

**LAWS**  
**LOGISTIC AUTOMATED WAREHOUSE SYSTEM**

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA

## BORANG PENGESAHAN STATUS TESIS\*

JUDUL: LOGISTIC AUTOMATED WAREHOUSE SYSTEM

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**LAWS**  
**LOGISTIC AUTOMATED WAREHOUSE SYSTEM**

OMAR MUKHTAR BIN HAMBARAN

This Report is submitted in partial fulfillment of requirements for the  
Bachelor of Computer Science (Artificial Intelligence)

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY  
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

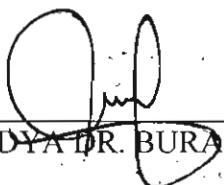
2011

## DECLARATION

I hereby declare that this project report entitled  
**LOGISTIC AUTOMATED WAREHOUSE SYSTEM**

is written by me and is my own effort and that no part has been  
plagiarized without citation.

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## **DEDICATION**

To my beloved parents, En. Hambaran Bin Abd. Samad and Pn. Rosina Binti  
Abd. Ghani, for their expression of love and fully support...

To my supervisor, Prof. Madya Dr. Burairah Bin Hussin, for making it all  
worthwhile...



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## ABSTRACT

This project is performed to develop a software system that can simulate the environment process in the warehouse.

Automatic Warehouse System is one of the key parts of the Infrastructure for Logistics, and the simulation has become an effective measure to solve the problem in system design. Taking the tobacco automated sorting system as an example; this book will provide a way of visual simulation process model through the LAWS.

This project supposes to use automated input system via laser sensor to retrieve the actual width size of each item that comes into the warehouse, but in this project, it just retrieve the input by manual user input via keyboard. It is done by using some optimization and defragmentation techniques such as: Levenberg-Marquardt, Trust-Region, and so on.

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## CHAPTER I

### INTRODUCTION

#### 1.1 Project Background

Generally, Logistics Automatic Warehouse System is consisted of Electrical Engineering, Communication Engineering, Information Engineering, Mechanical Engineering, and many other subjects, etc., which was defined as a large-scale complex systems. In the same time, the characteristics of the system also determine that actualizing a project usually has high input and high risk, so it impossible to make the prototypes for evaluation. Therefore, the system design and system simulation analysis appear to be critical in the project preparation. The previous semi-automatic sorting systems are relatively simple; as a result, we can usually carry out the system design through the experience of system designer. With the progressive realization of intelligent sorting system and flexible sorting system, the dependability of the system design based on the experience has been unable to meet the demand.

Naturally, the system simulation becomes the first choice in the automatic sorting system design. In the process of system design, choosing an appropriate system simulation platform and a reasonable simulation model can effectively simplify and optimize the system design.

## 1.2 Problem Statement

The problem statements are:-

- When the item or storage comes into the warehouse to be stored, it will need to be stored manually by human resource or warehouse worker.
- We need human critical thinking to manage the storage that so the storage can be stored in the right manner.
- When the worker that had been assigned to manage the storage get sick, ill, dying, die, or other serious injuries, the storage will not be managed properly.

## 1.3 Objective

The objectives of this project are:

- To manage the storage in the warehouse automatically.
- To manage the storage every time – 24 hours, 7 days a week.
- To reduce human resources that manages the storage.
- To optimize the space in the storage automatically and fast.



## 1.4 Scope

This project, which is code named “LAWS”, is categorized in the optimizing field, which is the subset field of Artificial Intelligence.

As mentioned in the problem statement, the project covers the optimizing problems in automatic way.

The project’s target will be specialized to optimize and manage the storage automatically. In this case, machine has a full control of storage management system.

## 1.5 Project Significance

LAWS provide the solution for machine or a system to optimize and manage the storage automatically.

The system allows the machine to automatically do insert, defrag, and remove the storage when necessary automatically.

That is possible by using one of the optimization techniques to manage the storage in the warehouse. The further explanation of how LAWS works will be elaborated in the next chapter.

