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Detection of Movable Object and face using adaptive thresholding and Median filters

Sukanya Majjagi[1], Sheela K Kore[2], Sadanand B Kulkarni[3]

[1]PG Student, Electronics and Communication, K.L.E DR. M.S.Sheshgiri Collage of Engineering and Technology, Belagavi, Karnataka, India
[2,3] Faculty, Electronics and Communication, K.L.E DR. M.S.Sheshgiri Collage of Engineering and Technology, Belagavi, Karnataka, India

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Abstract - *The newer technologies in security issues has emerged to provide security in various places like hospitals, in military areas, railway stations etc. The biometrics is the measure and mathematical analysis of person's unique physical and behavioural characteristics. The technology is used for identifying individuals who are under surveillance. Hair, clothes, nose or figure are examples for former and signature, voice etc., are examples for latter one. Detecting moving object and face plays an important role in security applications. In order to provide safety in these field, Adaptive Threshold method, BackGround Subtraction techniques are used in moving object and face detection. The VHDL code is auto-generated after creating netlist. The project is implemented using Xilinx 14.6 and Matlab R2013b and dumped on Spartan 3A board.*

***Key Words*: Median filter, Background subtraction, Adaptive thresholding, Xilinx 14.6, Matlab R2013b.**

1. INTRODUCTION

We can use it as a security application like hospital security. Here we use background subtraction algorithm. Whether it may be object, face, or mouse, real time detection is essential for various applications. The project can be implemented using various FPGA Boards. In the past few decades, technology is improving rapidly in the field of video surveillance. In early days there were no real time applications like capturing real time videos. So, situations where crime used to occur were unable to detect the particular moment. Now, researchers came up with moving object detection to handle such kind of incidents. Not only applicable for worst situation like detecting theft but this application is also used for medical image processing.

2. IMPLEMENTATION

Fig 1 shows Simulink block diagram for moving object or face detection. Here actual video frame is converted in to samples or images. Then the color image is converted in to gray scale image.

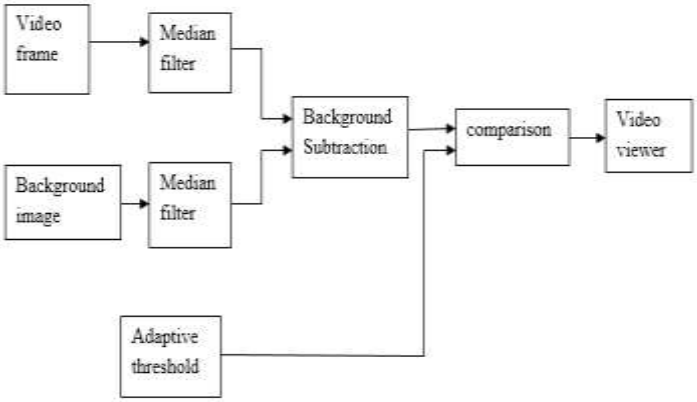

Fig-1: Block diagram of object or face detector

Then resizing of image is done. Filters like Gaussian or median filters are used to remove high frequency components and signal noise. In this proposed system, median filters are used.

