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TJ223.P76 .N67 2010.



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Beverage can vending machine / Norjuliana Juhari.

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**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**  
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**(FKE)**

**FINAL REPORT**  
**FINAL YEAR PROJECT 2 (FYP II)**  
**BEKU 4983**

**‘BEVERAGE CAN VENDING MACHINE ’**

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**(B010710048)**

**MEI 2010**

# BEVERAGE CAN VENDING MACHINE

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A report submitted in partial fulfillment of the requirements for the degree of Electrical  
Engineering (Industrial power)

Faculty of Electrical Engineering  
UNIVERSITI TEKNIKAL MALAYSIA MELAKA  
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**“I hereby declare that I have read through this report entitle “ Beverage can vending machine” and found that it has comply the partial fulfillment for awarding the degree of Banchelor of Electrical Engineering (Industrial power)”**

**Signature**

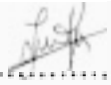


.....

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**Date : 10 MAY 2010**

I hereby declare that this report entitle “Beverage can vending machine” is the result of my own work research except as cited in the references. The report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature :  .....

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Date : 11/5/10 .....

## **DEDICATION**

**“For my beloved mum and dad, Zaini bt Ahmad and Juhari b. Shafiei ”**

## ACKNOWLEDGMENT

Assalamualaikum warahmatullahi wabarakatuh....

A project of this size could not have been completed without help from variety of capable and concerned individuals. First and foremost, I am indebted as always to my coordinator En.Ahmad Aizan b. Zulkefle who has contributed a lot of idea and advices, and can be said as main reference for me in order to go through this project. His support and guidance give me strength to accomplish this project. Thanks also goes to En.Zulhani and Dato' Rudin for giving me a good comment and ideas during the project seminar. The comments and ideas will help me to improve the project in future.

Special thanks go out to my family and friends for their constant support and patience. I would also like to thanks the staff of FKE for their "behind the scenes" effort on helping me, and all the peoples who deserve special recognition.

Indeed, throughout the whole process in implementing this project, many problems occurred, but it did not stop me from working hard. In fact, the problems has become the strength for me to worked even harder, in order to make sure that this project is going the way it should be.

Thank you.

## ABSTRACT

Vending machine represent an automatic seller machine, where about buyer enough enter a number of coin to get the product wanted which is there are in the vending machine. Beverage can vending machine is the machine that dispense a several types of beverage contained in aluminum can to the customers. The purpose of this invention is to reduce the time of buying a drink and makes the dispensing process become easier and faster. The automatization mechanisme arranged by electronic system of vending machine controller, commisioned among other things to identify the entered coin type, accomodating coin if happened transaction, releasing coin if happened the transaction cancellation, and release the product if happened transaction. The coin detector will verify the coin inserted into the coin slot, then the indicator will light up if the coin is enough for the transaction. Press the switch that function as selection button for the drink. Drink will fall down through the delivery chute to the release latch. the Implementation use the PLC as especial brain at vending machine controller, while for the configuration of this device use the software CX-Programmer from OMRON. This machine hopefully will be a great invention that will help people to make their life better infact, improving the marketing strategy

## ABSTRAK

*Vending machine* mewakili mesin penjual automatik, di mana pembeli memasukkan sejumlah syiling untuk mendapatkan produk yang terdapat di dalam *vending machine* tersebut. *Beverage can vending machine* ialah mesin yang menjual beberapa jenis minuman di dalam tin aluminium kepada pelanggan. Matlamat ciptaan ini adalah untuk mengurangkan masa untuk membeli minuman di samping membuatkan proses pembelian menjadi lebih mudah dan cepat. Automatik mekanisma disusun oleh sistem elektronik pengawal. Pembayaran selain dari itu mengenalpasti jenis syiling yang di masukkan, menerima syiling jika berlaku transaksi, melepaskan syiling jika transaksi batal, dan melepaskan produk jika berlaku transaksi. Pengesan syiling akan mengenal pasti syiling yang dimasukkan ke dalam alur syiling, kemudian lampu akan menyala jika syiling sudah mencukupi untuk transaksi. Tekan suis yang berfungsi sebagai butang pilihan untuk minuman. Minuman akan di jatuhkan melalui pelongsor penghantaran ke pintu pelepas. Penggunaan PLC sebagai otak kepada pengawal vending machine, manakala untuk konfigurasi alat ini, menggunakan perisian CX-Programmer daripada OMRON. Mesin ini diharap akan menjadi ciptaan yang hebat yang akan menolong manusia untuk memudahkan kehidupan mereka, selain memperbaiki strategy pemasaran.



