you know I thought I would at first. But just knowing it's possible is what I find so interesting.

One other thing about that is what if a community does not have access to internet that is fast enough to access information in a convenient way? So I remember reading about examples where raspberry pi's pre-loaded with kiwix and wikipedia have been put in a bag and taken on a bus or on a train and brought to a community where they don't have internet being wired in from the outside. And as long as they have some kind of solar energy collection system where they can power a socket to run that raspberry pi, any phone in the area, any wi-fi enabled device will be able to access that
copy of wikipedia. Which is just mind-blowing.
(Jess) Well thank you so much for coming on the
show today Shane. And as always a big thank you to everybody listening! If you would like to try
computer coding for yourself, you can find our Scratch tutorials at bit.ly/whatdoscientistsdo
or you can check us out on Twitter or Instagram @scientistsdopod. That's also where we'll be
announcing our guests for each episode. So if you have a question about anything from
microwaves to
megalodons you can tell us on Twitter or send us an email at whatdoscientistsdo@superstaff.ca.

Thank you for listening and I'll see you next episode. Bye for now!

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