

KNOXVILLE

Scratch

GAME

Knoxville Game Design

November 2019

Levi D. Smith

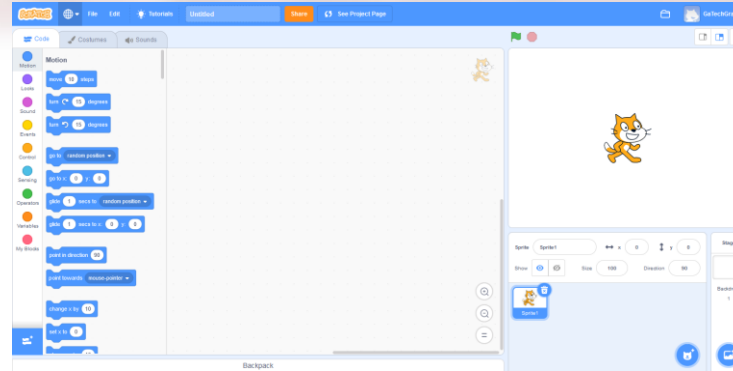
DESIGN

Scratch Overview

- Developed by MIT Labs
- Free to download / use
- Version 1.4 based on Squeak (Smalltalk)
- <https://scratch.mit.edu/>
- Design Mode (visual blocks) used by Stencyl

Scratch Versions

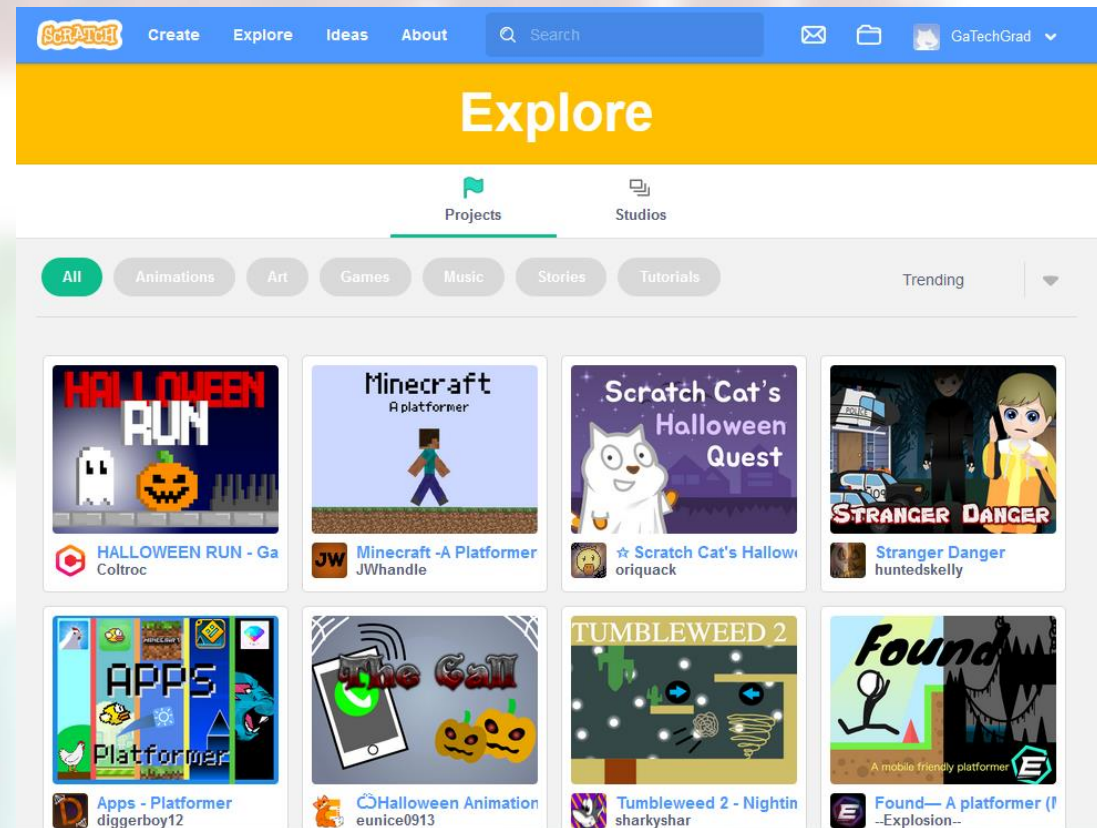
- Web version



- Offline editor - <https://scratch.mit.edu/download/>
 - Can save projects to file
 - Can be uploaded to Scratch website later

