Faculty of Electrical and Electronic Engineering Technology

DEVELOPMENT OF A MICROCONTROLLER-BASED AUTOMATIC BILLING MALL SHOPPING CART SYSTEM

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Bachelor of Electrical Engineering Technology (Industrial Automation & Robotics) with Honours

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DEVELOPMENT OF A MICROCONTROLLER-BASED AUTOMATIC BILLING MALL SHOPPING CART SYSTEM

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A project report submitted
in partial fulfillment of the requirements for the degree of
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SESI PENGAJIAN: **2021**

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I declare that this project report entitled " Development of a Microcontroller-based Automatic Billing Mall Shopping Cart System " is the result of my own research except as cited in the references. The project report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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I hereby declare that I have checked this project report and in my opinion, this project report is adequate in terms of scope and quality for the award of the degree of Bachelor of Electrical Engineering Technology (Industrial Automation & Robotics) with Honours.

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Date : .....

DEDICATION

To my beloved parents, Rosli Bin Jaffar and Azizan Binti Yunos for their support and prayers. Also my siblings Muhammad Amzar Rusydi Bin Rosli always helps me with financial and moral support throughout my entire life. You are my fortune which is the most valuable thing in my life. I love you to the moon and back.

ABSTRACT

During the holidays and at the end of the week, expect a significant increase in shopping activity in towns and metropolitan areas. If there are more large offers, this proves so much more. Today, people buy a range of things and put them in the car for the day. After all, you should go to the counter to get a charge. The employee prepares the bill, which is a tedious interaction, by using standardized identification. In the long run, this results in the charging of the counters. To conquer the above, it is a task that proposes to promote a context in shopping centers. To accomplish this, all products in shopping malls and all trolleys should be equipped with RFID labels, RFID reading, and an LCD screen. If any item is in the trolley with its code, naturally, the name of the item and cost are shown on the LCD. The cost is placed on the all-out tab accordingly. If we wish to remove the item from the trolley, then the item is deducted from the added sum using similar data is transmitted to the focal charger unit. From now on, the actual trolley should be able to charge them, saving customers a tonne of time.

ABSTRAK

Di komuniti bandar metro, dapat melihat orang ramai bersiar-siar di pusat membeli-belah semasa cuti dan hujung minggu. Apabila terdapat banyak tawaran, hasilnya menjadi lebih besar. Pada masa kini, setiap orang membeli pelbagai barang dan memasukkannya ke dalam troli. Walau bagaimanapun, atas alasan pengisian, pembeli harus pergi ke kaunter. Dengan menggunakan pengenalan standard, pegawai membaca barang yang merupakan interaksi yang membosankan. Ini mengakibatkan deretan panjang di kaunter membeli-belah. Tugas ini mengemukakan rancangan untuk membina kerangka kerja di pusat membeli-belah untuk menyelesaikan masalah yang disebutkan di atas. Untuk mencapai semua ini, semua komoditi di pusat membeli-belah harus dilengkapi dengan tag RFID, dan semua troli harus dilengkapi dengan layar RFID dan LCD. Apabila seseorang meletakkan apa-apa barang di dalam troli, kodnya secara semula jadi dapat dikenal pasti. Nama dan kos item akan dipaparkan di LCD. Sepanjang masa ini, kos akan dihapuskan pada label yang lengkap. Sekiranya kami ingin menghapus item dari keranjang belanja, anda boleh menghapus item tersebut, ukuran item tersebut akan dikurangkan dari jumlah keseluruhan, dan menggunakan modul untuk mengirim data yang serupa ke unit pengisian fokus. Oleh itu, dengan cara ini, ia boleh di caj di dalam troli jalanan sebenar, menjimatkan banyak masa pelanggan.

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Ω – Ohm

V - Voltage

cm - Centimeter

lx - Lux

° - Degree

LIST OF ABBREVIATIONS

IoT - Internet of Things

RFID – Radio-frequency identification

UTeM - Universiti Teknikal Malaysia Melaka

Wi-Fi - Wireless Fidelity

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CHAPTER 1

INTRODUCTION

1.1 Background

In this quickly evolving time, the advancement of innovations is developing at a dramatic rate. Numerous organizations are putting in improvements that guarantee fulfillment for all phases of the purchase. Quite possibly the most well-known improvement advances in client support, which guarantees new and strong frameworks for customers. Shopping carts, which are likewise usually known as shopping trolleys, are a strategy of transportation for merchandise briefly before changing it out. Shopping carts have restricted changes made since their development. A significant portion of the extension has been completed to change its capability and weight. In any case, because of the improvement in innovation, a portion of the organization's examination has fostered a helpful shopping framework for clients.

