DOCUMENTATION AND SUMMARY

This project implements a vending machine along with a facial recognition system to get access to it. The vending machine either dispenses a food item or a drink depending on the user’s choice. Denominations accepted are nickels, dimes and quarters. Food item costs 35 cents and the drink costs 30 cents.

The facial recognition is implemented with a standard Local Binary Patterns (LBP) Algorithm. The LBP method is a simple yet widely used algorithm for facial recognition systems. It works by taking 3x3 pixel blocks from the image and using the intensity value of the middle pixel as the threshold. Based on the threshold pixel the remaining neighboring pixels are then formatted to 0s or 1s. The algorithm first converts the image of the user into a grey scale image. Then the greyscale image is converted into a LBP image by processing it in the above mentioned way and storing it. An LBP image is independent of contrast of the original image. The User’s LBP image and the LBP image stored in the machine are then compared in a bitwise fashion. If the number of bits matched exceeds the set threshold (90%), the vending machine works. If not, the machine doesn’t recognize the face and fails to work.

Matlab is used for face identification and cropping, processing and converting of the user’s picture to an LBP image as Verilog does not support the image processing features required for the conversions. Verilog accepts only binary signals and processing images would be inefficient as it would require a lot of computational time and resources. The matlab code consists of two parts ;the first one is used to identify the face and crop it while the other one is to convert the image into its corresponding average lbp image. Matlab has been coded in Mathworks.

The user’s LBP image data is stored in ‘user.dat’ file and the stored LBP image data is in ‘check.dat’.

The verilog code consists of one module for the vending machine (Vending\_Machine1) which first tests if the face is recognized and then accepts the user’s choice and money accordingly and then dispenses the item of choice. The reset input is in case the machine goes into an illegal state.

CONTRIBUTIONS:

I researched the design, coded and debugged the drink and change for drink dispensing part of the vending machine.