



**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

**DEVELOPMENT OF A DRYER FOOD MACHINE**

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electrical Engineering Technology (Industrial Automation and Robotics) with Honours

by

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## **DECLARATION**

I hereby, declared this report entitled “Development of a Dryer Food Machine” is the results of my own research except as cited in references.

**Signature** :.....

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## **APPROVAL**

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Engineering Technology (Faculty of Engineering Technology) (Bachelor of Robotic and Automation Industry with Hons.). The member of the supervisory is as follow:

.....

(Miss Suziana Binti Ahmad)

## **ABSTRACT**

Drying out is method of food preservation during which meal can be dehydrated. Sun drying is only possible in regions where the weather allows food being dried up just after harvest. Sun drying method need a proper care to prevent the food from contamination and unexpected condition. This project is focused to develop a dryer food machine using conveyer system. This dryer food machine no need a proper care to monitor the food. The dryer food machine will mix the food based on the timer had been set. With this dryer food machine, it can increase dryer food production. Besides that, this dryer food machine also reduce man power energy because less monitoring need. This project should be able to improve small scale food industry and other food industry.

## **ABSTRAK**

Pengeringan adalah satu kaedah pengawetan makanan di mana sesuatu makanan boleh menjadi kering. Pengeringan tradisional menggunakan cahaya matahari hanya boleh dilakukan di kawasan yang mempunyai cuaca panas. Kaedah pengeringan tradisional memerlukan penjagaan yang rapi untuk mengelakkan makanan daripada pencemaran dan keadaan yang tidak dijangka seperti hujan. Fokus utama projek ini adalah untuk membangunkan mesin pengering makanan menggunakan sistem conveyer. Mesin pengering makanan ini tidak memerlukan penjagaan yang rapi untuk memantau makanan tersebut. Ini kerana mesin ini akan menggaul makanan berdasarkan pemasa yang telah ditetapkan. Dengan adanya mesin pengering ini, ianya boleh meningkatkan keupayaan pengeluaran makanan kering. Selain itu, mesin pengering ini dapat mengurangkan tenaga kerja kerana kurang pemantauan semasa proses pengeringan. Projek ini dapat memajukan industri kecil pembuatan makanan kering.

## **DEDICATION**

To Allah SWT

To my beloved parents

To my kind lecturers

And not forgetting to all my friends

For their

Love, Sacrifice, Encouragement and Best Wishes

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# **CHAPTER 1**

## **INTRODUCTION**

### **1.1 Introduction**

Drying is the oldest method of preserving food. Drying out is method of food preservation during which meal can be dehydrated. Drying out inhibits the actual development associated with microorganisms, yeasts and form through the removal of water. Dehydration has been used widely for this specific purpose due to the fact old times. Water can be typically taken off through evaporation (air drying, sun drying or wind flow drying). Many types of food can be prepared by drying method like meat, fruits, fish and vegetables. Many method to dry the food like sun drying method, oven and freeze drying method. Although sun drying become a popular method because it's the cheapest method to drying food. Sun drying food is not difficult but it need a lot of attention and take a times. Nowadays, the small scale food industry is growing rapidly. It require a dryer food machine that could increase capacity and reduce time and energy.

### **1.2 Background**

Drying out is usually an approach to taking away normal water via stuff. Suitable procedure program make it possible for to get greatest foods compared to goods dehydrated with traditional methods. Drying method have many types for example sun drying method, freeze drying method and oven drying. The popular method is sun drying method.



Although sun drying method need a lot of attention and take more times compare with other method. Around the domestic market there exists a significant offering of unique variations of dehydrated goods. A superior charge with the blow drying however limitations the particular wide-scale program in the foods marketplace. Apparatus innovation of dryer foods equipment could slow up the hard work required for this.

