Lab Exercise 5: First Encounter with Interrupts & Events

Goal

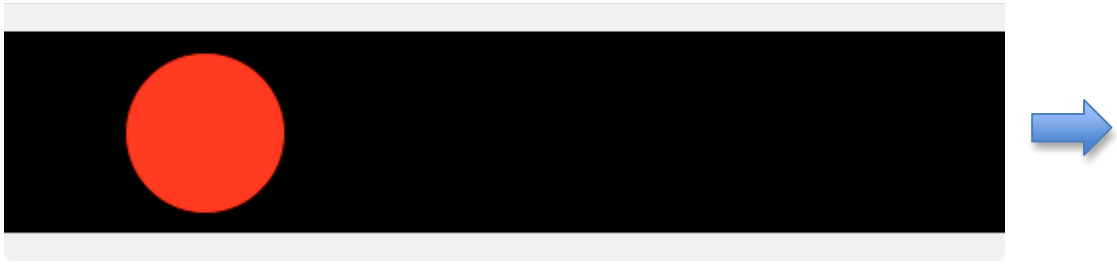
The objective is to get more practice controlling action on the screen. The programming in this exercise is easy. The goal is follow the logic of the computation.

Base Program

Write a Processing program that has an 800 x 100 canvas, and moves a red ball from left to right across the screen. These are the requirements:

1) The ball is 80 pixels in diameter, and it is "centered vertically on the canvas."
2) The ball's horizontal position is an integer variable called `xPos`.
3) The ball's initial position is 100 pixels from the left.
4) The ball moves one pixel each time the screen is redrawn.

The result looks like this, but longer:



Check that the four requirements are all fulfilled.

Change in Parameters

Declare four more integer variables in your program:

1) An integer variable called `incDec` that is initialized to 1; this variable is an abbreviation for "increment / decrement." *Increment* means to add to something, *decrement* means to subtract from something.
2) Three integer variables: `rPos`, initialized to 255, `gPos` initialized to 0, and `bPos`, initialized to 0; these variables will be used for RGB values in `fill()`.

Verify that all four variables are declared and initialized.

Now, change your program so the amount the ball moves is changed from 1 to `incDec`.

Also, change the RGB values in your `fill( )` command are replaced by the three variables `rPos`, `gPos` and `bPos`.

Check to see that your solution just as it did in the last part.

keyPressed( )

Among the functions that Processing is on the lookout for is `keyPressed( )`. This is a function that you write (like `setup( )` and `draw( )`) that works as follows. Whenever a key is pressed on the keyboard, the function runs. Here is an example of a `keyPressed( )` function:

```
void keyPressed ( ) {
    incDec = - incDec;  //flip incrementing/decrementing
}
```

Add this code to our Processing program, and try it! What you will see is that each time you press a key, the direction of motion of the ball will reverse. Why is that? Because when the `keyPressed( )` function runs, it causes `incDec` to change sign: When it's positive (incrementing), it becomes negative (decrementing); when it's negative, it becomes positive. Slick, right?

mousePressed( )

Analogous to the `keyPressed( )` function is the `mousePressed( )` function – a function that will run when the mouse is pressed. For example,

```
void mousePressed( ) {
    int temp;
    temp = bPos;    //save bPos value
    bPos = gPos;    //make bPos be gPos
    gPos = rPos;    //make gPos be rPos
    rPos = temp;    //make rPos be original bPos
}
```

Add this code to our Processing program, and try it! What you will see that with each click of the mouse the color changes red → green → blue → red → green → blue → … . Notice what is happening: The "255" value is being moved from its original position in `rPos`, to a new position in `gPos`, and `rPos` is re-assigned what was in `bPos`, namely 0.

After playing with your code some, change the `gPos` variable to have 255 as its initial value, and try it again.

Spreadsheet Explanation

Open a spreadsheet (Excel) and set it up to have the form shown below. (If you are not familiar with spreadsheets, ask your TA for help.) The heading row should have a column for the mouse click count, and then columns for the variables `temp`, `rPos`, `gPos`, `bPos`. Use the "red" initialization shown. Fill in the numbers for the first 10 clicks as they exist after the last assignment statement (`rPos = temp;`)

Tracing the RGB values of the program

Mouse click	temp	rPos	gPos	bPos	
initial	?	255	0	0	
click #1					
click #2					
click #3					
click #4					
click #5					
click #6					
click #7					
click #8					
click #9					
click #10					
					My explanation of what is happening ...

Finally, explain in your own words (a short paragraph) as to what is happening with these assignment statements of the `mousePressed( )` function. I want to know the concepts involved here.

Wrap Up

You have seen two functions (`keyPressed( )` and `mousePressed( )`) which are run whenever a key is pressed or the mouse is pressed, respectively. These occurrences are called *events*, and they interrupt the Processing Engine whenever they happen. The Engine, wanting to respond to the events, calls the functions, which gives us a chance to say what to do when the event happens. For key pressing, we changed the direction of the motion; for mouse pressing, we changed the color, in rotation. BTW, we can know what key was pressed, too, but that will come later.

Turn In

Save the spreadsheet and turn it in to the class dropbox.