Department of
Computer Science and Engineering

Title: Overview of Scratch

Problem Solving and Flowchart Design
CSE 100

Green University of Bangladesh

1 Objective(s)

- To gather basic knowledge of Scratch programming.

- To implement basic animation using Scratch programming.

2 Introduction to Scratch

Scratch is a visual programming language that allows students to create their own interactive stories, games, and animations. As students design Scratch projects, they learn to think creatively, reason systematically, and work collaboratively. Scratch was created by the Lifelong Kindergarten group at MIT Media Lab and is available for free download at http://scratch.mit.edu. Once Scratch is downloaded to a computer, you do not need Internet access to create a project.

2.1 Downloading Scratch

Go to the Scratch website at http://scratch.mit.edu. From the home screen, click on

Figure 1: Home Screen

2.2 Elements of Scratch

There are four main elements in Scratch: the stage, the sprites, the script, and the programming palette. These elements can be compared to those in a play.

1. **Stage** similar to the stage in a play. This is where everything will take place. The stage can have different backgrounds (see page 7), just like in a play.

2. **Sprites** are the actors or main characters of the project. Sprites are programmed to do something in Scratch.

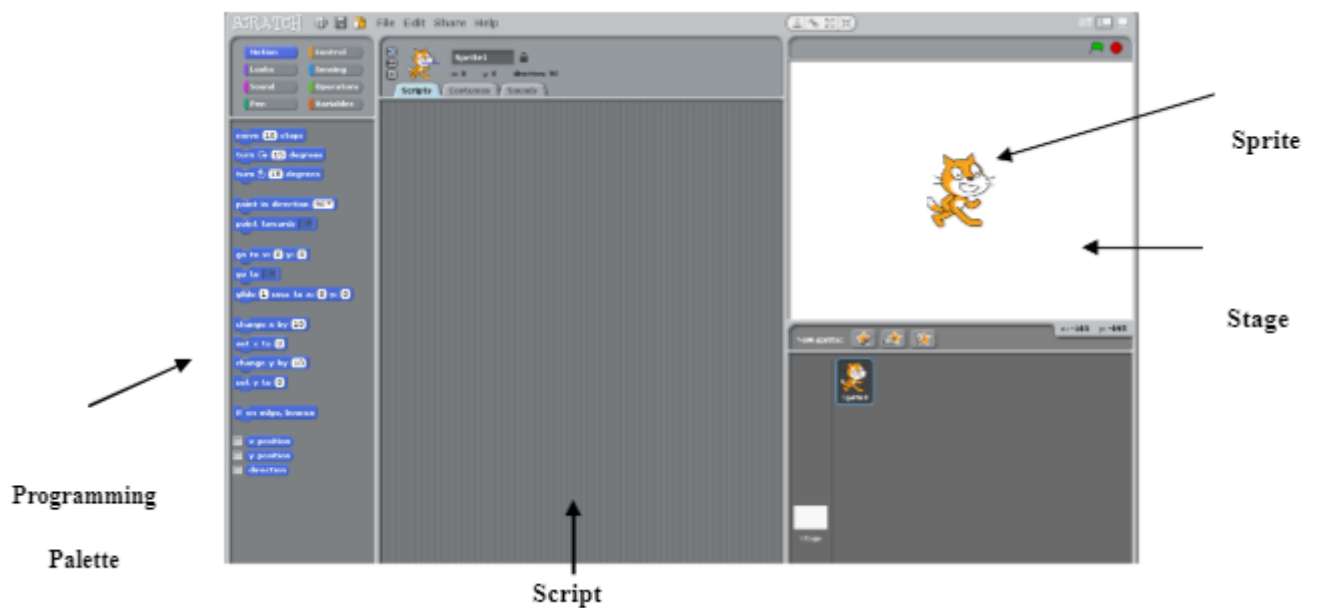3. **Script** tells the actors what to say or do. Each sprite is programmed with a script.

Figure 2: Programming Interface

4. **Programming palette** elements used to program the sprite to do or say something. Sprites must be programmed to carry out every function you want them to perform

3 Programming a Sprite

3.1 Control blocks

Programming a sprite ALWAYS begins with a control block (orange/yellow category from the programming palette). There are three blocks that can be used to begin programming:

Figure 3: Control blocks

1. **When the green flag is clicked** The project will begin when the green flag in the upper right hand corner is clicked.

