

CHAPTER 1

INTRODUCTION

1.1 Background

Internet of Things (IoT) refers to the ever-growing network of physical objects which has connection to the internet to communicate. It usually use sensors to exchange data system while communicating. As the IoT grow year by year, more devices that can be monitored from remote and program are considered as an IoT device. [1]. As shown in Fig.1.1 the ecosystems for IoT are all the component devices in people's daily life such as businesses, kitchen appliances, medical appliances, cars, security, and governments. The IoT itself help a lot for people's daily activities to finish people's job easily without having a real-interface. DLX micropocessor used in this thesis is a microprocessor with 32-bit RISC architecture with the core such as fixed point unit and also exist a floating point extension. The DLX fixed point unit uses 32 general purpose registers (R0 to R31) with 32 bits for each of registers. For R0 has the value of 0 so nothing can be added to this register. The aim of this thesis which make this thesis important is to help making an efficient microcontroller work as CCTV (security and survailance IoT implementation) to report the situation around itself by sending images as report which have been compressed and simulated in DLX Microprocessor with Application Specific Instruction set Processor (ASIP) instructions which give benefit to less the power and less storage consumptions [9]. as our use of and reliance on computers continue to grow, so too does our need for efficient ways of storing large amounts of data.

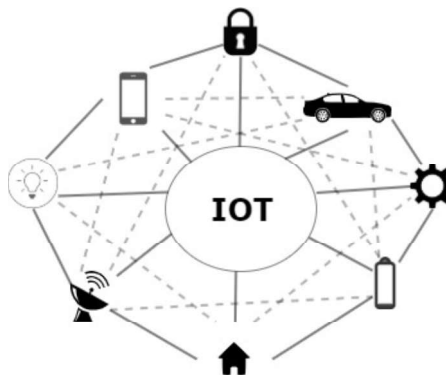


Figure 1.1 Internet of Things ecosystem.

This thesis is focusing on Discrete Cosine Transform (DCT) Application in JPEG image compression that suppose to work by separating images into parts of differing frequencies. Common microprocessor still uses many instructions for their machines and it causes a low power efficiency, in this problem ASIP has to solve the problem by reducing the power/battery usage. The instruction of ASIP designed to accelerate most used and huge data functions. ASIP architecture is designed to implement this assembly instruction set with efficient power.

This thesis topic also related to the previous paper of one of the senior in Telkom University with title "Evaluation Of DLX Microprocessor Instructions Efficiency For Image Compression" written by Nyoman Karna, Nimas Fatihah from Telkom University , Indonesia and Dong-Seong Kim from Kumoh National Institute of Technology in Gumi, Korea. [11]

1.2 Problem Formulation

The problem of Internet of Things devices nowadays are a low power efficiency and high data storage consumption caused by those devices are still using a general instructions of microprocessor. This thesis give solution to cut those data storage consumption and create an efficient micro controller simulated in winDLX program with Application Specific Instruction set Processor (ASIP) machine instructions. This thesis presents the design of ASIP specific machine instruction of DLX Microprocessor for JPEG image compression by Discrete Cosine Transform (DCT) method.

1.3 Objectives

Able to design the DLX Microprocessor instructions for Discrete Cosine Transform (DCT) image compression on JPEG and analyze the statistics based on result of simulation.

1.4 Scope of Research

1. Compressing original image format using Matlab.
2. Create DCT image compression simulation with MIPS assembly on DLX Microprocessor.
3. Do the DCT method simulation on DLX Microprocessor and evaluate the performance.

1.5 Research Methodology

The method for this thesis consist of several stages as follows:

1. Literature Study Method
By studying the existing problems to be more understand about the content of the thesis.
2. System Planning
In this stage, using specific instructions machine and algorithm in DLX Microprocessor for DCT method of image compression.
3. Simulation
Using winDLX to do the simulation for this thesis.
4. Conclusion
After it has done with the simulation, Conclusion of this thesis can be made.

1.6 Structure of Thesis

The rest of this thesis writing consist of several stages as follows:

- Chapter 2 BASIC CONCEPT
This literature review is including theories supporting this thesis.
- Chapter 3 SYSTEM MODEL AND TECHNIQUES
This chapter consists of the stages to create the system design, afterward do the simulation on winDLX.
- Chapter 4 RESULT AND EVALUATION
This chapter consists of the simulation results.
- Chapter 5 CONCLUSION AND SUGGESTION
This chapter consists of the summary gathered from results and the suggestions for further development.