CONTROLLED CONVEYOR SYSTEM

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This report is submitted in partial fulfillment of requirements for the Bachelor of Bachelor in Mechatronic Engineering

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May 2009

"I hereby declare that this project report is the result of my own work and all sources of references have been clearly acknowledged"

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Date : 22ND April 2009

"I hereby declare that I have read this project report and in my opinion this project report is sufficient in terms of scope and quality for the award of the degree of Bachelor of Mechatronic Engineering

Signature : .....

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Date : 13/5/2009

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For my beloved parents

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ABSTRACT

Robotics is one type of technology that currently being widely used by widely currently in this world. Robotics technology is the latest technology where its application is in anywhere especially in industrial sector. Robot is a machine that could help to reduce human work force in order to get the optimum products manufactured in factory and works that can not be done by human and many more. To fulfill this purpose, 'Controlled conveyor system' was designed with combination of cylindrical coordinate robot and conveyor system. This system use PIC 16F877A's chip as major tool to control system movement. Mikro C's software used to write program to download to PIC's microcontroller.

Moreover, learning in education institution in this country either at school or at senior level still lacked with exposure on the robotics technology. The students are not exposed to the real robotic application in industrial sector. Thus, with this project, it can help to increase the teaching and learning quality in the robotic subject.

ABSTRAK

Robotik adalah satu cabang teknologi yang digunapakai dengan meluas pada masa ini. Teknologi robotik adalah teknologi yang terkini di mana penggunaannya dapat dilihat di mana-mana sahaja terutamanya di kawasan perindustrian. Robot adalah satu mesin yang dapat membantu manusia dengan meringankan kerja-keja seperti pengeluaran produk yang optimum di kilang, kerja-kerja yang tidak dapat dilakukan oleh manusia dan sebagainya. Untuk tujuan ini, 'Controlled conveyor system' telah direka bentuk. Projek ini terdiri daripada hasil gabungan robot kordinat silinder dengan sistem pengangkut. Sistem ini menggunakan cip PIC 16F877A sebagai alat utama untuk mengawal pergerakan sistem. Perisian Mikro C digunakan untuk menulis program untuk memuat turun ke cip PIC.

Tambahan pula, pembelajaran di institusi pengajian di negara ini samada di sekolah ataupun di peringkat lebih tinggi masih kurang mendedahkan tentang teknologi robotik ini. Mereka tidak dapat pendedahan tentang aplikasi sebenar di sektor perkilangan. Oleh itu, dengan hasil kajian dan reka bentuk prototaip robot ini, sedikit sebanyak dapat membantu dalam usaha untuk meningkatkan mutu pembelajaran dari segi teknologi pada masa ini.

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CHAPTER 1

INTRODUCTION

1.1 Background

Robotics is a field of engineering concerned with the development and application of robots, as well as computer systems for their control, sensory feedback and information processing. There are many types of robotic device including robotic manipulators, robot hands, mobile robots, walking robots, aids for disabled persons, telerobots and many more.

A robot is a mechanical device that operates automatically. Robot can perform a wide variety of tasks. The term robot comes from the Czech word *robota* meaning drudgery. The robot's action is controlled by a microprocessor that has been programmed for the tasks. The robot follows a set of instruction that tell it exactly what to do to complete the tasks.

The deployment of robots in industrial environments is increasing so as to achieve manufacturing economies. This trend is being driven by the technological advancements in the field of robotics. Robotic-vision-guidance systems are being used extensively in material-handling operations. The most basic applications for vision systems enabled robots in pick-and-place and conveyor system operations.

Industrial applications are used across many industries, including agriculture, automotive, medical, military, and testing labs. They are used for assembly, manufacturing, instrumentation, packaging, and communications.

1.2 Objective of this project are:

1. To design and build a prototype of conveyor system that can transfer products in horizontal way.
2. To design and build a prototype of cylindrical coordinate robot that can pick up products to conveyor.
3. To provide an overview implementation in industry to student.

1.3 Scope of project:

- To study the most appropriate microcontroller device and also mechanism of robotic for the building of cylindrical robot and conveyor system.

1.4 Problem Statement

Students are less exposed to the concept of industrial robotic application. To overcome the problem, this project is to build small scale industrial robotic application using appropriate mechanism and PIC microcontroller that will imitate the industrial application concept.

CHAPTER 2

LITERATURE REVIEW

2.0 Background

There are some theories that needed before starting to build a controlled conveyor system. This information is a guidance to complete the project. This chapter will explain about conveyor belt and the robotic features selection. The features consist of the type of belt, pulley, motor, sensors and the mechanical structure. The explanation of the pick-and-place robot and it features will been covered.

2.1 Conveyor belt

Conveyor belt are used for the controlled movement of a large variety of both regular and irregular shaped products. It can move light or heavy products on a horizontal, inclined or declined path within the limits of product stability and capacity. It is a machine with a moving belt.

2.1.1 Type of conveyor belt

1) Horizontal belt conveyor

Horizontal Belt is a basic transportation conveyor. It is ideally used to convey items with irregular bottom surfaces, small items that would fallin between rollers or bags that might sag between rollers.