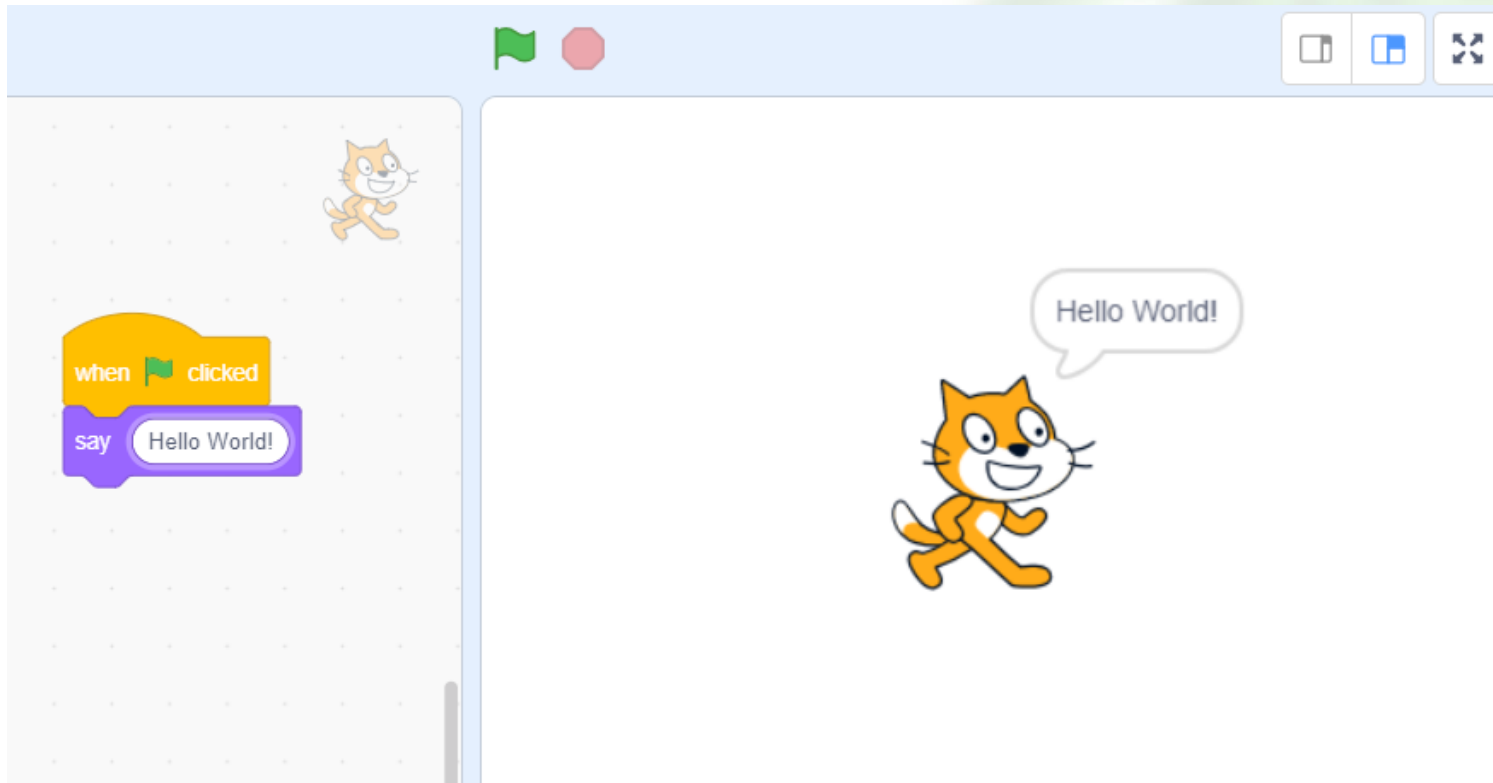
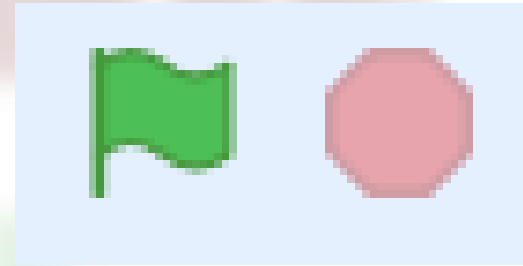
Explore

