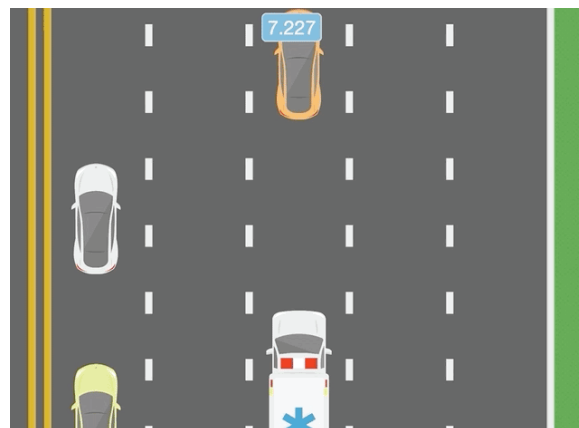


# Emergency! A Scratch Game

In this activity, you'll learn the fundamentals of coding in Scratch by creating a simple game. In the game, players pilot an ambulance as it dodges traffic on its way to an emergency. Players must weave through traffic for 90 seconds—without hitting any cars—to beat the game. As you create the code for the Ambulance and Traffic sprites, you'll familiarize yourself with the Scratch code blocks, learn how sprites interact with each other, and finish with a playable game.



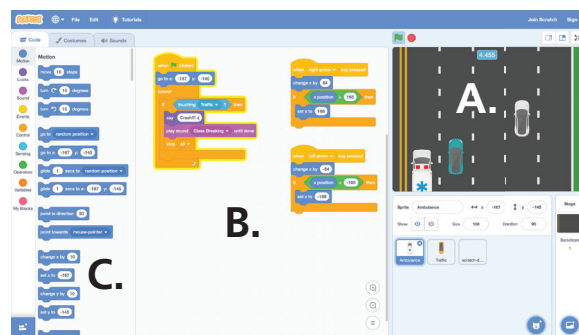
**Figure 1**  
*Dodging traffic to reach an emergency!*

## Getting Started

1. Open the Scratch editor window at <http://scratch.mit.edu/projects/editor>
2. From the File menu, choose "Load from your computer".
3. Choose the "Emergency.sb3" file and open it. (Emergency Instructor.sb3 is a completed project for reference)

### The Scratch window is divided into three main sections.

- A. Stage and Sprites:** The Stage is where the action happens! Below the Stage, you'll see all the sprites used in your Scratch project. Sprites can be anything from game elements to story characters to user instructions.
- B. Sprite Code:** The center section is where you create programs for each sprite.
- C. Block Palettes and Code:** The interlocking blocks on the left, organized into palettes like "Motion", "Looks", and "Variable", are the code you use to control sprites and the Stage. You drag blocks from this section into the Sprite Code section to create your program.



**Figure 2**  
*The Scratch window*

By starting with the Emergency.sb3 file, you'll already have three sprites and a stage.



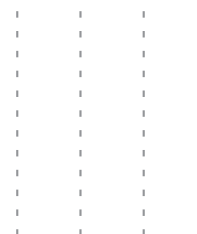
A highway backdrop for the Stage



**An incomplete Ambulance sprite:** This sprite is controlled by the player. You'll need to create programs to tell it where to start and to move it from lane to lane.



**An incomplete Traffic sprite:** This sprite may look like a single car. But you'll write code to "clone" it to create multiple cars on the highway and move those cars down the lane.



**A complete Highway Stripes sprite:** This sprite is the lanes on the highway. The code is already created to make it move so that it appears that the Ambulance and Traffic cars are moving.

## Ambulance Sprite Code

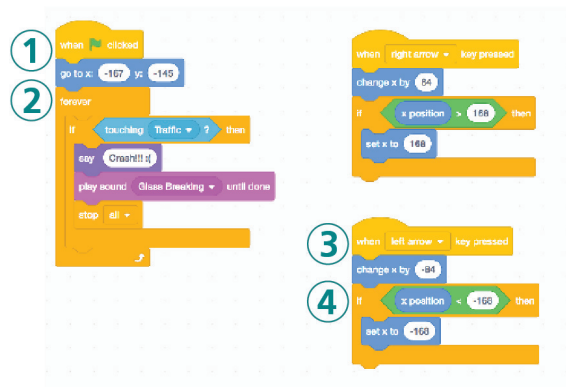


Let's start by creating the code for the Ambulance.

