

# Advanced Digital Systems Project Report

(Rick L. Swenson)

## Project name:

Cookie animation.

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## Lab description:

This project is about animating a gingerbread cookie.

## Schematics, block diagrams and/or timing diagrams:

The first step was to create a diagram of the cookie's motion over the x\_axis. The image 1 shows the diagram that was used.

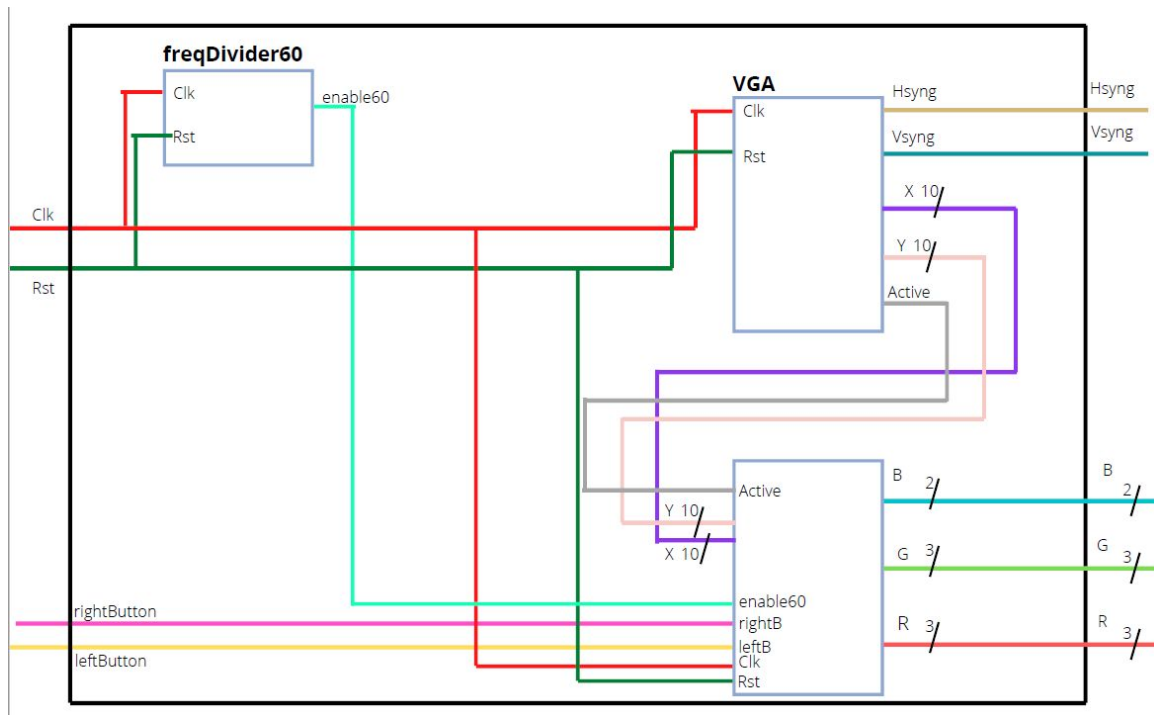


Image 1. Cookie's motion diagram.

The next step was to create the state machine system in order to use different images according to the direction of movement that occurs.

### State Machine

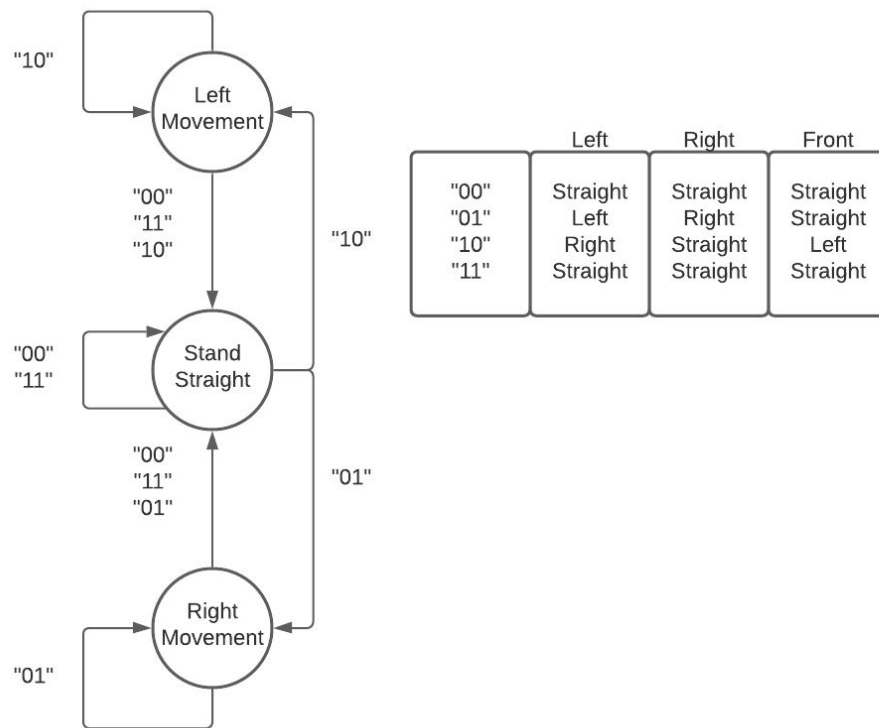


Image 2. State machine diagram.

### Results obtained:

After several tries we got to make our character moves, we wanted to make a movement ilusión but after all we could move it to the left and the right and make it through a manual made memory.

### Evidence:

<https://drive.google.com/file/d/1iV6AUDefiGp5N8X1Zq9-JSudCjVPihUp/view?usp=sharing>

### How to operate:

As in every project we need to program the FPGA as usual then a red background and our character if you push the left button of the tablet cookie will move to the left of the screen and if you push the right button of the tablet cookie will move to the right of the screen.

### Conclusions:

Through the following work, there were complications but we realized that the process of learning was great. Somehow, we knew that we had to solve the problem of the distorted image and that is why we draw upon other tools provided to us throughout

the course. Thanks to our knowledge of other courses, we managed to declare the image without aid of the module.

Problems encountered:

The biggest problem throughout the project was displaying an image with the IP (core generator) source type. We calculate the memory needed for a 128x128 image. Later, we made the corresponding configuration and it displayed a distorted image. After spending all this time with it, we decided that the best option would be to configure the image manually as seen in the first ROM memory class. For this development, the PPM to COE converter was modified to generate the image values in the format that Navigator understands.