A small sprite animation framework

INTRODUCTION

Now that we have presented the principle of sprite extraction (a big image, get the sprites as sub-images), let's write a small sprite animation framework.

Here is how you would create and animate a sprite:

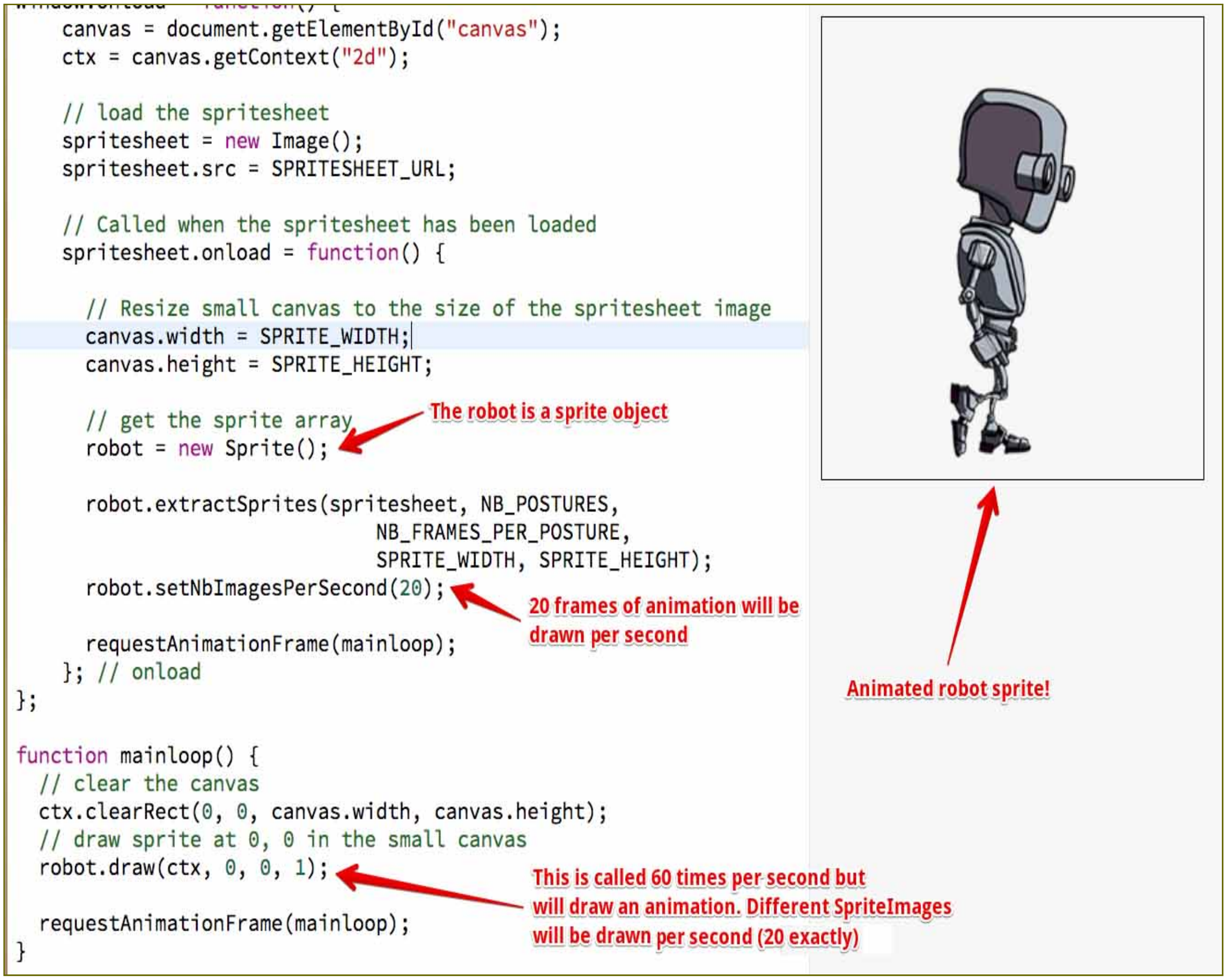
```
var robot;

window.onload = function() {
   canvas = document.getElementById("canvas");
   ctx = canvas.getContext("2d");
  // Load the spritesheet
  spritesheet = new Image();
  spritesheet.src = SPRITESHEET_URL;

  // Called when the spritesheet has been loaded
  spritesheet.onload = function() {
    ...
    robot = new Sprite();
    // 1 is the posture number in the stylesheet. We have
    // only one with the robot.
    robot.extractSprites(spritesheet, NB_POSTURES, 1
                                     NB_FRAMES_PER_POSTURE,
                                     SPRITE_WIDTH, SPRITE_HEIGHT);
    robot.setNbImagesPerSecond(20);
    requestAnimationFrame(mainloop);
 }; // onload
};

function mainloop() {
  // Clear the canvas
  ctx.clearRect(0, 0, canvas.width, canvas.height);
  // draw sprite at 0, 0 in the small canvas
  robot.draw(ctx, 0, 0, 1);
  requestAnimationFrame(mainloop);
}
```