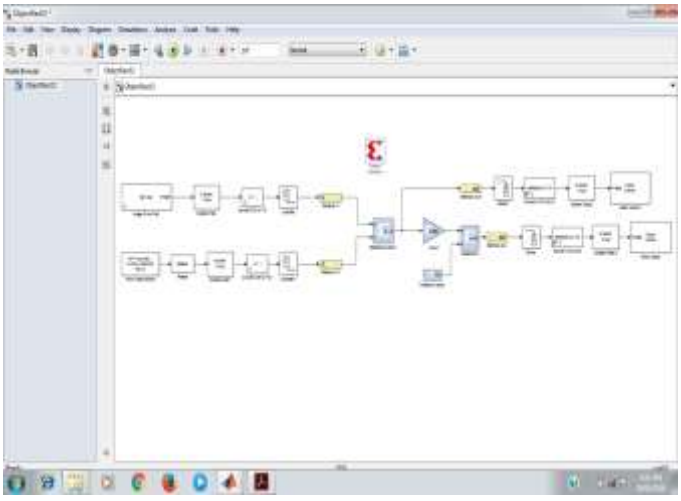

Fig-2: simulink model for object/face detection

Figure shown above is the Simulink model of object/face detection. Here first we will take background colour image by using static camera. This image is converted to grayscale 2 dimensional image, as it is applied to median filter to remove high frequency component or noise present in the image. Initially image resizing should be done. Here it is resized to 250*250.

Unbuffer block is connected between 2D to 1D block and Gateway In block. This block converts frame based signal to sample based signal with same channels at higher data rate that is N channels with 4 samples per frame to same channel length with single sample per frame. We have to select 'same as frame based' so the block performs frame based processing on sample based inputs. Next unbuffered images are applied to gateway In block. Now we will capture real time video. That is also converted to grayscale. Up to gateway in block, same procedure is followed that is resizing and filtering. This is called image preprocessing. Background is subtracted from foreground or video.

Gateway in block converts inputs of type Simulink integer, single, double and fixed point to Xilinx fixed point or floating point data type and we have to select arithmetic type as Unsigned. Both background image and captured video is applied to subtraction block which is then applied to Xilinx constant multiplier block. Xilinx blocks are connected within gateway in and gateway out blocks. Here the multiplier value is set to 255. Pixel values of subtracted image is compared with threshold value using comparator. If the values are greater than the latter the object is detected as output or else the output is zero that is obtained output will be dark. Above figure shows the output for both with adaptive and without adaptive thresholding. we will get binarized or segmented image. It is applied to gateway out block. It performs the reverse operation as that of gateway in block.

Buffer block converts scalar samples to a frame output at a lower rate. Then it is reshaped. Finally, we can observe output in video viewer.

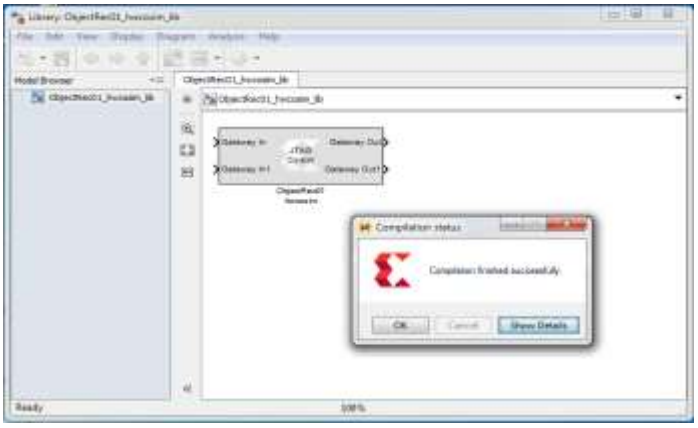

Fig-3: hardware co-simulation block

After compilation finish successfully, hardware co-simulation library block is generated which is again drag and dropped to the proposed Simulink model as shown in the below figure.