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# CHAPTER 1

## INTRODUCTION

### 1.1 Project Overview

This project is mainly about to design a beverage vending machine that dispenses a few types of beverage contained in aluminum can. Machine will start to operate when the customers inserted the coin and selected their drink. The beverage will be chute down to customers after a few seconds. This machine will give change after successful trade, and return money back if the trade fails.

Vending machine represent an automatic seller machine,where about buyer enough enter a number of coin to get the product wanted which is there are in the vending machine.The automatization mechanisme arranged by electronic system of vending machine controller,commisioned among other things to identify the entered coin type,accomodating coin if happened transaction,releasing coin if happened the transaction cancellation,and release the product if happened transaction.Implementation use the PLC as especial brain at vending machine controller,while for the configuration of this device use the software CX-Programmer from OMRON.

The first recorded reference to a vending machine is found in the work of Hero of Alexandria, a first-century engineer and mathematician. His machine accepted a coin and then dispensed a fixed amount of water. When the coin was deposited, it fell upon a pan attached to a lever. The lever opened up a valve which let some water flow out. The pan continued to tilt with the weight of the coin until it fell off, at which point a counter-weight would snap the lever back up and turn off the valve.

Despite this early precedent, vending machines had to wait for the Industrial Age before they came to prominence. The first modern coin-operated vending machines were introduced in London, England in the early 1880s, dispensing post cards. The first vending machine in the U.S. was built in 1888 by the Thomas Adams Gum Company, selling gum on train platforms. The idea of adding simple games to these machines as a further incentive to buy came in 1897 when the Pulver Manufacturing Company added small figures which would move around whenever somebody bought some gum from their machines. This simple idea spawned a whole new type of mechanical device known as the "trade stimulators". The birth of slot machines and pinball is ultimately rooted in these early devices.



Figure 1.1: A vending machine made in 1952.

Vending has gone through significant changes over the decades. Many machines are still evolving to take credit cards and monitor machines from a far. With consumers wanting quick and convenient access to competitively priced products, the vending industry has seen a great deal of growth over the last ten years. Vending offers new entrepreneurs a way to start businesses which can grow quickly. Snack, beverage, candy and food vending machines continue to be the most lucrative and stable in the market place. New innovations in service vending machines include internet kiosks and DVD vending. Cashless vending now allows consumers to use debit cards or precharged 'keys' such as the U-Key for added convenience. Vending is a multi-billion dollar industry, and growing.

## **1.2 Objectives**

The main aim of this project is to produce a beverage vending machine. Vending machines are just one of the modern conveniences in the world because these machines allow customers to purchase items without having to stand in line and check out at a store.

### **1.2.1 To produce a machine that will save people time**

Nowadays, people were so busy with their own tentative such as study, working, and so on. Sometimes, don't have enough time to take their drink.. Consumers will be able to purchase items like drinks and snacks on the go, which will save them time throughout the day.

### **1.2.2 To produce a portable and compact features of vending machine**

- Don't need a huge space to locate it. This vending machine is portable, and can be place anywhere. So people can have their drink anytime and anywhere whether at railways station, hospital, collage, malls, or as well as in the companies.

### **1.2.3 To produce a bussiness in the whole day**

- Bussiness people want to make money in each time they breath. So, with the implement of this machine, the dispensing process will be held for the whole day and no times limit. This vending machine is ready to serve, 24 hours.

### **1.2.4 To save cost**

- This machine doesn't need workers to operate it, except for the machine maintenance once in a while. So, don't have to waste money to pay the workers salary.

### **1.2.5 To make purchasing process become easy**

- The invention of this machine make the dispensing process become more easier. Just follow the instruction, and the items will be directly dispense to the customers.

### 1.3 Scopes

Generally, each project has its own scope as the limit of the project. In order to accomplish this project, there's a few scope that have been stated, so that the project are not out of the borders.