## 1.6 Expected Output

This project is expected to be able to produce computer software which will simulate the machine while manage the storage.

The software is called LAWS, the system that simulate the real machine on managing the storage.

The software is expected to become confidential, user friendly, easy to use, and does not require much cost to implement.

## 1.7 Conclusion

LAWS is software which is expected to be the software that simulate all the process of automated machine that manage the storage.

Finally, the introduction of this project has been elaborated, the literature review is the further process along with the project methodology to explain the algorithm of LAWS.

## CHAPTER II

### LITERATURE REVIEW AND PROJECT METHODOLOGY

#### 2.1 Introduction

In this chapter, all of the literature review will be elaborated as well as the algorithms and the project methodology used in this project.

This project uses various kinds of titles and types of references which are taken from various trusted scientific paper sources. It is done, in order to do some research about the algorithm, performance, and specification needed.

The existing systems are also elaborated in order to give a clear image about this project, the advantages and disadvantages, how it works, and how the performance is.

This project uses several kinds of techniques in order to achieve the expected output and goals. And also the project is planned in order to meet the schedule of submission.

## 2.2 Facts and Findings

### 2.2.1 Domain

LAWS is categorized as an artificial intelligent domain. In the more detailed area, it is in the optimizing and automated field which is the branch of artificial intelligent. In order to get the global view of the domain discussed in this project, the figure below is shown.

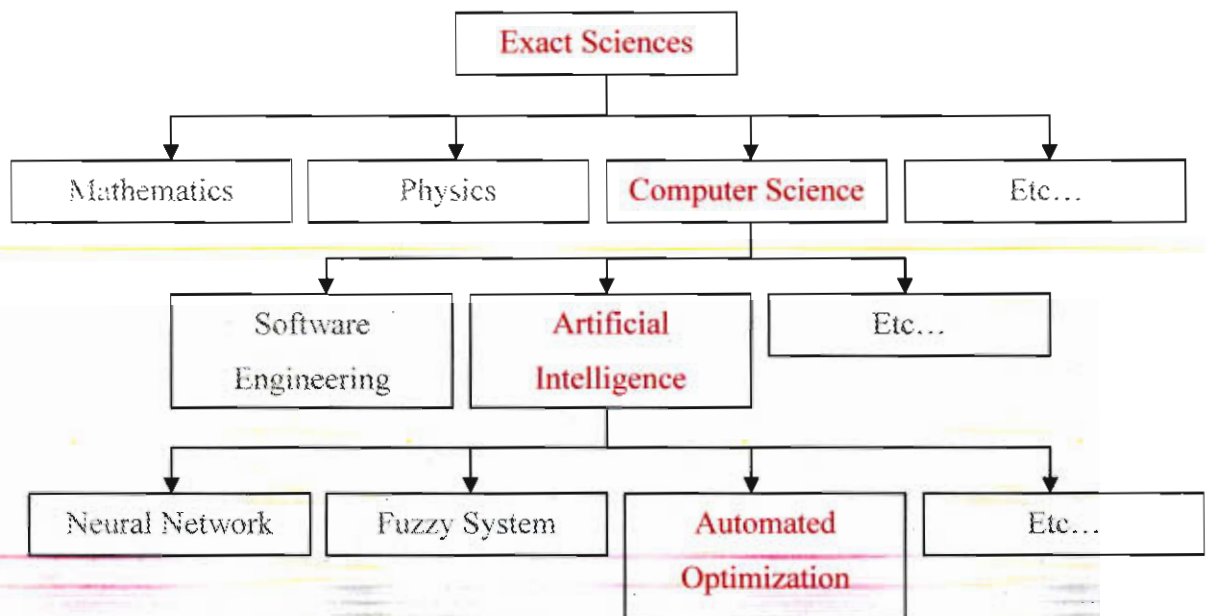


Figure 1 : Relation between automated optimization and various other fields

After understanding the figure above, it is clear that the domain in this subject is automated optimization which is involving the domain of artificial intelligence as well. For further explanation, the definition of the domain discussed in this project is important.

