

# Western Engineering Outreach

## *Twinkle Twinkle Little Scratch*

### *Grade SK-2*

### *Meet Today's ENG HERO!*



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Dr. Ouda teaches undergraduate and graduate courses in Software Engineering at the Department of Electrical and Computer Engineering. While working for over 14 years in the computer industry, he gained a rich experience in Software Engineering. Dr. Ouda uses his industrial experiences to show what software engineers in the real world do. His current research is mainly in information security, network security, big data security and data warehousing. To learn more about Dr. Ouda visit: <https://www.ak-ouda.com/>

### *Learning Goal:*

- Students will explore basic coding fundamentals through interactive activities.
- Students will be introduced to coding through the Scratch platform
- Curriculum Connections: Students will develop critical and creating thinking skills with the application of those skills on a technological platform, as recommended in the Ontario Science and Technology curriculum.

### *Materials Needed:*

- Ipad or tablet
- Internet access
- Scratch Jr app

- Apple: <https://apps.apple.com/us/app/scratchjr/id895485086?ls=1>

- Google Play: [Google Play: https://play.google.com/store/apps/details?id=org.scratchjr.android](https://play.google.com/store/apps/details?id=org.scratchjr.android)



## 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 instruction?

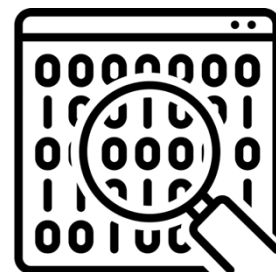
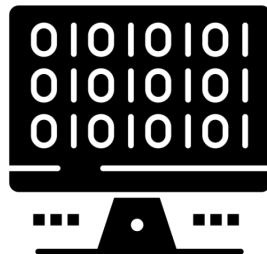
Computers cannot think for themselves; they can only read what they are being told. We must communicate with computers to be able to make them function.

### Can we tell a computer what to do out loud?

No, we can only say instructions to humans out loud, because they will be able to understand the same language that we speak. Computers only speak very specific languages, that must be given to them through text.

### What is the only language that computers understand?

Computer understands two types of data: on and off, or 1 and 0. A computer has set of on and off switches or transistors. Anything that a computer does is a combination of transistors turned on and off. However, transistors of a computer are represented as 1 and 0 numbers. The set of 1 and 0 numbers is called binary code, which is the only language that computers could understand. Binary code is grouped into bytes or a group of 8 digits that represent 8 transistors each. Modern computers contain millions or even billions of transistors, so lots of binary code combinations.



### What is a compiler?

To be able to write a computer program by typing out billions of 1s and 0s would require superhuman brainpower and a lifetime! Therefore, programming languages exist, so we can write code in a language that has letter and that we could understand. However, the computer can't understand programming languages by themselves, since the computer only understands binary. That's why a compiler is very crucial, because it translates what we write into binary code.

## What do software engineers do?

Software engineers code or write the instructions that tells the computer what to do. A software engineer writes the software for the computer or changes existing software to make it a better quality.

## What are the most used programming languages?

Python, Drag and Drop, Scratch, JavaScript, Java, C++, C#, Scala, C, FORTRAN, Pascal, Ada, Cobol

Today we will be using the Scratch coding Language. It's very great way to start coding, since it simplifies the task instead of writing lines of code. Let's learn more about some coding terms!



## Coding Vocabulary

**Variables:** Used to store values such as numbers. Makes it easier to change values easily rather than being changed manually one by one.

**If-Statement:** Used to execute a specific line of code if a condition is true

**Loops:** Loops are used to repeat lines of code over and over.

**While Loop:** The while loop goes through a block of code if a specified condition is true.

**Inputs:** Something that you put into the computer which will be used to produce an output

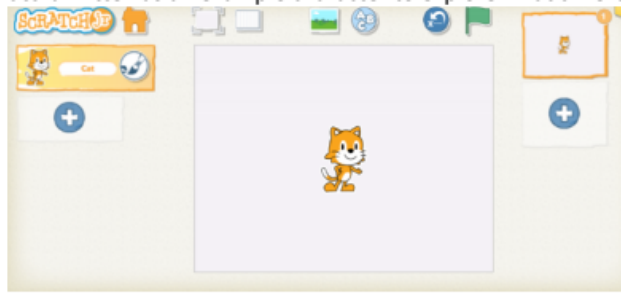
*Video Recommendation: Invention of Computer Programming Language*

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

## Activity

To get started: Go the Scratch Jr app. Click the create button on the top left to begin a new project or tap the plus button under "My Projects". Start using the ScratchJr Kitten as an example character to explore what different blocks can do. Explore the blue movement blocks and make the kitten move.

## TWINKLE TWINKLE LITTLE SCRATCH



Review the concept of adding a new character using the blue plus sign on the far left. Also, look through the different background option and practice changing the background.



New Background



OK

Let's start making our Twinkle Twinkle Little Star themed program now!

Step 1: Delete the Scratch Jr cat that you have created when exploring

Step 2: Add the star character using new character.



New Character



Step 3: Add at least 4 stars that are scattered across the sky.

Step 4: Make the program with a beginning, middle and an end. Start with the green flag block to indicate the start of the program. To have the star twinkle use a turn left then turn right block. Instead of ending the story right away use a repeat forever end block.



Step 5: To copy your program from the 1<sup>st</sup> star to all the other stars, tap the green start block with your finger and drag and drop it to a star on the left. Repeat this for each star.

Step 6: Add a background to make your stars look like they are in the night sky!

## What did you learn?



- What is Coding?
- What are some programming languages?
- What do software engineers do?

## Future Learning



- If you enjoyed coding keep on coding with Scratch. For a Idesign challenge , you can come up with three different ways to make your stars move. Some stars can move in the same pattern, but they should not all be moving in the same way.

## Share your creations!

We would love to see what you made. Email as at [discover@uwo.ca](mailto:discover@uwo.ca) or tag us on social media.

Instagram: @westernueng

Twitter: @westernueng

Facebook: @westernueng

Thanks for discovering with us!