2. **When the space key is pressed** The project will begin when the space bar is pressed. The black drop down arrow indicates that you can choose a key different from the space bar; and that key will begin the project.

3. **When sprite 1 is clicked** The project will begin when the sprite is clicked. Note: Click the sprite on the stage, NOT the small thumbnail sprite shown underneath the stage.

Drag the control block to the gray scripts area. The next block will connect to this one like a puzzle piece
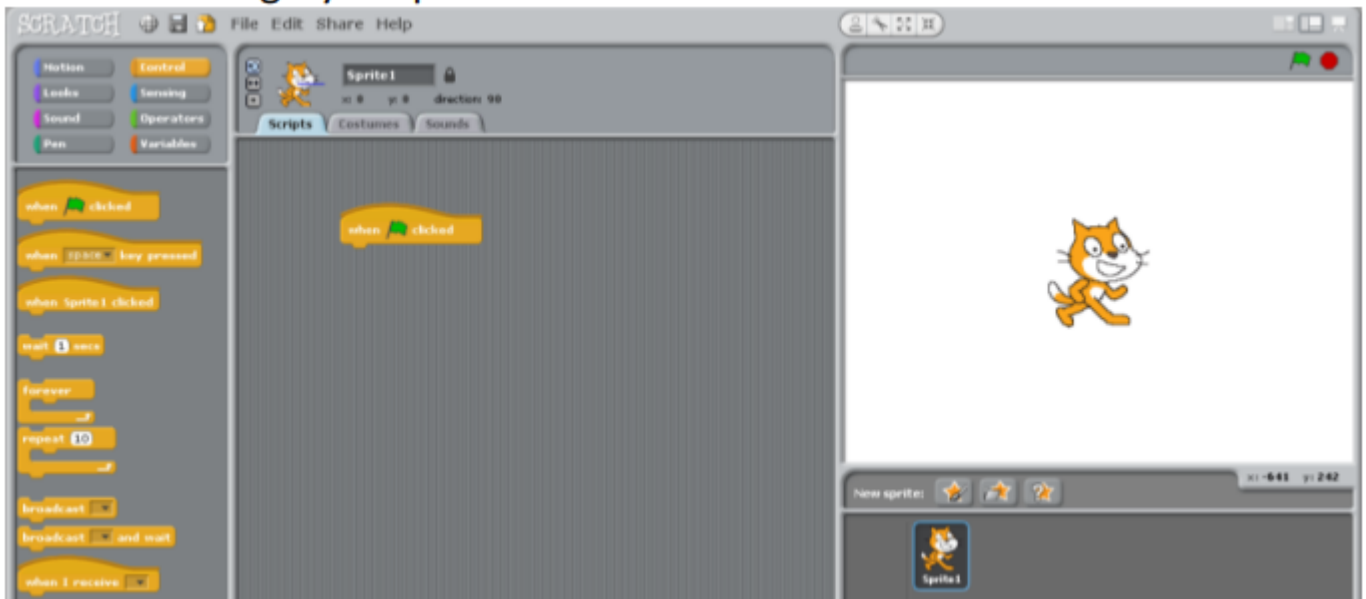

Figure 4: Motion blocks

3.2 Motion blocks

Motion blocks fall under the "blue" category. There are several blocks that will allow the sprite to move. This category teaches students to understand positives and negatives and other mathematical concepts, like degrees.

1. the sprite will move X steps. You can change the value whenever there is a fillable white area in a programming block. For example, 10 steps can be changed to 25 steps. Positive values move forward (to the right) and negative values move backward (to the left)

2. Glide_sec to x:__ y:__ - The sprite will glide to a specified position in X seconds. Remember: the more seconds you use, the slower/longer it will take the sprite to glide across the stage. Find a position on the stage that you would like the sprite to glide to and then move it there. Above the scripts area, you will find X and Y positions. Use these values to fill in the X and Y area on the glide block. Be sure to use a (-) sign when necessary.