Try the example on JSBin that uses this framework first! In the code, change the value of the parameter of this call and see the result: `robot.setNbImagesPerSecond(20);`



```
    canvas = document.getElementById("canvas");
    ctx = canvas.getContext("2d");

    // load the spritesheet
    spritesheet = new Image();
    spritesheet.src = SPRITESHEET_URL;

    // Called when the spritesheet has been loaded
    spritesheet.onload = function() {

      // Resize small canvas to the size of the spritesheet image
      canvas.width = SPRITE_WIDTH;
      canvas.height = SPRITE_HEIGHT;

      // get the sprite array
      robot = new Sprite();

      robot.extractSprites(spritesheet, NB_POSTURES,
                           NB_FRAMES_PER_POSTURE,
                           SPRITE_WIDTH, SPRITE_HEIGHT);
      robot.setNbImagesPerSecond(20);

      requestAnimationFrame(mainloop);
    }; // onload
};

function mainloop() {
  // clear the canvas
  ctx.clearRect(0, 0, canvas.width, canvas.height);
  // draw sprite at 0, 0 in the small canvas
  robot.draw(ctx, 0, 0, 1);

  requestAnimationFrame(mainloop);
}
```

The robot is a sprite object
20 frames of animation will be drawn per second
Animated robot sprite!
This is called 60 times per second but will draw an animation. Different SpriteImages will be drawn per second (20 exactly)

THE SPRITEIMAGE AND SPRITE MODELS

In this small framework we use "`SpriteImage` ", a model called that corresponds to one sprite image. It is defined by the global sprite sheet image to which it belongs, its position in the sprite sheet and its size.

It also has a `draw` method for drawing the sprite image at a `xPos, yPos` position, eventually rescaled.

```
        function SpriteImage(img, x, y, width, height) {
           this.img = img; // the whole image that contains all sprites
           this.x = x;      // x, y position of the sprite image in the
        whole image
           this.y = y;
           this.width = width; // width and height of the sprite image
```

```
   this.height = height;

   this.draw = function(ctx, xPos, yPos, scale) {
      ctx.drawImage(this.img,
        this.x, this.y, // x, y, width and height of img to extract
        this.width, this.height,
        xPos, yPos, // x, y, width and height of img to draw
        this.width*scale, this.height*scale);
 };
}
```

We define the `Sprite` model. This is the one we used to create the small robot in the previous example.

- A Sprite is defined by an array of `SpriteImage` objects.
- It has a method for extracting all SpriteImages from a given stylesheet and filling the above array.
- It has a `draw` method that will draw the current `SpriteImage`. A `Sprite` is an animated object, therefore, calling `draw` multiple times will involve an automatic change of the current `SpriteImage` being drawn.
- The number of different images to be drawn per second is a parameter of the sprite.

