

Market Control System

BRD

Introduced By Group19

Introduction

Executive Summary

Market Control System is a technological solution offering easy control for any market whatever how large this market is. This system offers many solutions for easy automatic control . It can also be used in houses or in any place. This system also maintains security for the market and its resources .

This system can be connected to mobile or to a database to check the inputs and the outputs of the market , to check the conditions of the place remotely or to check the security of the market . Also , the circumstances of the place can be automatically adjusted by this system.

Document Overview

This document introduces Market Control System study plan. It introduces general description, technical description, development plan, operation plan, cost analysis and marketing study.

Business Objectives

- Offers easy and effective control for the temperature.
- Offers security for the market.
- Offers remotely communication and control.
- Offers security for the market.
- Offers price searching using barcode (Kasher system)

Background

Introduction [1]

We are living in the Embedded Magic-World. We are surrounded with and become habitual to many embedded products and our daily life largely depends on the proper functioning of these gadgets. Television, Radio, CD player of your living room, Washing Machine or Microwave Oven in your kitchen, Card Readers, Access Controllers, Palm devices of our work space enable us to do many of your tasks very effectively. Apart from all these, many controllers embedded in your car take care of car operations between the bumpers and most of the times you tend to ignore all these controllers. Embedded system takes care of Mission Critical Systems (MCS) like nuclear reactor plant, production divisions, flight control etc. which are expected to run continuously for years without errors and in some cases recover by them self if an error occurs. Now a days Embedded Systems are integral part of all aspects modern life

- **What is an embedded system ?**

An embedded system is a special purpose computer system designed to perform one or a few dedicated functions, often with real-time computing constraints. It is usually embedded as part of a complete device including hardware and mechanical parts, anything that uses a microprocessor but isn't a general-purpose computer. PDAs Set-top boxes Televisions Video Games Refrigerators Cars Planes Elevators Remote Controls Alarm Systems

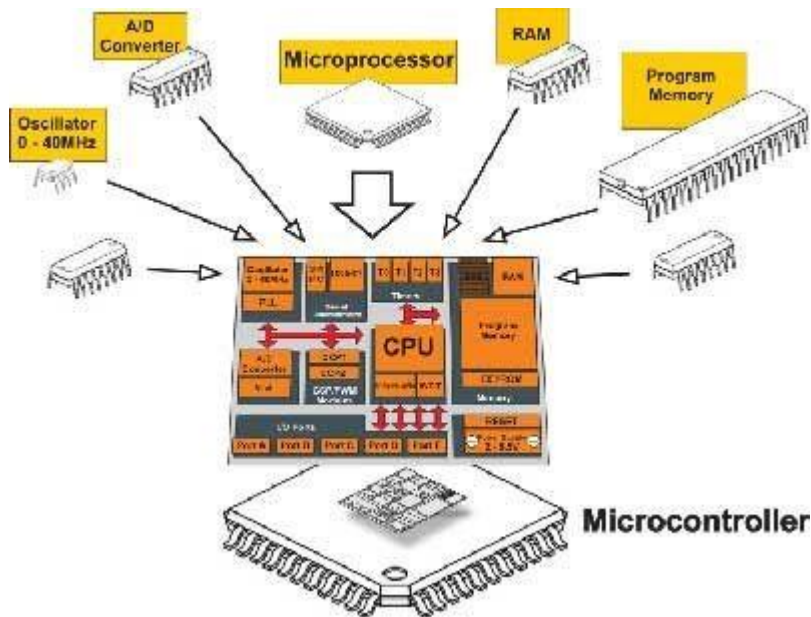
Stationary installations like traffic lights, factory controllers, or the systems controlling nuclear power plants came under these systems. Since the embedded system is dedicated to specific tasks, design engineers can optimize it reducing the size and cost of the product or increasing the reliability and performance. In general, "embedded system" is not an exactly defined term, as many systems have some element of programmability. For example, Handheld computers share some elements with embedded systems - such as the operating systems and microprocessors which power them - but are not truly embedded systems, because they allow different applications to be loaded and peripherals to be connected.

Impact

- **There are some advantages of microcontrollers are given below,**

- Low time required for performing operation.
- The processor chips are very small and flexibility occurs.
- Due to their higher integration, cost and size of the system is reduced.
- The microcontroller is easily to interface additional RAM, ROM and I/O ports.
- Once microcontrollers are programmed then they cannot be reprogrammed.

- At the same time many task can be performed so human effect can saved.
- Without any digitals parts it can be act as microcomputer.
- It is easy to use, troubleshooting and systems maintain is simple.



WHAT IS AVR MICROCONTROLLER?

Brief history

The AVR architecture was conceived by two students at the Norwegian Institute of Technology (NTH), Alf-Egil Bogen and Vegard Wollan.^[1]

The original AVR MCU was developed at a local [ASIC](#) house in [Trondheim, Norway](#), called Nordic VLSI at the time, now [Nordic Semiconductor](#), where Bogen and Wollan were working as students.^[citation needed] It was known as a μ RISC (Micro RISC)^[4] and was available as silicon IP/building block from Nordic VLSI.^[5] When the technology was sold to Atmel from Nordic VLSI, the internal architecture was further developed by Bogen and Wollan at Atmel Norway, a

subsidiary of Atmel. The designers worked closely with compiler writers at [IAR Systems](#) to ensure that the AVR instruction set provided efficient [compilation of high-level languages](#).^[6]

Atmel says that the name AVR is not an acronym and does not stand for anything in particular. The creators of the AVR give no definitive answer as to what the term "AVR" stands for.^[3] However, it is commonly accepted that AVR stands for **A**lf and **V**egard's RISC processor.^[7] Note that the use of "AVR" in this article generally refers to the 8-bit RISC line of Atmel AVR Microcontrollers.