3. Go to x__ y:__ - this block is used to place the sprite at a specific position when the project begins, so you do not have to manually pick the sprite up and put it in that position every time you restart the project. For example, if the sprite glides when the green flag is clicked, it will move away from the beginning location. Instead of moving the sprite back to the spot where it originally began, you can program it to begin at that position.
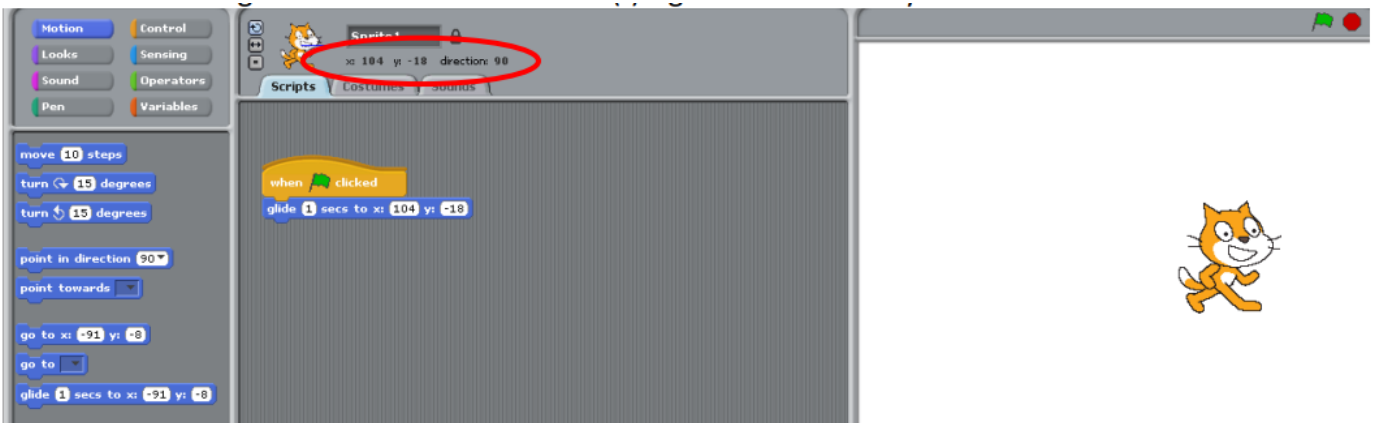
Figure 5: Looks blocks

Figure 6: Glide sec to x: y:

3.3 Looks blocks

It looks like blocks fall under the purple category of the programming palette. There are several blocks to control what you SEE the sprite say or how the sprite looks.

1. Saying hello for 2 seconds allows you to program the sprite to give a word bubble that says what you have typed. Because the white space is fillable, you can delete hello and type another message. Note: You will SEE the sprites message, not hear it because this block is under the looks category.

2. Switch to costume If you click on the Costumes tab beside the word Scripts, you will notice that some sprites have more than one costume. You can program the sprite to switch costumes. If the sprite does not have another costume, you can always create your own by clicking copy and then editing (see page 6 for more about painting a sprite)