Click on the Ambulance sprite in the Sprites area below the Stage.  
Then locate the blocks in **Figure 3** (to the right) and snap them together.

### The code works like this:

1. A hat block, like the "When green flag clicked" hat block shown here, tells Scratch when to run the code connected to it. In this case, you're using the green flag to start the game. The connected "go to x: y:" block puts the Ambulance sprite in the leftmost lane by moving it to the (-167, -145) position, when a player clicks the green flag.
2. After moving the Ambulance to the leftmost lane, Scratch will then continually check for crashes, that is, to see if the Ambulance sprite is touching any of the Traffic sprites. The "if then" block does the checking; it's placed within a "forever" loop so that Scratch checks for the entire game. If Scratch does detect a crash, it will run the "say", "play sound", and "stop" blocks.
3. Both this section of code and the "when right arrow pressed" section of code move the Ambulance sprite from lane to lane. When you press the left arrow key, Scratch changes the Ambulance sprite's x-coordinate (x position) by -84, i.e., 84 pixels to the left. 84 pixels is enough to move it into the lane to the left.
4. In both left- and right-moving sections of code, these blocks check to see if the player is trying to move the Ambulance sprite off the highway. You don't want that to happen! So, if the Ambulance sprite's x-position gets set to a position outside the outermost lanes ( $x > 168$  or  $x < -168$ ), Scratch will move it back to the outermost lane.



**Figure 3**

Ambulance sprite programs

See page 4 for larger screenshot



### After creating this code, try it out!

Click the green flag. Does the Ambulance start in the leftmost lane?  
Can you move it from lane to lane by using the left and right arrow keys?

## Traffic Sprite Code



Next, let's create the code for the Traffic sprite.

Click on the Traffic sprite in the Sprites area below the Stage.

### The code works like this:

- These two programs create the traffic cars the Ambulance sprite will have to dodge. Even though there is only a single Traffic sprite, you can get multiple cars on the highway by cloning it. When you clone a sprite in Scratch, you get a copy of it. You have to write a program for what the original sprite should do (section 1) and for what the cloned sprites should do (section 2).
  - All the original Traffic sprite does is create three clones of itself and then hides. The number in the repeat loop determines how many sprites are created. Notice the "wait" block – it adds a 1 to 3 second delay before creating the next Traffic sprite clone so that they appear staggered in the highway. The "hide" block makes the original sprite disappear so that the Ambulance only has to avoid the clones.
  - In order to give each Traffic sprite clone its own speed, you'll need to create a speed variable. From the Variable palette, click on the "Make a Variable" button, name it "speed" and choose the "For this sprite only" option. Once you've created the speed variable, you will be able to choose "speed" from the "set variable to" block's dropdown menu and a speed reporter block (oval shaped block) will appear in the Variables palette.
- When the clone is created, Scratch randomly chooses a speed for it, randomly chooses a costume (color) for it, and moves it to the top of the screen (y = 172) in a randomly determined lane. The Traffic sprite has six costumes, each identical except for a different color; you can view them by clicking on the Costumes tab in the upper left corner.
- This "repeat until" loop moves the Traffic sprite clone down the highway. Each time through the loop it changes the clone's y-position (y-coordinate) by speed pixels. The speed variable, created in step 4 above, could be anywhere from 5 to 10. Scratch repeats the loop until the clone drops off the bottom of the screen, when its y-position is less than -180.
  - At that point, the clone is done with its job. The "create clone of myself" block will create a new clone, which appears at the top of the screen. The finished clone then deletes itself.
  - This last section of code is the timer. When a player clicks the green flag to start the game, the timer is set to zero. The timer is displayed in the middle and at the top of the Stage. If the timer runs up to 90 seconds, the player wins.