- Dispenses a beverage cost for RM 0.50 cent each. Accept only RM 0.10 cent, RM 0.20 cent and RM 0.50 cent.
- Analyze the Implementation of infra red and inductive sensor to detect the presence of coins that have been inserted into the coin slot.
- Design a program for coin detection using programmable logic controller (PLC).  
- CX PROGRAMMER

### 1.4 Problems statement

Nowadays, people are so busy with their own tentative. Until don't even have time to go the cafe or restaurants to buy their drink. At certain place such as hospital, the cafe is quite far from the ward. So, it's become a problem to the patients or visitors to buy a drink. Besides that, it's require a huge cost to built a cafe and to pay the workers salaries. So, with the implement of this machine will reduce the cost to dispense the drinks.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

Literature review is once a conceptual for analysis of a project. This is a step to find out once how to design and operation of the project. There are various methods for brew a literature review such as analysis a paper work which is related with a project. This method is very important to ensure that the project can be accomplished.

#### **2.2 CASE STUDY**

Case study is one of the alternatives to revise the method or scheme of other designer that have related title and purpose of project. This revision is done according to the systems that have similar specification with the project that will be built. There are a few types of coin detection method that already invented in the market such as:-

- Coin detector for Used in a Coin Acceptor
- Coin sensor
- Inductive coin sensor

## 2.2.1 CASE STUDY 1 (Coin Sensor Unit, by Suzo International (NL),BV)

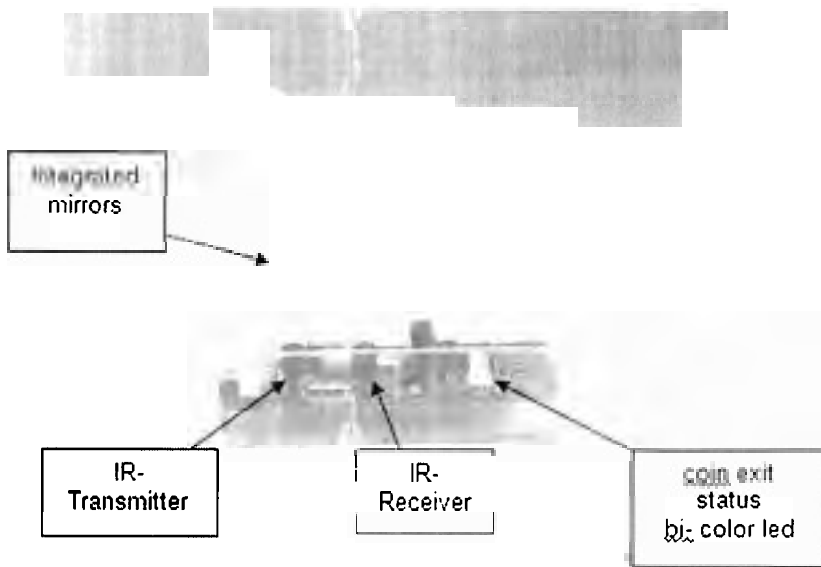


Figure 2.1 : Coin sensor front side

The coin sensor type 17-0435 was designed to be used in the Escalator hopper. But it may be used in other hoppers as well. The coin sensor is equipped with an IR-emitter and IR-receiver. The light beam emitted from the IR-led is reflected back to the IR-receiver by the integrated mirrors in the housing of the sensor, forming an U-shaped light path. When a coin passes the exit, it interrupts the IR-beam and this will activate the coin exit output signal. The IR-emitter emits pulses of 150 usec with a frequency of 820 Hz.

If a coin passes the opto-sensor, a coin exit output signal will be generated. This output is an opto-coupled isolated output. Both the collector and emitter of the output transistor must be connected to the machine. Two types of active output signals can be made:

- Active Low: connect the emitter to ground and pull-up the collector with a 10K resistor.

Active High: connect the collector to the positive power supply and pull-down the emitter with a 10K resistor.