3.4 Sound blocks

Sound blocks fall under the fuchsia category and allow you to program the sprite to produce sounds or words you can hear. Click on the Sounds tab beside the word Costumes, to import
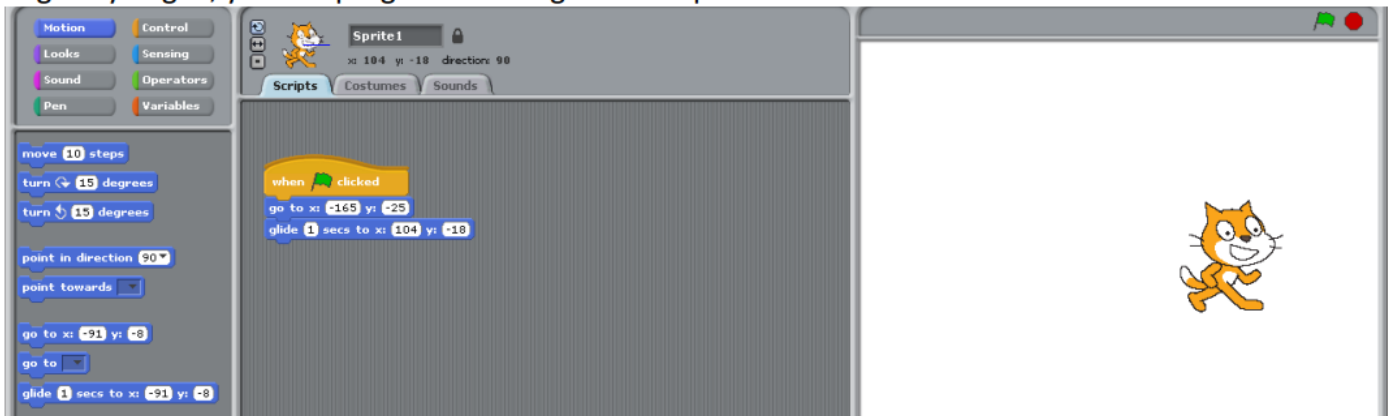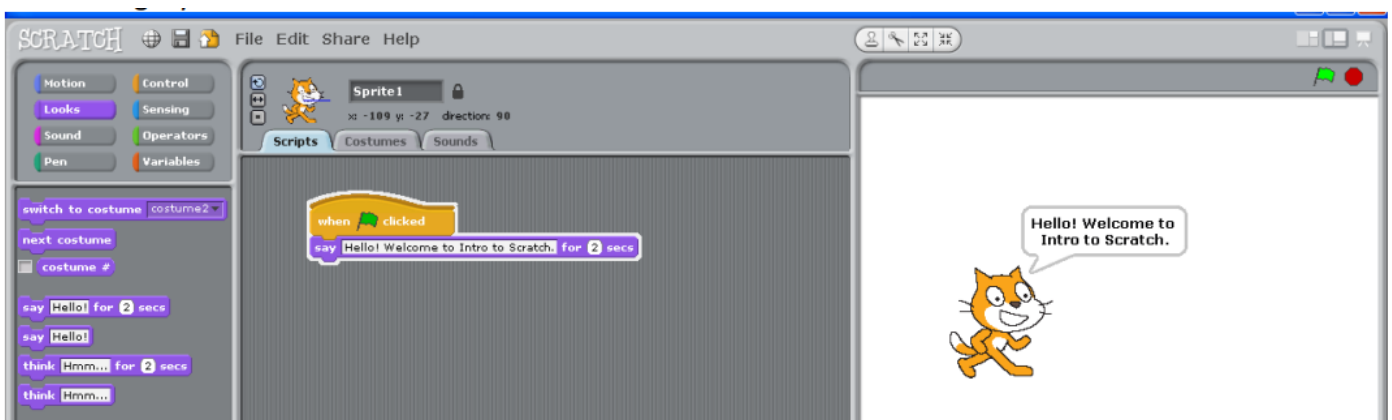
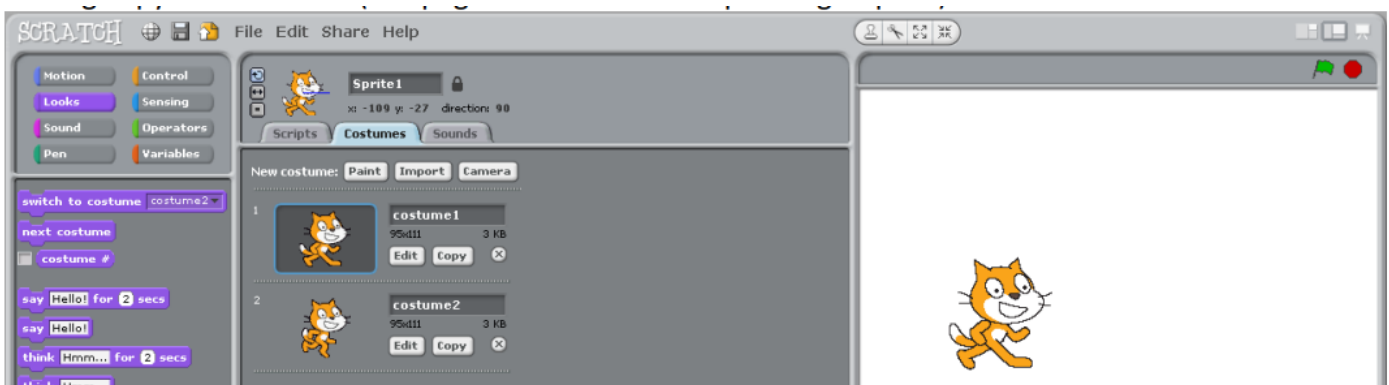Figure 7: Go to x y:

Figure 8: Saying hello for 2 seconds

Figure 9: Switch to costume

or record a new sound. Click Sounds → Import and then double click on one of the folders (animal, effects, human, etc.).

