Motorcycle Image Analysis with Nanoelectronics Platform

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Abstract: This research investigated of image tracking and edge detection for motorcyclein various lighting and weather conditions with nanoelectronics platform. The platform capability in different resolution and threshold level also evaluated. Comparison between field programmable gate array (FPGA) hardware platform and (MATLAB) software platformhas been made. Developed framework showed great accuracy in segmentation of motorcycle plate numberin daylight compared to rainy daylight and night condition. System developed has the processing time less than 40 milliseconds in various critical conditions such as daylight, rainy daylight and night conditions. The output image was analyzed by comparing the accuracy of bounding box and edges which is displayed in different conditions, threshold level, resolutions and distances. The result showed different performance for each condition. The output image is clear with pixel 1024 x768 in daylight, rainy and night. Meanwhile image quality getting blur while used low pixel resolutions such as 640 x 480, 720 x 480 and 800 x 600. Total speed for each image processing is 30 frames per second. The ability of this system capturedmotorcycle image is 5 to 15 meter in daylight, rainy and night. Analysis with Histogram level and contrast stretching method showed performance in hardware is improved rather than software [1-6].
***Keywords*:** Nanoelectronics, motorcycle, field programmable gate array, bounding box, edges

INTRODUCTION

The detection capability of motorcycle images in different lighting conditions criteria and weather condition are also considered in this project. Therefore, different conditions are analyzed which involved daylight and night as lighting condition criteria while rainy as a weather condition. Moreover, the various distances of motorcycle detection from the driver also not tested yet from previous literature.

MATERIALS AND METHODS

The image preprocessing is to remove distracting and useless information from the image. This process optimizes computational requirement in producing better performances of image. Thresholding process is a basic approach in image segmentation and it created binary masking image from color or grayscale image. In this project threshold value is referred to threshold level which can be adjusted in design block diagram. The segmentation can be determined from a single parameter known as intensity threshold. Gradient intensity value can be control while manipulated the intensity threshold value. Image can be correctly segmented by simple thresholding and it can be determined by looking at an intensity histogram of image. The background and foreground in an image is subtracting each other base on gradient intensity value.

RESULTS AND DISCUSSION

The consumed FPGA resources are listed in Fig. 1. The FPGA used in this project is speed grade -4. The minimum period is 11.3 ns. The minimum input arrival time before clock is 10.941 ns. The maximum output required time after clock is 13.545 ns. The selected device 3sd3400afg676-4 used

during detection of image. Graph in figure 4.8 shows a device utilized used during implementation of this system. The slice used is 35% out of 23872. The number of slice flip flop used 23% out of 47744. Number of 4 input LUTs used are 26% out of 47744.

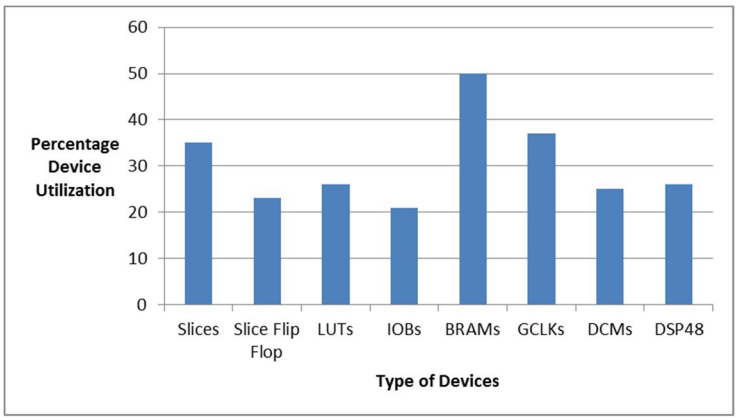

Fig. 1. Consumed FPGA resources.

CONCLUSIONS

Although motorcycle image can detect in all condition there is a limitation to recognize it based on plate number in extreme condition. The develop framework was also unable recognize motorcycle plate number in long distances. Further development can be carried on addressing this issue thus increasing the overall capabilities of the developed framework. Its ability in recognized process is based on pixel intensities on image. Due to this, image output should be exploited to differentiated performances of platform tolls used during the experiment.

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