Figure 2.1: Horizontal belt conveyor

2) Slider bed conveyor belt

Slider belt conveyors are available for incline or horizontal positions and are primarily used to perform jobs for sorting, assembling, inspecting or transporting items. It can handle products of various shapes and size. These light duty belt conveyors have a bolt together construction.

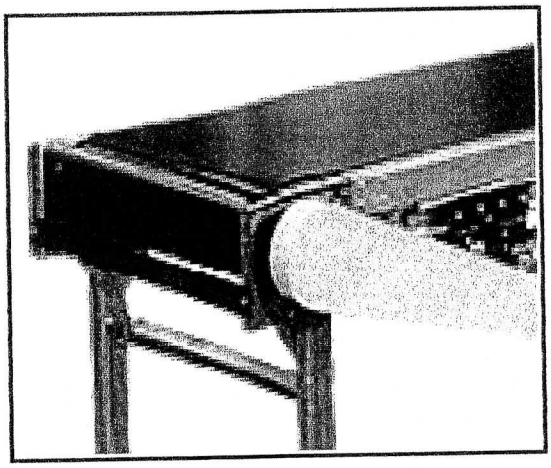


Figure 2.2: Slider bed conveyor belt

3) Incline and decline conveyor belt

These conveyor belt transports products from one floor to another or it can be used as a 'Booster Conveyor' regaining adequate height for gravity applications. The conveyors provides a smooth transfer from incline or decline to the horizontal plane with it's curved and is available in either bolted or welded construction.

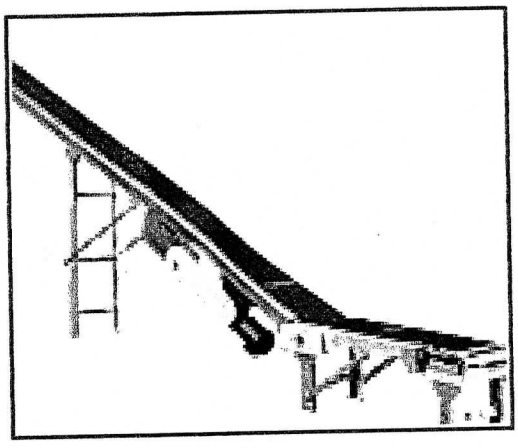


Figure 2.3: Incline/decline conveyor belt

2.1.1 Mechanism of conveyor belt

1) Bed

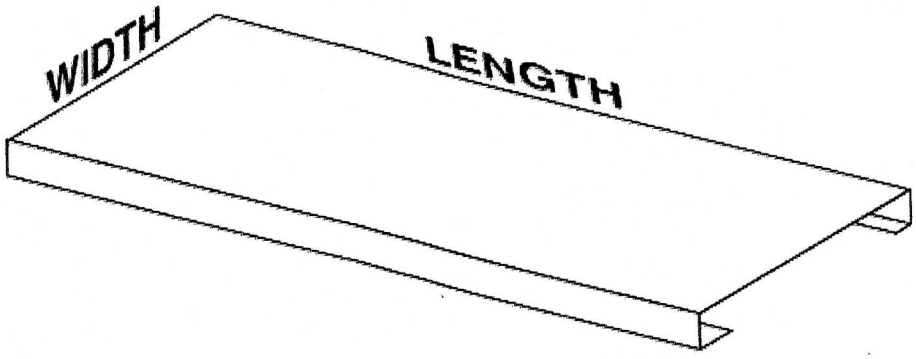


Figure 2.4: Bed conveyor

— Base of conveyor.

— It comes in many sizes-many lengths-many widths.

2) Pulley

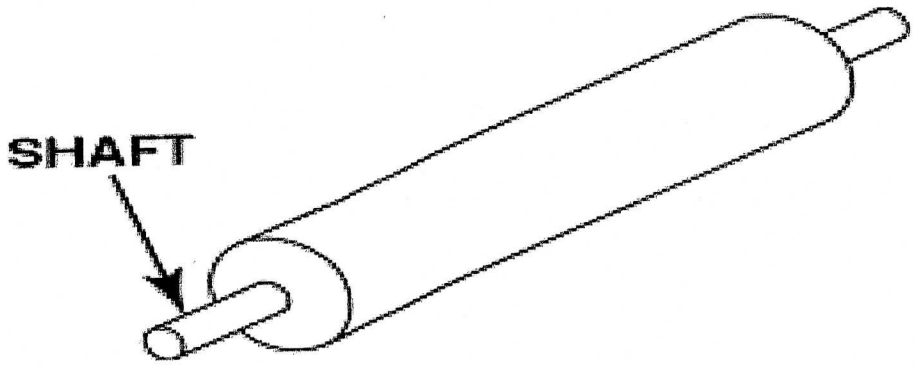


Figure 2.5: Pulley

— A pulley is like an iron pipe.

— Pulleys are put on each end of the bed. (Drive and driven)

— The pulleys are as wide as the bed.