- Repository of user created Scratch games



Running a Scratch Game

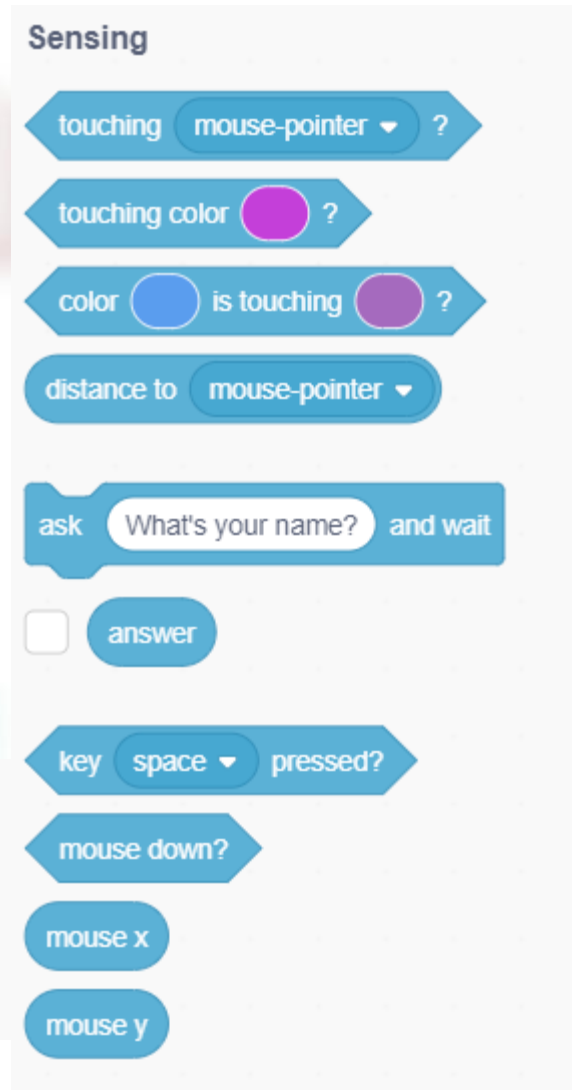
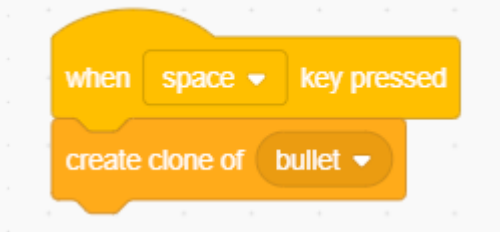
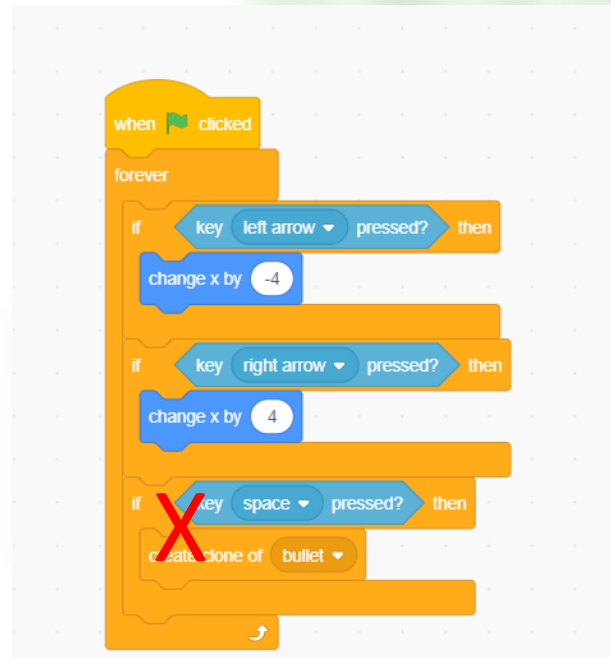
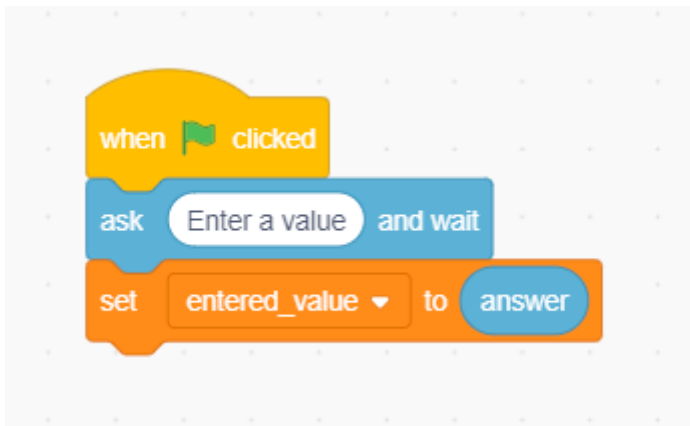
- Green Flag – start program execution
- Red Stop Sign – stop program execution