3.5 Choosing a new sprite

If you do not wish to use the Scratch Cat as your sprite, there are two ways to delete it: 1) click on the scissors above the stage and then click on the sprite or 2) RIGHT click on the thumbnail and then click delete.
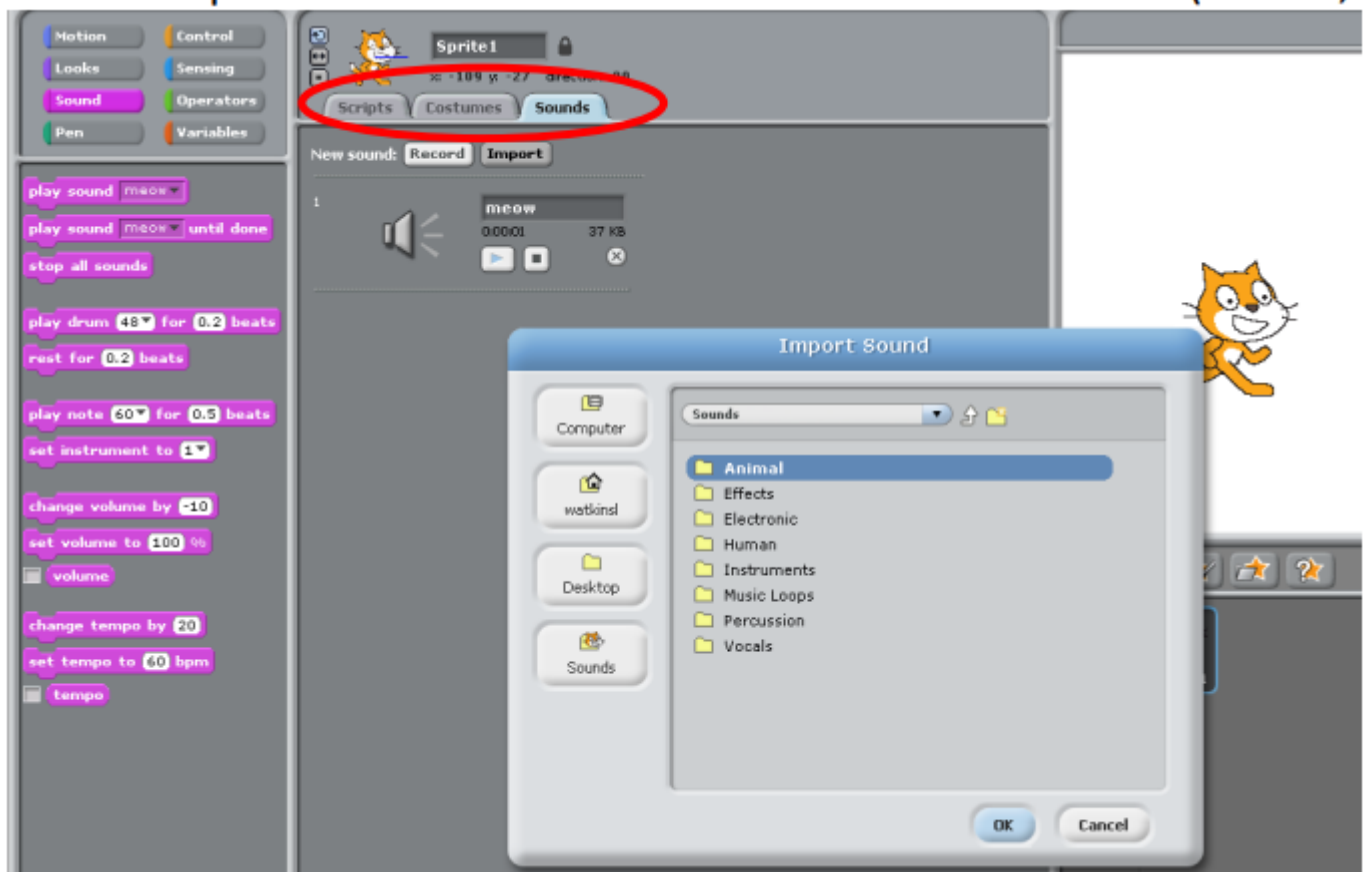
Figure 10: Sound blocks

Figure 11: Sound program

There a three ways to choose a new sprite: paint, import or use a mystery sprite.

1. Paint a new sprite allows you to use the paint editor to create your very own sprite. You can use a paint brush, paint bucket, lines, circles and squares to create your sprite.

