CHAPTER 1

INTRODUCTION

1.1 PROJECT BACKGROUND

An automated storage and retrieval system (AS/RS) can be defined as a storage system that performs storage and retrieval operations with speed and accuracy under a defined degree of automation (Aslam, Gardezi, and Hayat, 2009). The performance of any manufacturing industry depends mostly on its material handling and storage system.

Generally, AS/RS refers to a variety of computer-controlled methods for automatically depositing and retrieving loads to and from defined storage locations. Within an automated storage system environment, there are having several layouts such as horizontal carousels, vertical carousels, vertical lift modules, and fixed aisle storage and retrieval systems. The latter utilizing special storage retrieval (S/R) machines to do the work needed to insert, extract and deliver loads to designated input/output locations. AS/RS have many benefits including savings in labour cost, improved material flow and inventory control, high floor space utilization, increased safety and stock rotation. AS/RS, carousels/rotary racks, automated guided vehicles (AGV) systems, and robotic systems are some of the most commonly used material handling systems in manufacturing industries.

The right application of AS/RS provides a long list of user benefits. It has been demonstrated time and time again that automated storage and retrieval systems are proven technologies capable of effectively and consistently handling and buffering raw materials, work-in-process inventories and finished goods of all kinds, and making it possible to totally integrate material handling storage. This system works by enable user
to store their packages in the safe place and retrieve the packages correctly without the limit of human working hours. The system can be extended from medium to large storage capacity without difficulty to redesign the storage management. In this project, the design and development of AS/RS prototype was concentrated for small unit loads (small drawer). The capacity of the designated AS/RS to store various parts is ten of drawer. The developed storage structure (cabinet) of AS/RS consists of two rows and five columns to store parts in vertical and horizontal direction.

1.2 PROBLEM STATEMENT

This AS/RS is designed to reduce the error rates and increased reliability while savings labour costs and floor space. Material storage can be performed manually but the automated methods for storing and retrieving materials are more efficient. With the conventional system, need a lot of labour touching the material which can lead to errors and contribute the longer time since automated system is more accurate with higher stock reliability, for these reasons, safety stock figures can be lower, which means storage costs will be reduced. Other than that, the possibilities of error occur during storing and retrieving of the items at original location and find the items in shelving can sometimes be difficult.

1.3 OBJECTIVES OF THE PROJECT

The objectives of this project are:

i. To design a prototype of automated storage and retrieval system (AS/RS) for small loads.
ii. To integrate microcontroller on the storage/retrieval (S/R) machine.
iii. To fabricate, assemble, and test the prototype as following a design.
1.4 PROJECT SCOPE

This project focuses on design and fabrication of the AS/RS prototype. The design was developed using Solidworks software. Other than that, programmable autonomously storage/retrieve (S/R) machine is used in conjunction to store and retrieve the small drawer. Furthermore, design of electronic circuit to suit the software programming. Generally, every technology has its limitations, and for this project it is no exception. The movement of this system is limited to store and retrieve the small unit loads (drawer) into and from storage structure (cabinet).

This equipment is not durable. It cannot expose too much to any work pressure since it is available in portable small component. This system requires higher initial investment for start-up process. The design of this system needs precise decision making to get the best mechanism.

1.5 CONCLUSION

Chapter 1 has been discussed briefly about project background, problem statement, objective and scope of the project on development of automated storage and retrieval system to achieve the objective mentioned. This chapter is as a fundamental for the project and act as a guidelines for project research completion.