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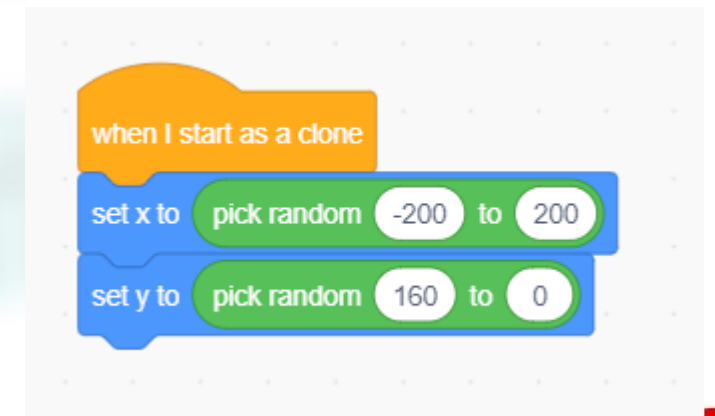
Input

- Use *Sensing* options to read keyboard and mouse input
- Keyboard input obtained with *ask* and stored in *answer*
- Use *set* to assign *answer* to a variable



Object Oriented

- Code options depend on object or backdrop selected
- Backdrop (“room” / “scene”)
 - Can be used for global / startup code
- Sprite (object)
 - Say / think – for outputting text
 - Move, rotate
- Create instance of object with *create clone*
- Instance start / constructor with *when I start as clone*
- Broadcast – to send messages between backdrops / objects



UNIVERSITY

GAME
DESIGN

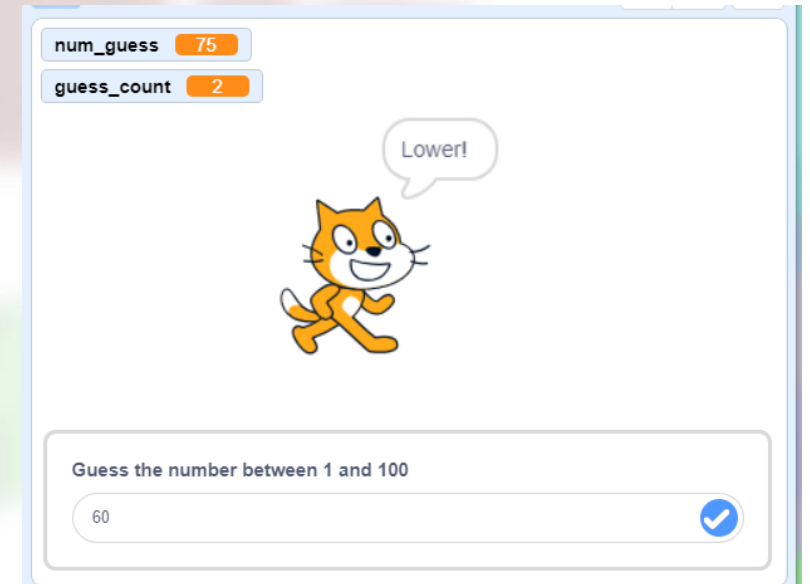
Number Guessing Game

```
when clicked
  set secret_number to pick random 1 to 100
  set num_guess to 0
  set guess_count to 0
  hide variable secret_number
  repeat until secret_number = num_guess
    ask Guess the number between 1 and 100 and wait
    set num_guess to answer
    change guess_count by 1
    if num_guess = secret_number then
      broadcast print_correct
    if num_guess > secret_number then
      broadcast print_lower
    if num_guess < secret_number then
      broadcast print_higher
```

```
when I receive print_correct
  say Correct!

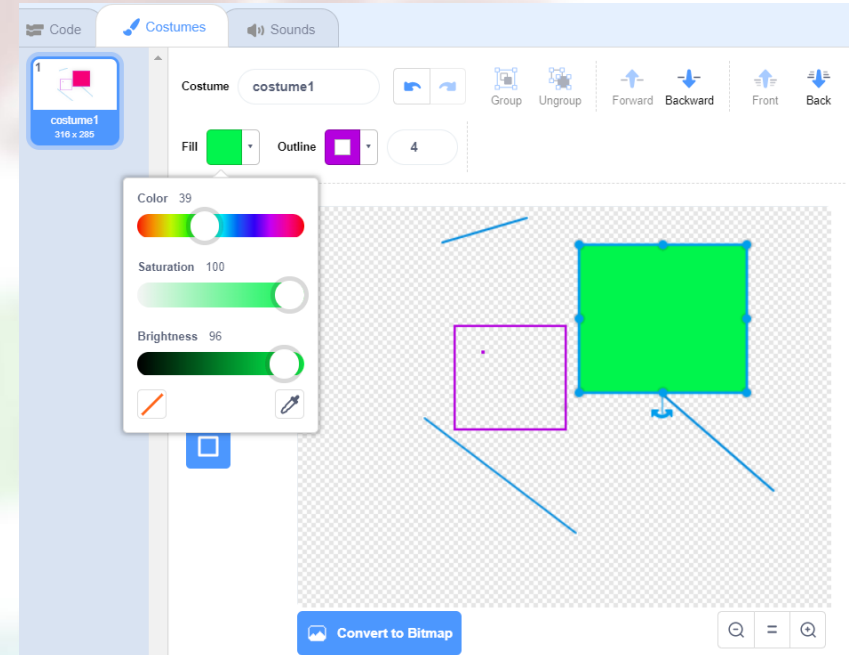
when I receive print_higher
  say Higher!

when I receive print_lower
  say Lower!
```