2. New sprite allows you to choose from sprites that are available in Scratch. Double click on one of the categories to find a sprite you wish to use

3. Mystery sprite Scratch will choose a random sprite for you.
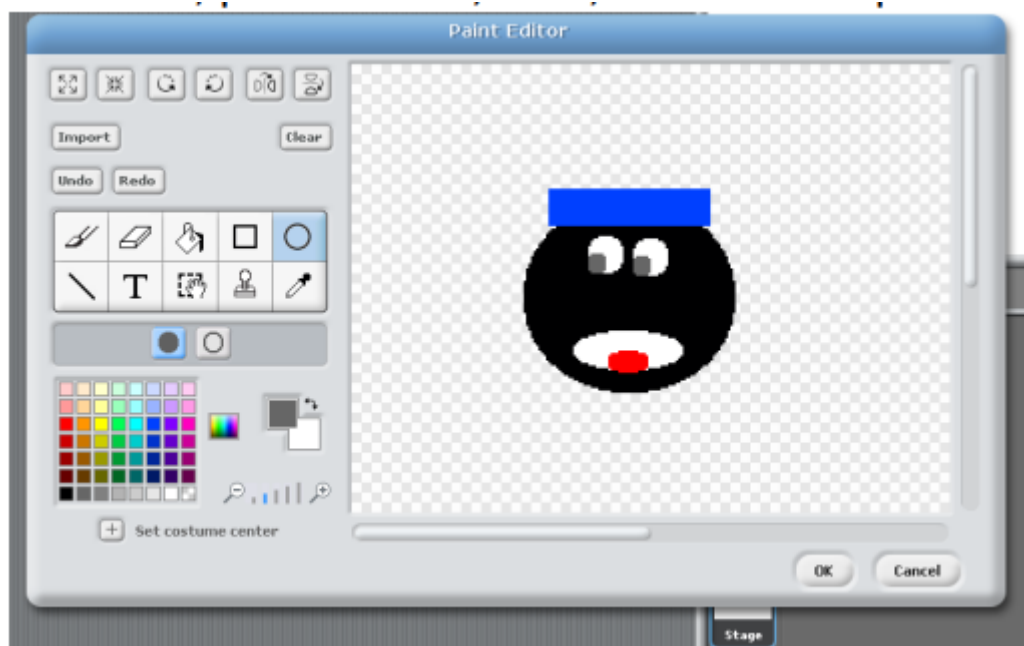
Figure 12: Choosing a new sprite

Figure 13: Paint a new sprite

4 Choosing a background

To choose a new background click on the thumbnail that says stage. A blue line will appear around the box. Next, click on the Backgrounds tab beside the word Script. You can paint or import a background. If your computer has a webcam, you can also take a picture for the background.

