
KLE Technological University

Creating Value
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**School**

**of**

**Electronics and Communication Engineering**

## ADLD COURSE PROJECT REPORT

**on**

# IMAGE PROCESSING USING VERILOG

By:

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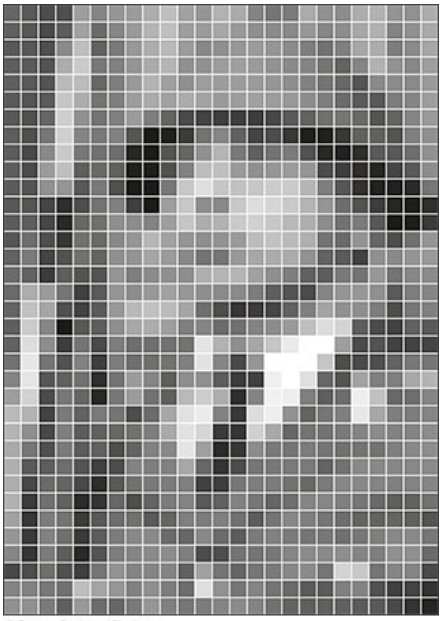
## 0.1 Problem Statement

Reading An Image, Processing And Writing The Image On FPGA.

## 0.2 Theory

Image processing helps to enhance images for human interpretation.Any desired density and contrast may be achieved by manipulating the image's pixels. Images may be conveniently saved and accessed.

Image processing is the term used for processing of images by computer in some way or another.Image processing has wide applications like medical image processing, digital photography, digital encryption and decryption.The parameters of the image are changed according to processing algorithms. The parameters include brightness, inversion, threshold and other operations. Brightness operation is increasing or decreasing the intensity of the pixels compared to original image pixels[1].




## 0.3 Architecture

Image processing includes image pre-processing, image processing[Algorithm], image post processing.Image pre-processing includes resizing, reshaping of the image, conversion of 2D image to 1D,conversion of jpg/png/gif to hexadecimal values, frame conversion and unbuffer are implemented in this unit[2].

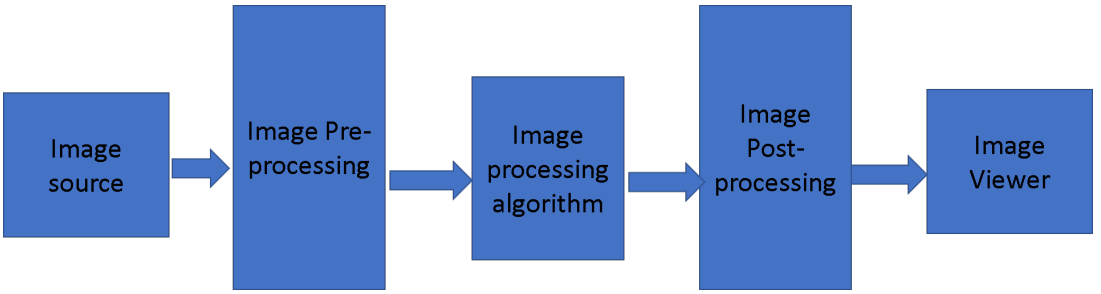
In image processing there are two steps image read and image write. In image reading each pixel values are read as hex values.Hsync is "Horizontal Sync", it is a pulse that synchronizes the start of the horizontal picture scan line in the monitor with the picture source that created it.

Vsync is the equivalent vertical synchronization, it ensures the monitor scan starts at the top of the picture at the right time.