### **1.3 Problem Statement**

Sun drying is only possible in regions where the weather allows food being dried up just after harvest. The disadvantages with this process tend to be toxic contamination, damage by rats and insects, intermittent sun drying and no protection from rain. Large area of property necessary for sun drying method. Direct exposure to sunlight decreases the food quality. Besides that, proper care is necessary whenever sun drying some fruits to prevent quick drying that can reduce food quality. Moreover, given that sunshine blow drying is determined by uncontrolled components, design and standard size are unexpectable. Sun drying duration range between 1 to 3 days depend on sunshine, humidity and type of food to be dried. (Agnieszka Ciurzyńska and Andrzej Lenart, 2011)

### **1.4 Objectives**

Project objectives are to;

- a) Study and understand a dryer food machine
- b) Develop a dryer food machine using PLC
- c) Study the electrical parameter of dryer food machine

## 1.5 Work Scopes

The scopes of this project involves conveyer as their main base to put dried food, DC motor as a prime mover to move the conveyer, timer and PLC as main controller to monitor the movement. When timer energised, the PLC circuit connect to turn on the DC motor. When DC motor on, it will move the conveyer to mix the dried food. Conveyer move depend on time set by timer. After timer end, motor will stop running to allow food dried at other side. The step of the dried food machine are:

- a) Food will placed on conveyer belt
- b) When timer is activated, the PLC circuit will turn on
- c) DC motor on to move conveyer to mixing the food at conveyer
- d) Timer set depend on type of food

## CHAPTER 2

### LITERATURE REVIEW AND PROJECT BACKGROUND

This section shows that the researches that have been done. In this chapter, the reviews are on conveyer, PLC controller and DC motor. The previous studies that had been done are discussed in this chapter.

#### 2.0 Conveyer

The conveyer system can be a common piece of mechanical handling apparatus that use to moves products from area to an alternative location as shown in Figure 2.1. Conveyer techniques let speedy along with productive vehicles intended for many products which help them quite popular within the stuff coping with along with packaging market sectors. A lot of varieties of offering techniques can be purchased.



Figure 2.1 : Conveyer

From journal titled 'Power Plant Coal Conveyer Coal Link PLC Control System' stated that electrical power grow coal advertising and marketing web page link PLC control method is actually geared towards creating a few improvement with the classic coal-fired electrical power plant life a relay-based semi-automatic advertising and marketing control method using the popular features of more defects, the lower dependable with the operations. The study explores this innovative PLC seeing that control method like equipment configuration and software design and style with the advertising and marketing method.

Conveying method typically performs by using parallel primary or perhaps subsequent operations. The parallel typically run along with the various other employed because standby to make certain advertising and marketing method run stability. This method consists of this microcomputer keeping track of and PLC control section. The actual control perform in relation to apparatus is mainly achieved by PLC, PC business control computer tidies up apparatus The actual managing condition keeping track of with the apparatus, belt managing deviation keeping track of and car accident file perform tend to be achieved by PC. The look connected with PLC consists of 3 pieces this equipment design and style, software design and style, the program design and style. PLC design and style primarily finds out the suitable scientific demands with the advertising and marketing method. (Zhang Jijie et al., 2011)

From journal titled 'Proposed industrial concept for automating a food production process using PLC' mention that automating any foodstuff generation practice through creating the automatic method in line with the technological know-how in the programmable logic controller (PLC) to fix the troubles. The primary problem is usually to control precisely the volume of funds that may be crammed inside a solution moulds over a conveyor belt which revolves inside a unique speed. The other problem is usually to keep an eye on virtually any deviation inside speed in the conveyor belt that will moves the product and gives any warning indicate for the owner in the instance of virtually any deviation. The particular simulation style contains two pieces, the very first is this control associated with moulding practice and the second portion could be the keeping track of in the movement speed of this practice. (Thabet el al., 2013)

From journal titled ‘Study of Synchronous Automatic Speed Control System Based On the Motors Driving Conveyer’ stated that the particular rotary encoder is usually used in order to identify the particular motor’s pace, trials along with explanations various generator data transfer speeds throughout the PLC along with changes the particular motor’s pace by means of programmed regularity converter, to ensure the line of the particular drives-electrical are renewed in order to sense of balance. Because central of the manage method, PLC will get the particular alerts on the spot, along with executes the particular stressful path. This manage plan ought to be made specific and also dependable so that the method can figure properly within the normal along with unnatural statuses.