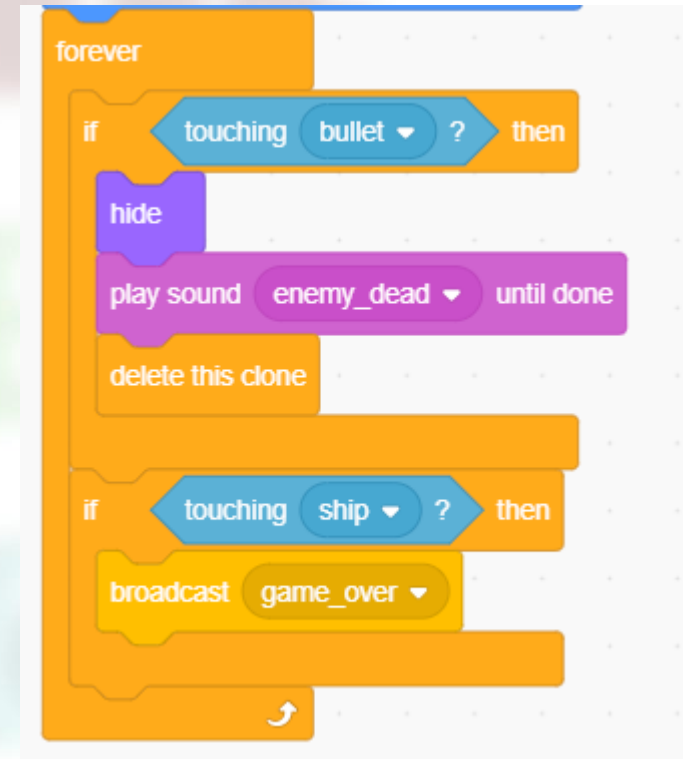
Graphics

- Game resolution – 480x360
 - (-240, -180) to (240, 180)
 - (0, 0) is center
- Sprites “costumes”
 - Built in editor
- Can upload sprites (png, svg, jpeg, gif)
- Use *hide* to make object invisible (dead but playing sound)
- Use *show* to make object visible (hidden Sprite cloned)