1. Painting your own background Click paint and then the paint editor will open.

2. Importing a background Click on import to choose from backgrounds available in Scratch and then double click on one of the folders.
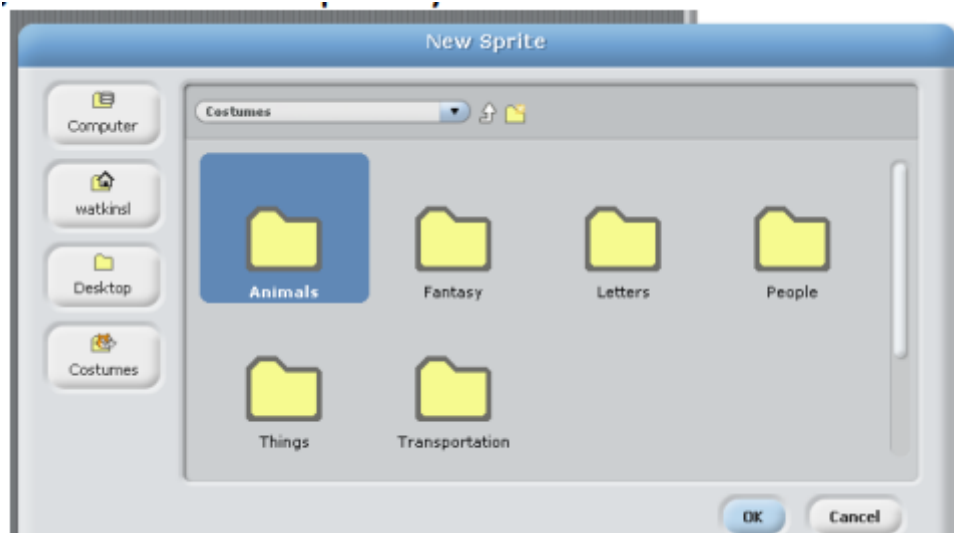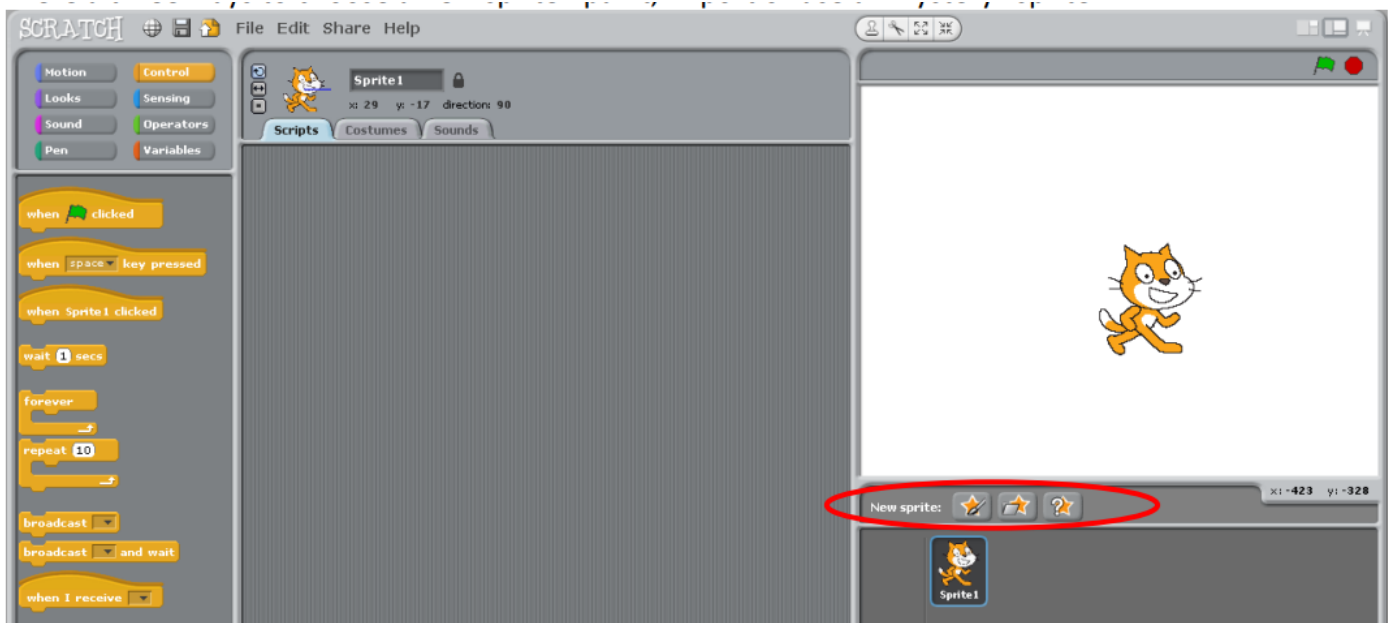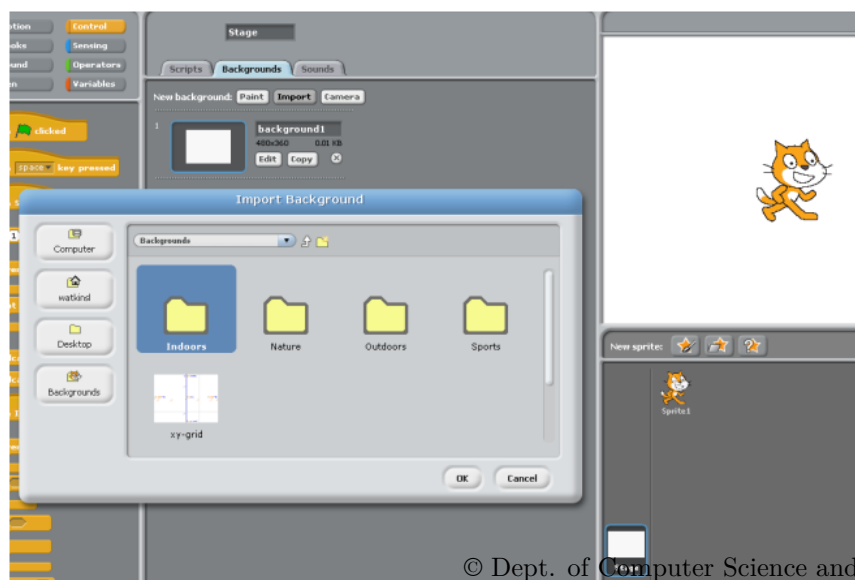
Figure 14: New sprite