Here is the code of the Sprite model:

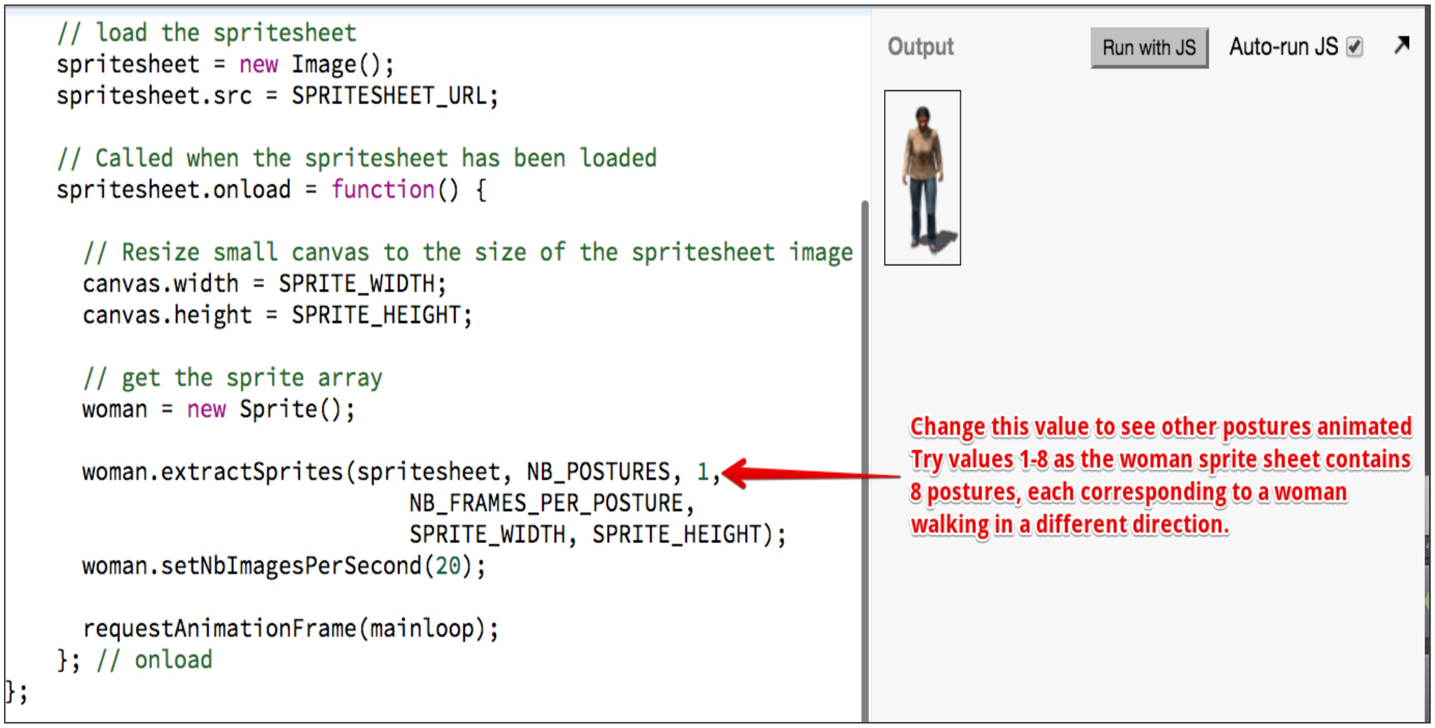
```
function Sprite() {
  this.spriteArray = [];
  this.currentFrame = 0;
  this.delayBetweenFrames = 10;
  this.extractSprites = function(spritesheet,
                                 nbPostures, postureToExtract,
                                 nbFramesPerPosture,
                                 spriteWidth, spriteHeight) {
    // number of sprites per row in the spritesheet

  var nbSpritesPerRow = Math.floor(spritesheet.width / spriteWidth);
    // Extract each sprite
    var startIndex = (postureToExtract -1) * nbFramesPerPosture;
    var endIndex = startIndex + nbFramesPerPosture;
    for(var index = startIndex; index < maxIndex; index++) {
    // Computation of the x and y position that corresponds to the
sprite
      // index
      // x is the rest of index/nbSpritesPerRow * width of a sprite
      var x = (index % nbSpritesPerRow) * spriteWidth;
      // y is the divisor of index by nbSpritesPerRow * height of a
sprite
      var y = Math.floor(index / nbSpritesPerRow) * spriteHeight;
      // build a spriteImage object

  var s = new SpriteImage(spritesheet, x, y, spriteWidth, spriteHeight);
      this.spriteArray.push(s);
    }
  };
  this.then = performance.now();
  this.totalTimeSinceLastRedraw = 0;
  this.draw = function(ctx, x, y) {
    // Use time based animation to draw only a few images per
second
    var now = performance.now();
    var delta = now - this.then;
    // Draw currentSpriteImage
    var currentSpriteImage = this.spriteArray[this.currentFrame];
    // x, y, scale. 1 = size unchanged
    currentSpriteImage.draw(ctx, x, y, 1);
    // if the delay between images is elapsed, go to the next one
    if (this.totalTimeSinceLastRedraw > this.delayBetweenFrames) {
    // Go to the next sprite image
      this.currentFrame++;
      this.currentFrame %= this.spriteArray.length;
    // reset the total time since last image has been drawn
      this.totalTimeSinceLastRedraw = 0;
    } else {
      // sum the total time since last redraw
      this. totalTimeSinceLastRedraw += delta;
    }
    this.then = now;
  };
  this.setNbImagesPerSecond = function(nb) {
    // delay in ms between images
    this.delayBetweenFrames = 1000 / nb;
  };
}
```