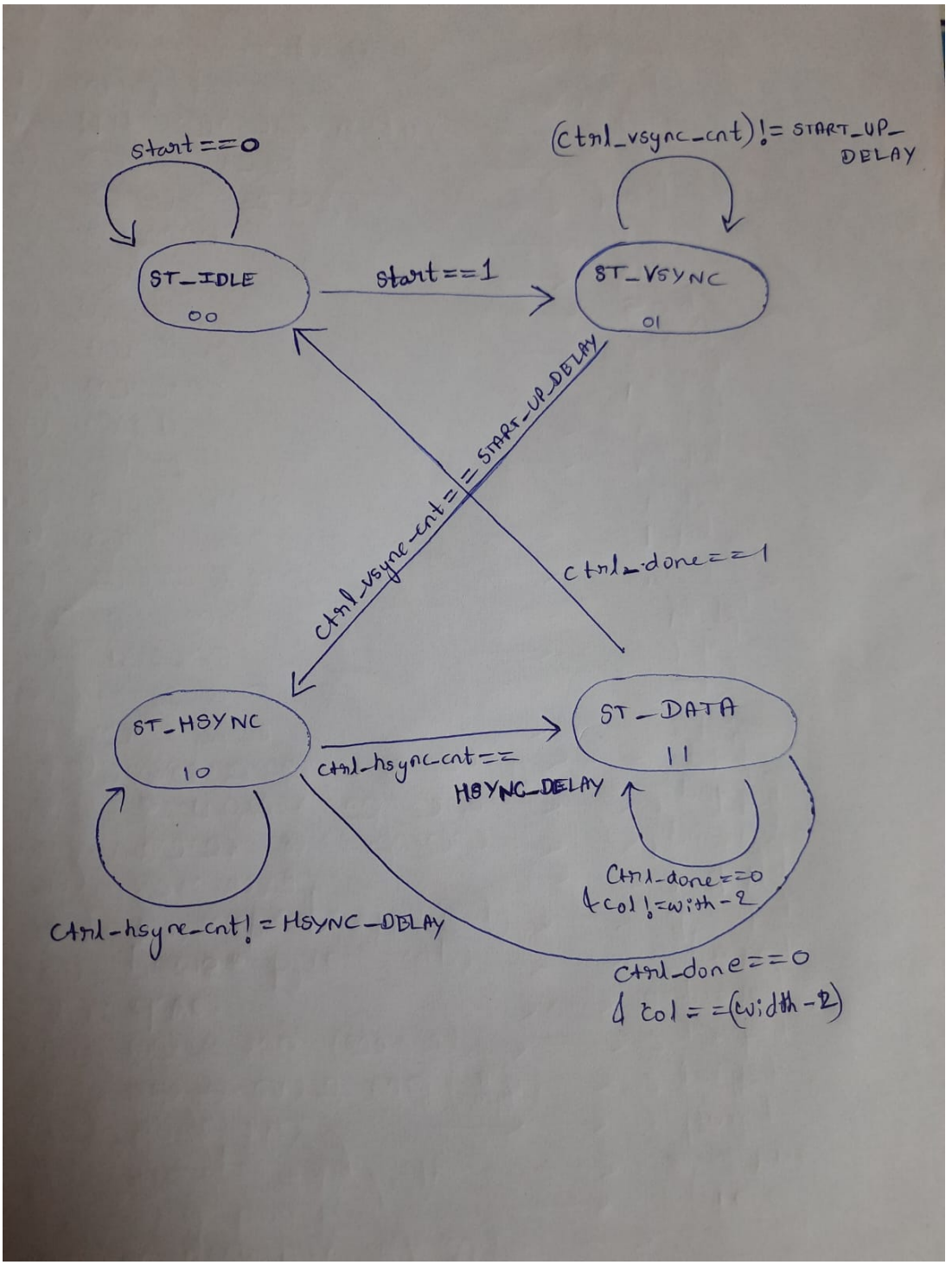
Pixels are not controlled by them at all. A Pixel is the smallest picture unit that can be displayed. Imagine the screen is a grid (like a spreadsheet) and each cell can contain one shade or color, the picture is composed of many of them, each small enough that the human eye cannot distinguish them individually so it sees them 'blend' into a picture. In the spreadsheet analogy, each cell is one pixel, Hsync would mean start at column zero and Vsync would mean start at row zero.

In an 800x600 pixel screen there are 480000 pixels (multiply them) so the time to scan the whole picture would be the period of one pixel (1/f) multiplied by the number of pixels. That only gives the time to wait on the visible part of the picture though, it doesn't include the time spent in sync pulses. The total is the sum of 800 horizontal sync pulse durations plus the time of all the pixels. Depending on where you start your timing, you might also have to add one vertical sync pulse duration. Without knowing how long those sync pulses last, I can't tell you the total time[3].

## 0.4 Functional Block Diagram



## 0.5 Finite State Machine



## 0.6 Result Analysis

Original Image[Before Image Processing]

Brightness Addition

Brightness Subtraction

## 0.7 Conclusion

Due to the creation of rapid and affordable tools, digital image processing has become a very prominent field of study and application. For a variety of useful applications, it provides economical solutions. Numerous techniques may be used to create intelligent systems, and many of them are now being worked on in locations throughout the globe. This chapter has provided an overview of image processing, including a brief history, methodologies, roles, tools, and applications. This will pique the curiosity of the community to learn more about image processing. The advancement of digital image processing is quite likely to aid the creation of a smart and intelligent society in terms of health, education, defence, traffic, residences, offices, cities, etc.

# Bibliography

[1] Donald G Bailey. Image processing using fpgas, 2019.

[2] Bruce A Draper, J Ross Beveridge, AP Willem Bohm, Charles Ross, and Monica Chawathe. Accelerated image processing on fpgas. *IEEE transactions on image processing*, 12(12):1543–1551, 2003.

[3] Deepesh Prakash Guragain, Pramod Ghimire, and Kapil Budhathoki. Implementation of fpga based image processing algorithm using xilinx system generator. *International Research Journal of Engineering and Technology (IRJET)*, 5(01):2395–0056, 2018.