Figure 15: Mystery sprite
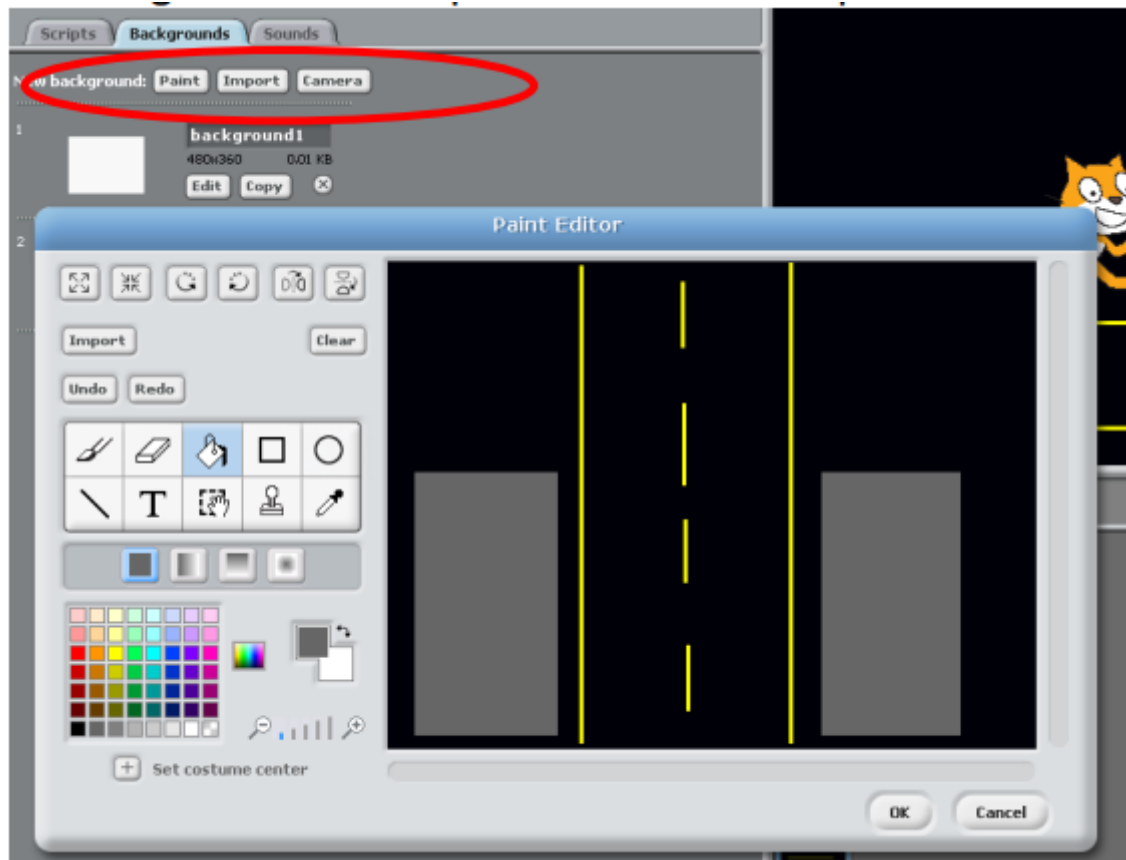
Figure 17: Importing a background

Figure 16: Painting your own background

5 Discussion & Conclusion

Based on the focused objective(s), to understand about *Scratch Programming* and implement various problems using it. https://www.create-learn.us/blog/scratch-exercises-for-kids/

6 Lab Task (Please implement yourself and show the output to the instructor)

1. Make the cat sprite fly towards your mouse pointe

2. Make a sprite jump

3. Make a color changing background

4. Make a sprite make noise when clicked

5. Change the size of your sprite with the arrow keys

7 Policy

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