SAME EXAMPLE BUT WITH THE WOMAN SPRITE SHEET

Try this JsBin



```
   // load the spritesheet
   spritesheet = new Image();
   spritesheet.src = SPRITESHEET_URL;

   // Called when the spritesheet has been loaded
   spritesheet.onload = function() {

     // Resize small canvas to the size of the spritesheet image
     canvas.width = SPRITE_WIDTH;
     canvas.height = SPRITE_HEIGHT;

     // get the sprite array
     woman = new Sprite();

     woman.extractSprites(spritesheet, NB_POSTURES, 1,
                          NB_FRAMES_PER_POSTURE,
                          SPRITE_WIDTH, SPRITE_HEIGHT);
     woman.setNbImagesPerSecond(20);

     requestAnimationFrame(mainloop);
   }; // onload
};
```

Change this value to see other postures animated
Try values 1-8 as the woman sprite sheet contains
8 postures, each corresponding to a woman
walking in a different direction.

This time we have changed the parameters of the sprites and sprite sheet. Now you can change the index of the posture to extract: the woman sprite sheet has 8 different postures, so you can call:

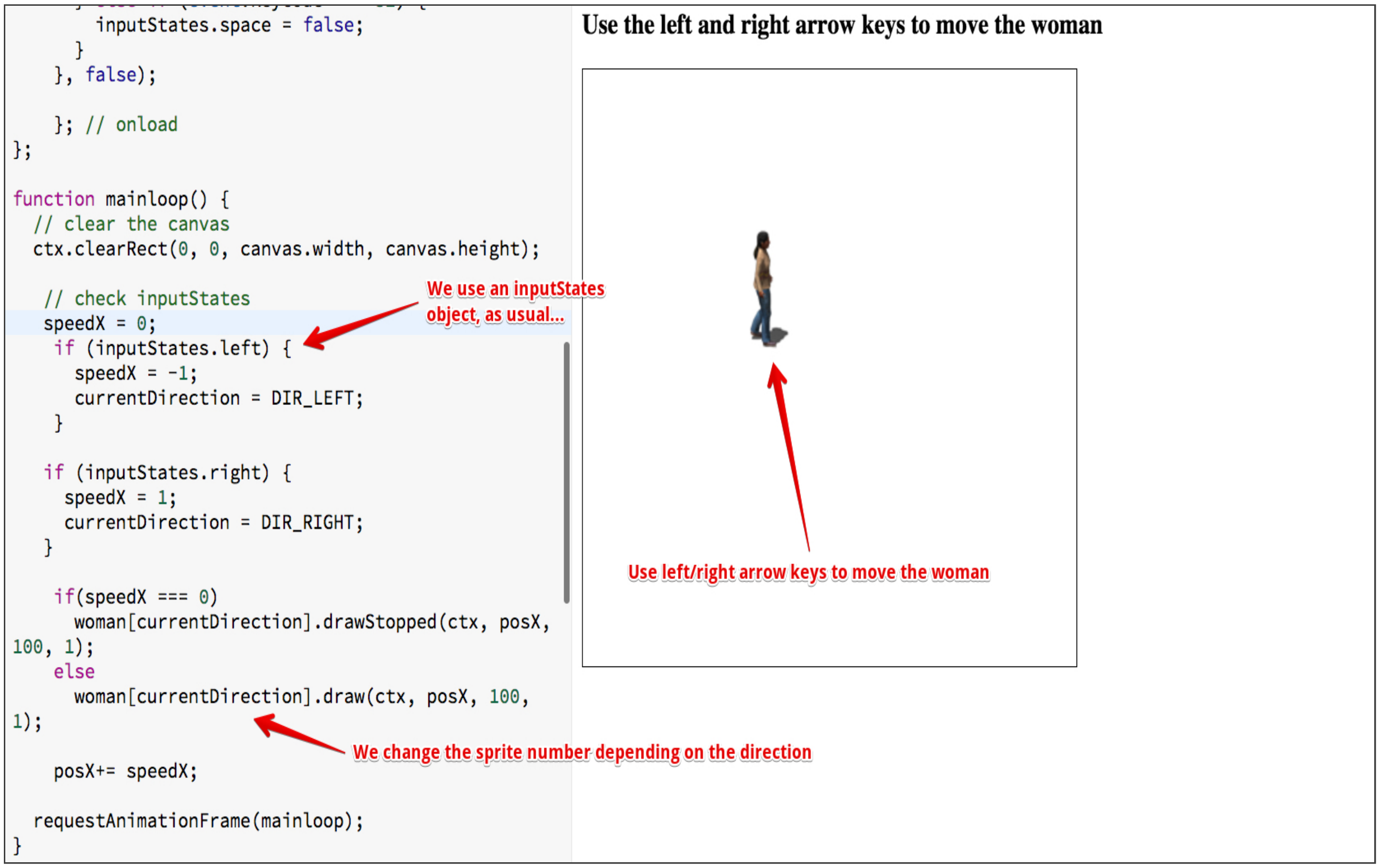
```
womanDown.extractSprites(spritesheet,NB_POSTURES, 1,
                         NB_FRAMES_PER_POSTURE,
                         SPRITE_WIDTH,SPRITE_HEIGHT);

womanDiagonalBottomLeft.extractSprites(spritesheet, NB_POSTURES, 2,
                        NB_FRAMES_PER_POSTURE,