For example, a board and a standardized identification scanner are attached to the shopping trolley, and the client can be educated about advancements and product areas on the board. Other than that, the standardized tag scanner will examine the purchase when the client places it into the trolley. What is more, the measure of the bill will be shown on the board display. The client will simply need to play out the installment dependent on the sum of the presentation to the clerk, without the long line of the installment technique. The improvement of the shopping cart as referenced can save the shopping season of the client, yet it requires physical routing by the client. As the goal of this task is to provide the client

with a hands-free shopping experience, the need for a self-propelled and man-made brainpower shopping trolley is unavoidable.

1.2 Problem Statement

In practical terms, these days, markets are used for a lot of things by many people together. Thing acquisition deals with an unusual methodology that includes time spent in ways, things in regions, and checkout lines. Customers usually experience a few issues and trouble during buying. These issues include agonizing over the cash which they have brought would be deficient for every one of the things bought and dispersing a ton of time the clerk.

In some examples, customers have difficulties with the lack of information about the limits and the abuse of pointless time. We can end this by replacing the inevitable normalized Widespread Item Code (UPC) with a sharp name, known as RFID. We are carrying on the broad idea of a sharp shopping cart based on RFID in the retail stock field to combat these problems.

1.3 Project Objective

There are a few goals in this study that are archive:

a) To design and develop a microcontroller-based circuit and hardware for an automatic billing mall shopping cart system.

b) To apply a Radio frequency identification (RFID) technology for object identification, which consists of an RFID reader and RFID tags.

c) To analyze the performance of the mall shopping cart system in terms of its effectiveness of product detection and automatic billing.

1.4 Scope of Project

To achieve there were several key criteria to consider for the objective of the project:

a) Only longitudinally can the tags used here be attached to the products without folding.

b) The tags applied for this project are sensitive to water and metal and can be read on one side only.

1.5 Summary

This is an important project for consumers to purchase because consumers can learn about the prices of each item, save time while paying and estimate their expenses. In the inventory, stock updates are easy for storekeepers and keep your service good. The current project has been upgraded to incorporate new RFID and barcode technologies. This chapter is about the project's overview, as stated clearly in all the project's general aspects. Different phases of the next chapter of the development of the system will be debated. Methods, outcome and discussion, conclusion, and future work are some of the topics covered in the literature reviews.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Individuals have consistently imagined and developed advancements to help with their needs since the dawn of time. The primary justification for development progress has been limiting tasks, simplifying standard errands, and speeding up, with little regard for the available spaces. Shopping is a critical task in which individuals are found to invest a critical proportion of their energy. For this, at the start, we utilized a standardized tag framework, but after certain years, it additionally began to have issues, expanding the line and so forth. To conquer these issues, an idea of a microcontroller-based automatic billing mall shopping cart system with RFID innovation was proposed.

2.2 Review of the current situation

The early system goal is to remove all inconveniences and potential from the systems and create a system that is consumer-friendly, customer-friendly, and high-activity. The system's aim would be shopper convenience and overall time potency and high performance. This goal could be achieved by mistreatment of the system enforced using RFID technology. In the current situation in supermarkets, time consumption is a major hindrance in the billing section. Customers do not have any plans regarding the current daily offers in supermarkets. Sometimes looking is completely out of the client's price range.

Keeping this in mind, a system must be developed that provides the customer with an easy-to-use interface as well as a way for vendors to endorse additional merchandise and bring home the bacon at a high profit. might be achieved through RFID technology, which

is presently in its preliminary stages. Automatic billing mall shopping cart system technology is used by vendors to capture the general merchandise sold products in supermarkets at the end of the day. Traders will stock the products in supermarkets earlier as a result of this.

2.3 Theory

2.3.1 Microcontroller

Figure 2.1 below shows that, in houses, offices, and analytics environments, microcontrollers have found widespread use. Microcontrollers are units in embedded systems that control the actions and options of the device as soon as they are managed. They usually manage one task within the device and not all the functions of the device.