3. RESULTS

3.1 SOFTWARE RESULTS

Fig-4: Background image

Fig-5: actual image

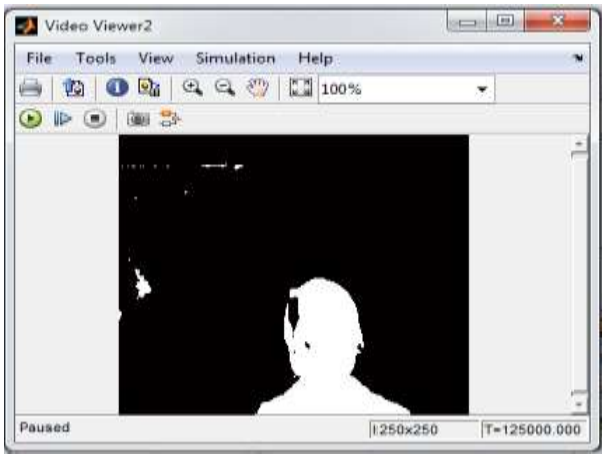

Fig-6: moving face detected with adaptive thresholding

3.2 HARDWARE RESULTS

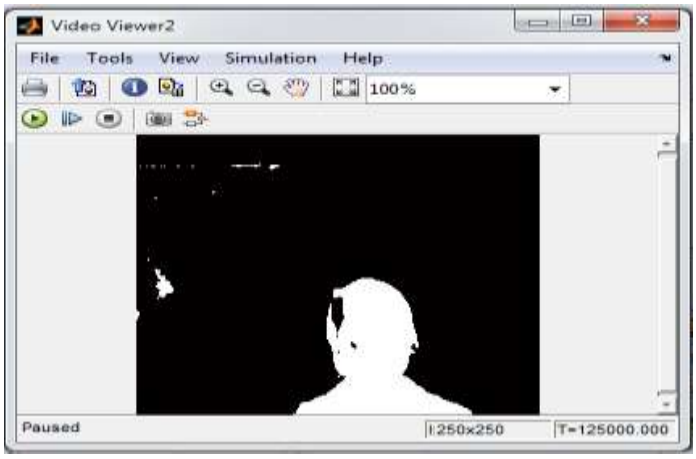

Fig-7: moving face detection through co-simulation block with thresholding

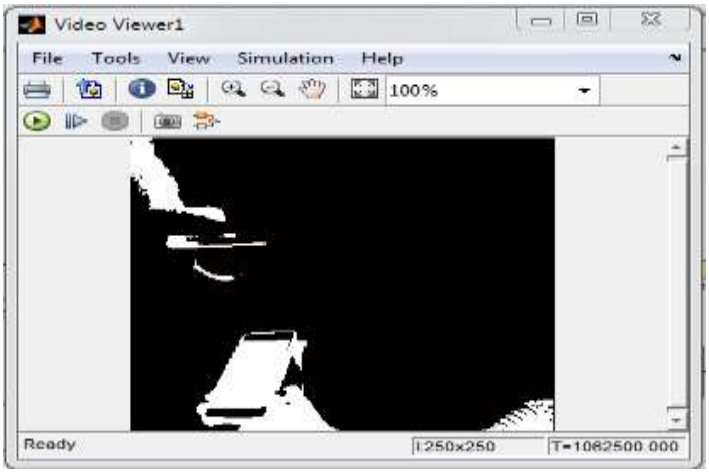

Fig-8: mobile as moving object with threshold

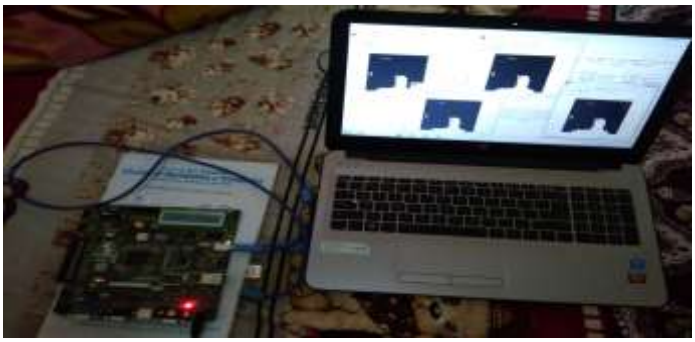

Fig-9: data transfer through JTAG Cable

Fig-10: green or Done led glow indicates correct model

4. CONCLUSION

Background Subtraction is particularly applied for moving object detection. We will get variety of background subtraction algorithm. person's safety is secured. Whether it may be object or face of images same Simulink block is used to detect the target image. The main thing to be considered is compatibility of software's. Xilinx 14.6 is compatible with matlab R2013b. sometimes fatal internal error occurs. We have to restart the matlab because drivers will not be installed properly to detect the hardware board.

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