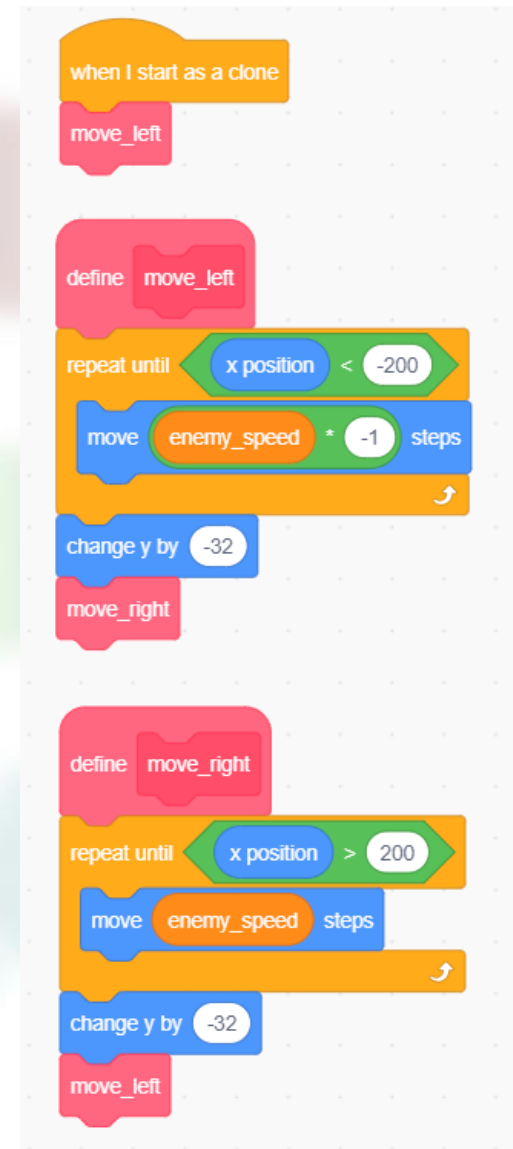
Collisions

- Use *touching* block
- Collision boxes are automatically generated
- Needs a reference to “other” object in the collision



Methods / Procedures

- Reusable code can be placed in *Blocks*



```
when I start as a clone
  move_left

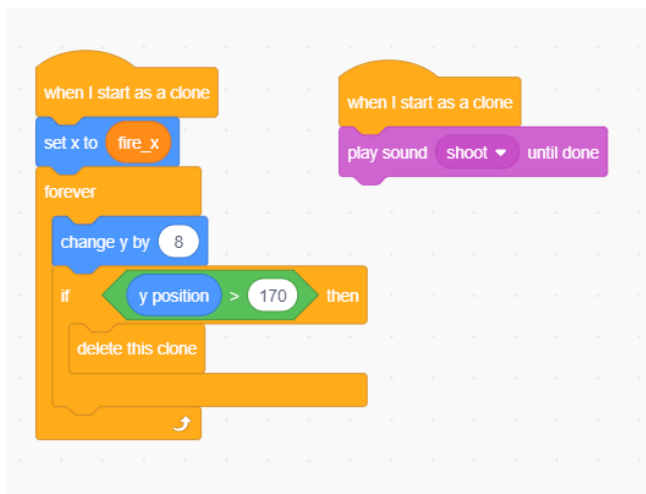
define move_left
  repeat until x position < -200
    move enemy_speed * -1 steps
  change y by -32
  move_right

define move_right
  repeat until x position > 200
    move enemy_speed steps
  change y by -32
  move_left
```

The image shows a Scratch script for an enemy clone. It starts with a 'when I start as a clone' block followed by a 'move_left' block. Below this is a 'define move_left' block containing a 'repeat until' loop where the x position is less than -200. Inside the loop, there is a 'move' block that moves the enemy by 'enemy_speed * -1' steps, followed by a 'change y by -32' block. After the loop, there is a 'move_right' block. Similarly, there is a 'define move_right' block containing a 'repeat until' loop where the x position is greater than 200. Inside this loop, there is a 'move' block that moves the enemy by 'enemy_speed' steps, followed by a 'change y by -32' block. After the loop, there is a 'move_left' block.

