

ABSTRACT

The application of monitoring over Wireless Sensor Network (WSN) is highly demanded to be implemented in the Internet of Things (IoT). The problem that appears in IoT is the general purpose microprocessor is still highly used, which causes more energy used than it is needed. Although, an Application Specific Integrated Circuit (ASIC) can be used to make a more efficient energy application, it is more expensive and permanent, which means it can't be changed or reconfigured. This thesis presents a method to design a specific purpose microprocessor by compressing an image in DLX microprocessor, which can still be reconfigured by optimizing machine instruction needed in the microprocessor.

Prior to DWT process, an image will go through pre-processing stage. The stage will be done in Matlab to turn an RGB image into a grayscale image, and the matrix of the grayscale image will be obtained. This matrix will be the input for Haar DWT machine instruction. The machine instruction is simulated in WinDLX, a simulator for DLX microprocessor. After the simulation has finished, the statistics of the simulation will be analyzed to conclude whether the machine instruction is optimum enough.

The result of Haar DWT machine instruction is the same as the result obtained from Matlab, which means the machine instruction is capable to do the image compression. Out of 92 kinds of instruction, Haar machine instruction only needs 20 kinds of instructions used. This shows that the program will not waste energy for unused instruction. From the statistics obtained, the total cycles executed from the pipelined DLX microprocessor is 1239 cycles, where a non-pipelined microprocessor would need 2755 cycles to execute the program. This means the program is a more efficient method to run a Haar DWT compression.

Keyword: *optimum machine instruction, DLX microprocessor, DWT image compression, internet of things (IoT), wireless sensor multimedia networks.*