— Each pulley has a steel shaft through it.

3) Sprocket

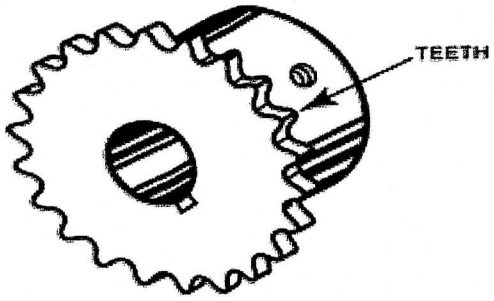


Figure 2.6: Sprocket or gear

— A sprocket is a metal or plastic "wheel" with "teeth" on the outside (Gear).

2.1.2 Concept of conveyor belt

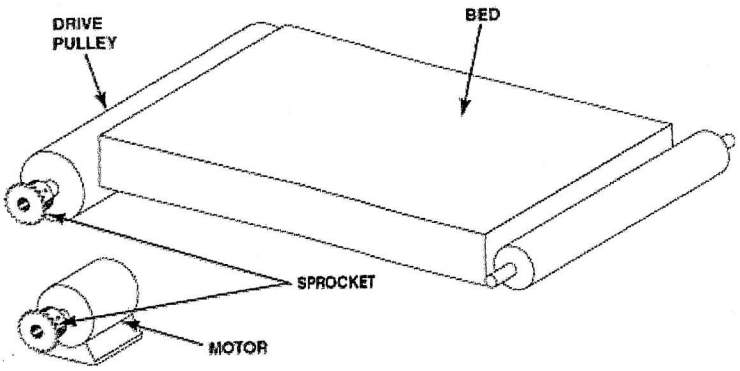


Figure 2.7: Belt conveyor concept

— The drive pulley is turned (driven) by a motor.

— A sprocket is put on the drive pulley shaft.

— A sprocket is mounted with the motor.

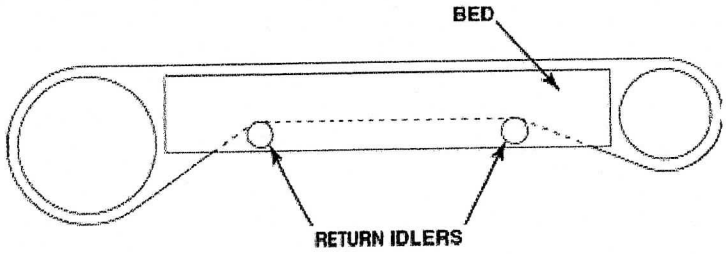


Figure 2.8: Conveyor arrangement

— Belt is put around the pulleys.

— The drive pulley turns and moves the belt around.

— Small rollers are put into the conveyor bed to hold up the belt.

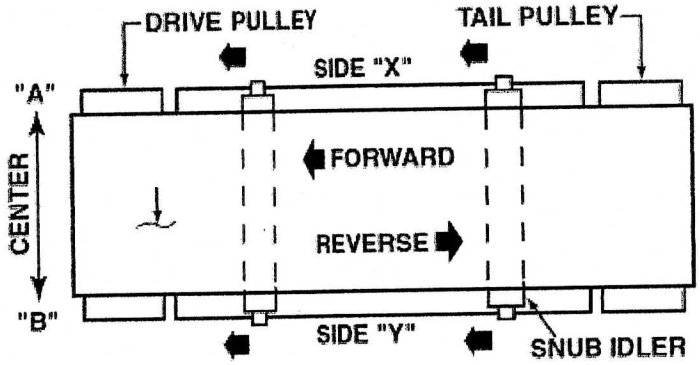
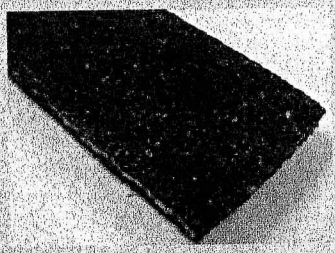
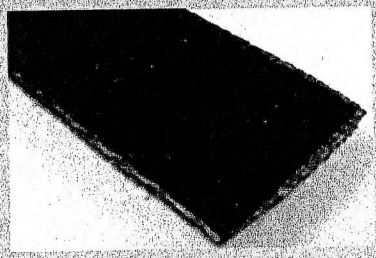


Figure 2.9: Flow of Belt Conveyor

2.1.3 Conveyor Belting-Standard Type

Table 2.1: Belt type

Belt Type	Application	Description
1. **Ultimate 140 BOS** (Nitrile Impregnated, Brushed One Side) 	▪Horizontal slider bed ▪Roller bed	▪Oil resistant ▪Quieter ▪Less roller build up ▪Withstands higher temperatures
2. **Ultimate 140 SD** (Nitrile Impregnated, Thin Polyurethane Top) 	▪Horizontal slider bed ▪Roller bed	▪High co-efficient of friction against rollers ▪More oil resistant ▪Quieter ▪Less roller build up ▪Withstand higher temperatures