                        SPRITE_WIDTH,SPRITE_HEIGHT);

womanLeft.extractSprites(spritesheet,NB_POSTURES, 3,
                         NB_FRAMES_PER_POSTURE,
                         SPRITE_WIDTH,SPRITE_HEIGHT);
// etc...
```

MOVING THE SPRITES, STOPPING THE SPRITES

Example at JsBin



```
        inputStates.space = false;
      }
    }, false);

    }; // onload
};

function mainloop() {
  // clear the canvas
  ctx.clearRect(0, 0, canvas.width, canvas.height);

   // check inputStates
   speedX = 0;
    if (inputStates.left) {
      speedX = -1;
      currentDirection = DIR_LEFT;
    }

   if (inputStates.right) {
     speedX = 1;
     currentDirection = DIR_RIGHT;
   }

    if(speedX === 0)
      woman[currentDirection].drawStopped(ctx, posX,
100, 1);
    else
      woman[currentDirection].draw(ctx, posX, 100,
1);

    posX+= speedX;

  requestAnimationFrame(mainloop);
}
```

Use the left and right arrow keys to move the woman
We use an inputStates object, as usual...
Use left/right arrow keys to move the woman
We change the sprite number depending on the direction

As usual, we used key listeners, an `inputStates` global object, and this time we created 8 woman sprites, one for each direction.

Notice that we added a `drawStopped` method in the `Sprite` model in order to stop animating the woman when no key is pressed for moving her.