Sounds

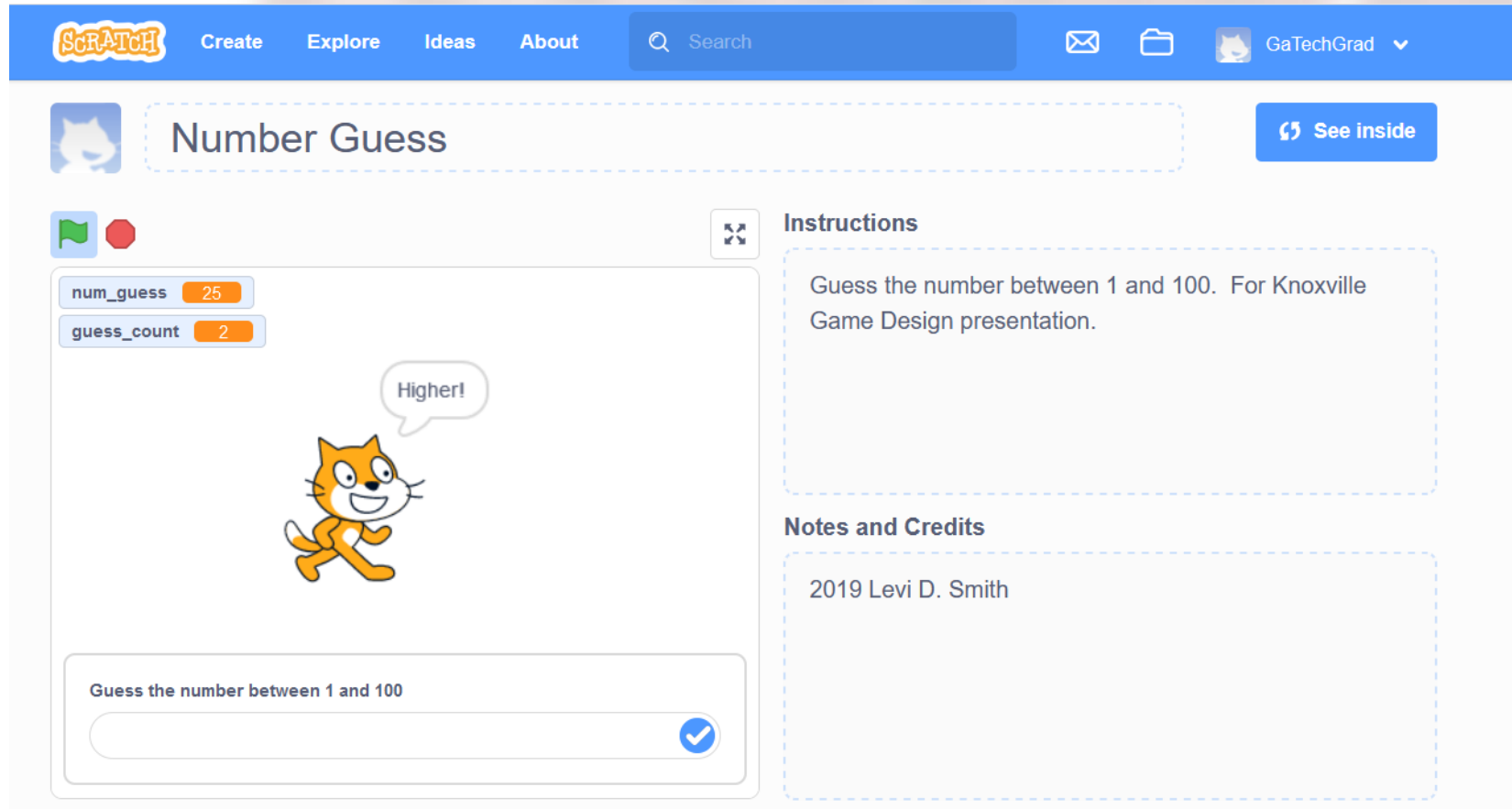
- Can upload (wav, mp3) or record sound effects
- Play with *play sound*
 - (will block any other code until sound is complete)
 - Can have multiple *when I start as a clone* blocks
- Sounds are specific to Sprites
 - If you load a sound to a background, it won't be accessible to a Sprite



Limitations

- Can't send a parameter with a broadcast message
- Requires Scratch VM to run games; Can't make a web build for own site
- Have to use global variables to pass values between objects
- No text output aside from *say* and *think* bubbles or standard variable output

Publishing Your Game to Scratch Website



The screenshot shows the Scratch website interface for a project titled "Number Guess". The top navigation bar includes the Scratch logo, "Create", "Explore", "Ideas", "About", a search bar, and a user profile for "GaTechGrad". The project title "Number Guess" is displayed with a "See inside" button. The main workspace shows a Scratch cat character with a speech bubble saying "Higher!". Above the cat are two variable monitors: "num_guess" with a value of 25 and "guess_count" with a value of 2. Below the cat is a text input field with the prompt "Guess the number between 1 and 100" and a blue checkmark button. To the right, the "Instructions" section contains the text: "Guess the number between 1 and 100. For Knoxville Game Design presentation." Below that, the "Notes and Credits" section lists "2019 Levi D. Smith".

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