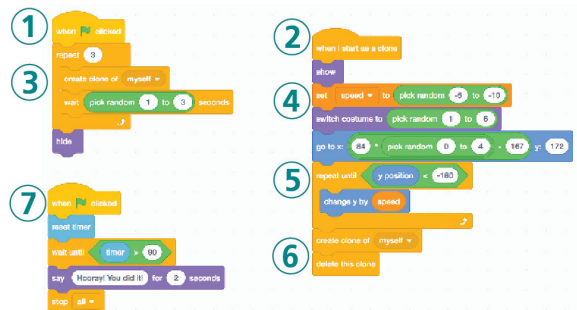


Figure 4

Traffic sprite programs

See page 4 for larger screenshot

### Challenge Extensions

Try adjusting the values in the "set speed" block to make the Traffic sprite clones move faster or slower. We originally set the speed to some random value between 5 and 10. Change the "-5" and "-10" values to other numbers and see how it affects the speed of the Traffic sprite clones.

- Try controlling the Ambulance with a Go Direct® Force and Acceleration sensor. Click on the Extensions icon in the lower left corner. Select the Go Direct Force and Acceleration extension. Be sure to have the Scratch Link software running and your Force and Acceleration sensor turned on; a window will pop up allowing you to choose your sensor from a list. Once you've added the extension and connected to your sensor, you'll have a whole new set of blocks. Swap out the "when left arrow key pressed" and "when right arrow key pressed" hat blocks for the "when tilted left" and "when tilted right" hat blocks. Now, when you tilt the sensor right or left, the Ambulance changes lanes!
- Can you modify the code so that a "Crash" sprite appears whenever the Ambulance touches a Traffic sprite clone? To add a new sprite, click on the "Choose a Sprite" icon in the lower right corner of the Sprite area.
- You may have noticed that sometimes Traffic sprite clones drive through each other, when two clones are created in the same lane one shortly after the other. Can you modify the code to prevent that?

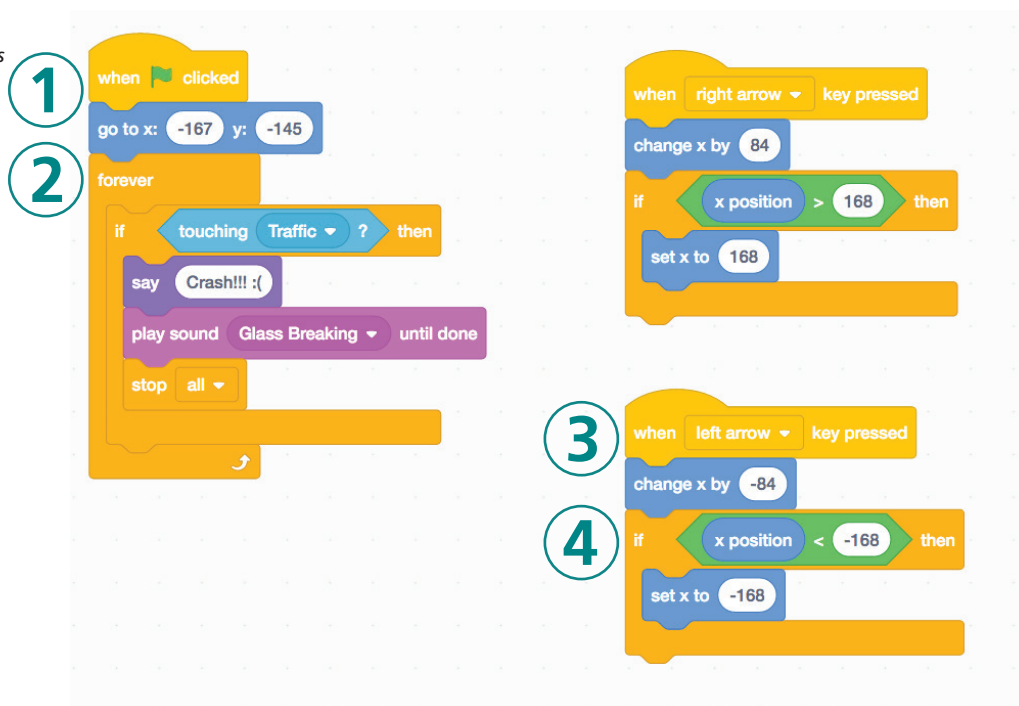


### Now that you've created all the code, try it out!

Click the green flag to start your game from the beginning.  
Can you reach 90 seconds without crashing into the traffic?

**Figure 3**

Ambulance sprite programs



**Figure 4**

Traffic sprite programs