Each has a package and a hardware item in the microcontroller. Currently, microcontroller microcomputers are popularly referred to as single-board computers. The field unit that is used for general computing, whereas the area unit for microcontrollers that is designed for a particular purpose, must not however be confused with microcontrollers(Kondaveeti et al., 2021).

In the long run, several companies were filled with completely different options in numerous microcontroller markets. 64-bit microcontrollers have been introduced on the market in recent years and are very popular for several applications in one-card microcontrollers. The choice of integrated circuits, the available environments suitable for the operation of those circuits, and the complexity of the programming phases have crystal rectifier users on the single card.

Given the requirements for the operation and scheduling of the microcontroller, these application development cards perform various features on their own using internal

hardware. On the other hand, microcomputers have additional system resources and interfaces so that they can perform more than one function. (Güven et al, 2017).

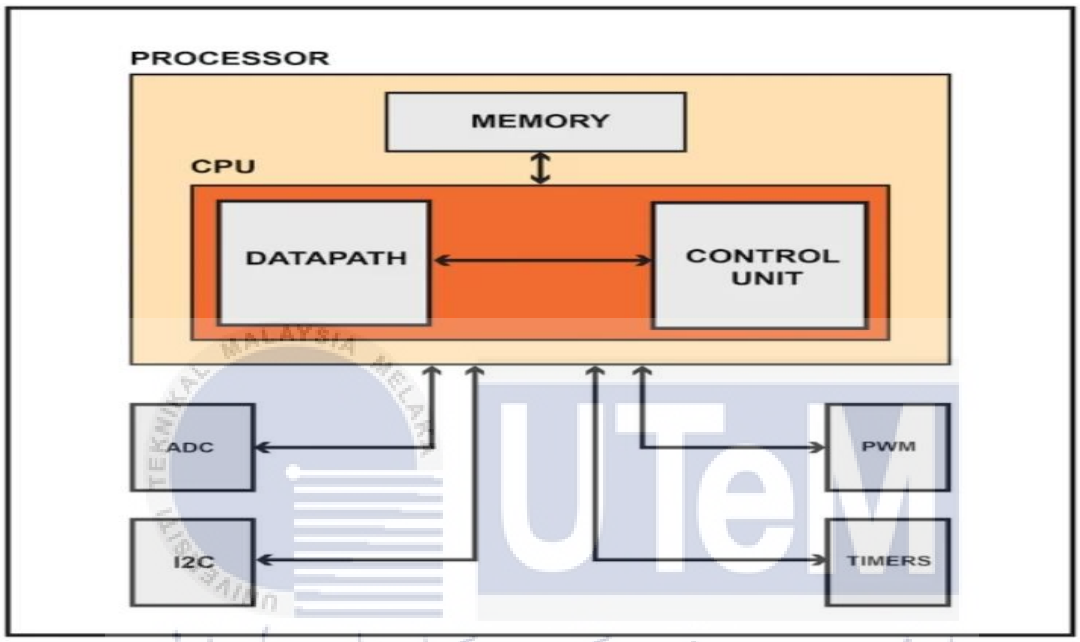

Figure 2. 1 Chart of the block Microcontroller

2.3.1.1 Arduino

By referring to Figure 2.2 below Arduino has been the most successful. Since 2005, Arduino has been producing microcontroller-based Arduino boards, associated hardware, computer code enterprise, and the user interaction community. These development panels are known as Arduino modules for the development of microcontrollers. Arduino facilitates the way microcontrollers are operated, but offers vast advantages when put together with similar systems to show students and hobbyists.

Arduino boards square measure moderately cheap not unlike alternative microcontroller development platforms. There is also a chance that a script could be uploaded to EEPROM's Arduino board and run while it isn't computer interfaced or some computer code outside of Arduino's system. (Güven et al, 2017)

This ensures that this performance is severe and highly accurate and mobile. In addition to microcontroller-based kits, Arduino boards help build digital devices and interactive bodies that do not just sense but manage real-life objects. AN Arduino itself contains the ATmega 328p or ATmega 168 microcontroller, and is part of the development of prototypes and is also supplied on this microcontroller.

A simple, easy-to-understand, and easy-to-use syntax is found in Arduino, which makes it excellent for those who are natural lovers of Cs, simplified C++, and especially for hobbyists, students, and amateur innovators. Arduino could therefore be a microcontroller conglomeration, with various necessary parts such as crystal, onboard power pins, bootloader. All these are essential to the success of the Arduino IDE's implementation of workable educational programs. (Louis, 2016)