When the method is usually working, every rotary encoder yields certain quantity involving pulses (actual range speed) in a few occasion which might be placed in the particular mainframe involving PLC. As soon as the inner running, the particular distinction of each energy motor’s rotary pace comes out, along with following the determining, the particular end result info is usually transformed into simulated benefit (0-10V) which can be insight on the regularity converter by means of C200H-DA003 simulated benefit end result element so as to alter their end result regularity as well as the revolving pace of the energy generator is usually modified. (You Wenqiang et al., 2011)

## **2.1 Micro Controller**

A micro controller is the most important part of the most. It is like a heart of the project, to control almost part of the project. Almost the journal mention important of the controller for every project. A programmable logic controller is an electronic computer employed for automation associated with generally industrial electromechanical techniques, like control associated with equipment in manufacturing facility set up traces, leisure flights as well as mild fixtures. PLC utilized in lots of devices in lots of industries.

PLC are made with regard to a number of plans associated with electronic and also analog inputs and also components, extensive temp amounts, health to help electric noise, and also weight to help vibration and also effect. Programs to manipulate appliance procedure can be saved throughout battery-backed-up as well as non-volatile storage. Some sort of PLC will be an example of a "hard" real time program considering that result effects has to be produced in reply to input disorders in a restricted time period, or else unintended procedure may outcome. PLCs tend to be programmed using program application in personal computers which often today represent the particular judgement throughout image form rather than figure symbols.

The particular programming application allows admittance and also modifying from the ladder-style judgement. Generally the application offers functions with regard to debugging and also troubleshooting the particular PLC application as an example by means of mentioning helpings from the judgement to indicate latest reputation in the course of procedure as well as by way of simulation. In a few types of programmable controller, this software will be shifted from the pc to the PLC via a programming aboard which often produces this software in a removable processor like an EPROM as well as EEPROM. The particular operation from the PLC should consist of sequential exchange control, motions control and course of action control and dispersed control programs. The information managing, storage, running electric power, and also communication features associated with some modern day PLC tend to be about similar to desktop computer.

Based on previous study, there have three control methods for programming:

- a) Programmable Logic Control (PLC)
- b) Peripheral Interface Controller (PIC)
- c) ARDUINO

### 2.1.1 Programmable Logic Control (PLC)

The programmable logic control, PLC as shown in Figure 2.2 is really an electronic digital personal computer employed for automation involving typically commercial electromechanical techniques, like command involving devices on manufacturing area assembly outlines, leisure voyages or even mild fittings.



Figure 2.2 : PLC Controller

The advantages of PLC are:

- a) Easy to troubleshooting. A PLC program can be test inside a lab
- b) Easy in order to develop applications by means of real world simulation
- c) Simple to monitoring inputs and outputs using HMI devices and from PC
- d) Flexibility because single PLC can operate many machines
- e) Easy correcting errors because is short and cost effective
- f) Visual observation. When run a program a visual operation show on the screen
- g) Rugged along with made to stand up to vibrations, temperature, dampness and noise

The disadvantages of Programmable Logic Controller are:

- a) PLC are designed by semiconductors which are depends on thermal characteristic
- b) Too much wires connector
- c) Difficult in finding errors so it requiring skilful work force
- d) High cost depend on quantity

In a journal titled 'On the Implementation of Industrial Automation Systems Based on PLC' mention of which PLCs usually are these days largely made in the different languages in the IEC 61131 typical that are certainly not willing to satisfy the new problems involving generally dispersed automation techniques. A good event-driven approach is actually offered to boost the style involving business handle techniques utilizing business oriented PLCs. With a lower degree, essential sequences usually are coded within simple software package objects, known as operate hindrances, delivering their particular functionalities because providers. (Basile et al., 2013)

In journal titled 'An Embedded PLC Development for Teaching in Mechatronics Education' mention that programmable logic controllers (PLCs) are any specialised style of embedded methods accustomed to command products in addition to processes. In contrast, PLCs have got offered flexibility, increased dependability, far better connection possibilities, more rapidly result occasion, in addition to simpler troubleshooting. So far, PLCs are already mostly associated with fascination with regard to manufacturing command engineers of which released, designed, in addition to standardised their unique design techniques in addition to coding 'languages'. (Pratumsuwan, P. and Pongaen, W, 2011)