## 2.2.2 CASE STUDY 2 (Coin detector for Used in a Coin Acceptor by Tien-Yuan Chien )

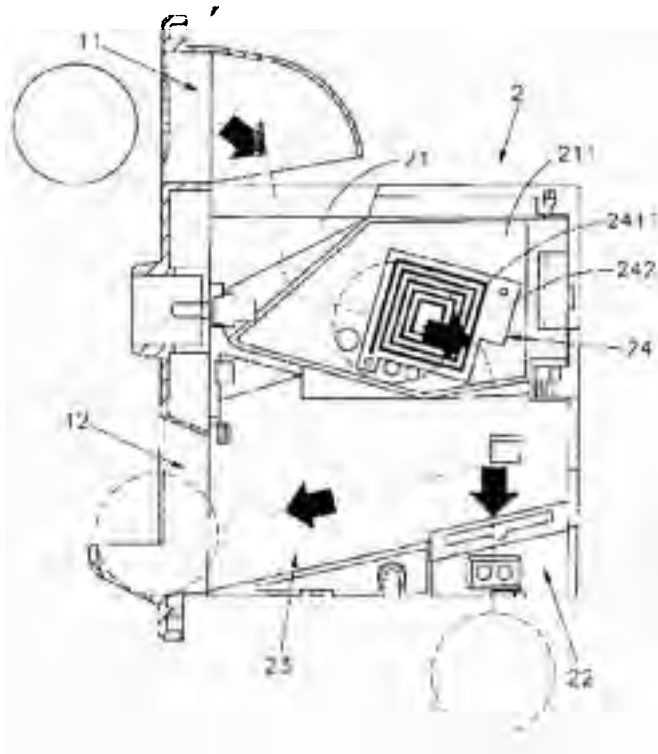


Figure 2.2 : Coin detector

A coin detector installed in the track of a coin acceptor at a back side of a face panel is constructed to include a frequency oscillation circuit, the oscillation circuit assembly being formed of two printed circuit boards symmetrically disposed at two sides of the track of the coin acceptor each printed circuit board having a spiral coil and adapted to measure the inductance value of the coin passing through, a frequency switching circuit for setting reference values, and a CPU adapted to compare the inductance value of the coin detected by the oscillation circuit assembly to reference values obtained from the frequency switching circuit so as to determine the authenticity and value of the coin detected.

### 2.2.3 CASE STUDY 3 (Coin sensor by Hiroshi Ohtomo, Iwatsuki)

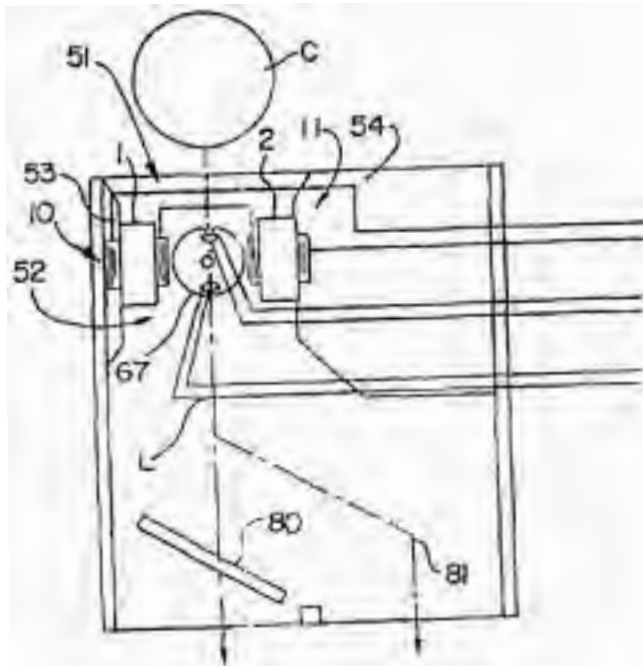


Figure 2.3: Coin sensor

A coin sensor is provided for more accurately assessing the authenticity of a coin through a vertical channel where the channel is sized to accommodate different diameter coins. In the present invention, magnetic coils are deployed on the side of the channel to measure magnetic flux, which is converted to digital signals and compared to stored values to assess the diameter, thicknesses, and material of the coin.

To reduce the tolerances associated with the varying path of the coin, the sensors have been provided with cores having generally straight and parallel upper and lower surfaces aligned perpendicular to the path of the coin to remove the variance in the overlapping coin area as the coin.