Artificial Intelligence is the science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable (McCarthy, 2007).

Automated Optimization refers to automatically manage and store the storage in an optimized manner. It means that the machine automatically optimize and minimize the cost of storage management. The aims of automated optimization are:

- Improve the manual management.
- Reduce human cost of optimize things.
- Fasten the optimization process.

In this project, the software is simulate the process of a machine that automatically optimize and manage the storage. From the point of view of automated optimization, it is clear that the aim is to automate the storage management process by a machine in a certain warehouse.

### 2.2.2 Existing System

As it has been mentioned before, this project is discussed in the domain of artificial intelligence, which is automated optimization. As the project's aim is to let the machine automatically manage the storage in the warehouse.

These are several of the existing system which is related with this project. Some of them are in the form of research or educational purpose only and some of them are already in the market. Those are:

- Automated Optimization of Thread-to-Core Pinning on Multi core Systems (Tobias, Michael, Josef, & Carsten, 2000)
- Fast remote procedure call (RPC) (Renaud, Gilles, Eugen-Nicolae, & Charles, 1998)
- The Process for Coercing Simulations (Sarah, David, & Paul, 2003)

The self study or self research has been conducted in order to select the suitable automated optimization technique used in this project. Finally it is founded that basic optimization and defragmentation using 'Tower of Hanoi' concept can be used to manage the storage automatically and in the right manner.

The software had been used in the project is Netbean 6.9.1 to develop Java Application for this software's project.

### 2.2.3 Technique

There are various kind of techniques used in this project. The techniques used are either from the discipline of automated optimization, or other technique proposed by researchers.

The first technique to automatically store the storage in the right manner is FCFS (First Come First Serve), and the technique to make it stored in the ascending or descending order is using the concept of 'Tower of Hanoi'.

## 2.3 Project Methodology

In this part, the structured methods used to make project management effective which is called the project methodology will be explained.

The project methodology used in this project is Object Oriented Application Development (OOAD).

The reason behind why does this project uses OOAD as its project's methodology, is simply because LAWS applied object oriented programming instead of traditional structured programming which makes the representation of the concept of the problems statements closer to the real world, easier, reliable, and reusable.

According to (Dixit, 2007), the goal of OOAD is to make systems elements more reusable, thus improving system quality and the productivity of systems analysis and design.

Refers to (Harich, 2000), There are four steps in the OOAD, which is relevant with the project methodology of this system. Each steps will be elaborated in detail based on the steps of this project.

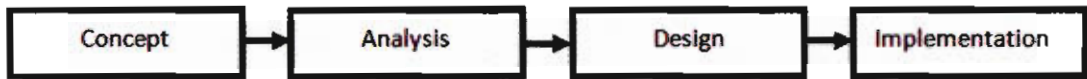


Figure 2 : OOAD Steps

The concept phase is to capture the essence of what to solve. In this phase, the sentences describing the vision to achieve and the key objectives are explained.

In the analysis phase, the definition of the problem in detail sufficient to provide a satisfactory solution is described and also the breakdown of the problem will be explained into details.

In the design phase, the satisfactory solutions are clearly visualized in terms of intentions. The visualization is a model showing a solution component with their relationship and responsibilities.

In the implementation phase, the code is written. The translation from the design phase, which is algorithm and system architecture, is translated into a working product.

## 2.4 Project Requirements

### 2.4.1 Software Requirement

- Netbean 6.9.1 for developing Java application software.
- MySQL 5.0 databases for storing the storage information either for temporary or permanently purpose.
- Microsoft Office for word processing software.
- Microsoft Project as project management software.

### 2.4.2 Hardware Requirement

- Personal Computer with 32-bit MS Windows (XP/Vista/Windows 7)
- 20 MB of free disc space
- Small Laser Detector for Storage's Size input detection.

### 2.4.3 Other Requirement

There is no other requirement in this project, unless all of it has already described in software and hardware requirement above.