Among the first of the AVR line was the AT90S8515, which in a 40-pin DIP package has the same pinout as an [8051](#) microcontroller, including the external multiplexed address and data bus. The polarity of the RESET line was opposite (8051's having an active-high RESET, while the AVR has an active-low RESET), but other than that the pinout was identical.

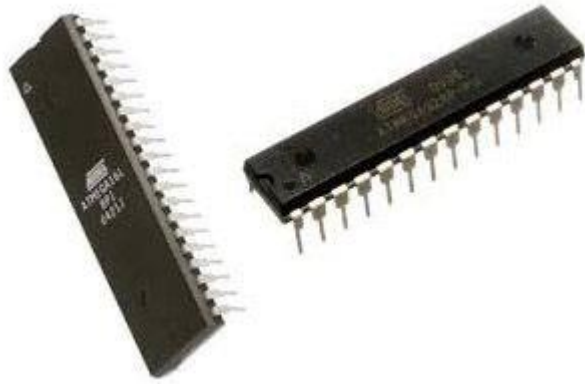
The AVR 8-bit microcontroller architecture was introduced in 1997. By 2003, Atmel had shipped 500 million AVR flash microcontrollers.^[8] The [Arduino](#) platform, developed for simple electronics projects, was released in 2005 and featured ATmega8 AVR microcontrollers.

An AVR microcontroller is a type of device manufactured by Atmel, which has particular benefits over other common chips, but first what is a microcontroller?

The easiest way of thinking about it is to compare a microcontroller with your PC, which has a motherboard in it. On that motherboard is a microprocessor (Intel, AMD chips) that provides the intelligence, RAM and EEPROM memories and interfaces to rest of system, like serial ports (mostly USB ports now), disk drives and display interfaces.

A microcontroller has all or most of these features built-in to a single chip, so it doesn't need a motherboard and many components, LEDs for example, can be connected directly to the AVR. If you tried this with a microprocessor, bang!

AVR microcontrollers come in different packages, some designed for through-hole mounting and some surface mount. AVRs are available with 8-pins to 100-pins, although anything 64-pin or over is surface mount only. Most people start with a DIL (Dual In Line) 28-pin chip like the ATmega328 or the 40-pin ATmega16 or ATmega32.



PC microprocessors are always at least 32-bit and commonly now 64-bit. This means that they can process data in 32-bit or 64-bit chunks as they are connected to data buses this wide. The AVR is much simpler and deals with data in 8-bit chunks as its data bus is 8-bit wide, although there is now an AVR32 with 32-bit bus and an ATxmega family with a 16-bit data bus.

A PC has an operating system (Windows or Linux) and this runs programs, such as Word or Internet Explorer or Chrome that do specific things. An 8-bit microcontroller like the AVR doesn't usually have an operating system, although it could run a simple one if required, and instead it just runs a single program.

Just as your PC would be useless if you didn't install any programs, an AVR must have a program installed to be any use. This program is stored in memory built-in to the AVR, not on an external disk drive like a PC. Loading this program into the AVR is done with an AVR programmer, usually when the AVR is in a circuit or system, hence AVR ISP or AVR In System Programmer.

So what is a program? A program is a series of instructions, each very simple, that fetch and manipulate data. In most applications where you would use an AVR, such as a washing machine controller for example, this means reading inputs, checking their state and switching on outputs accordingly. Sometimes you may need to modify or manipulate the data, or transmit it to another device, such as an LCD or serial port.

A series of simple binary instructions are used to do these basic tasks and each one has an equivalent assembly language instruction that humans can understand. The most basic way of writing a program for an AVR is to use assembly language (although you could write binary numbers if you want to be pedantic).

Using assembly language allows you to understand far more about the operation of the AVR and how it is put together. It also produces very small and fast code. The disadvantage is that you

as the programmer have to do everything, including memory management and program structure, which can get very tedious.

To avoid this, high level languages are increasingly being used to write programs for the AVR, C in particular but also Basic and Java derivatives. High level means that each line of C (or Basic or Java) code can translate into many lines of assembly language.

The compiler also deals with the program structure and memory management so it is much easier. Commonly used routines, such as delays or maths, can also be stored in libraries and reused very easily. The C compiler also deals with larger numbers that take up more than a byte (8-bits).

In my opinion, writing AVR programs in C is like driving a car. Yes you can do it very easily but if something goes wrong you haven't got a clue how to fix it and you can't deal with tricky situations like icy roads. Starting with assembly language and writing some simple programs lets you understand what

is going on "under the hood" so you know how it works and can get the most out of it. Then swap to C by all means but at least you know how the AVR microcontroller fits together and its limitations.

MARKET CONTROL SYSTEM

It's a system that is used in shopping centers, markets malls
, etc....

This system makes it easy for the managers to control the place circumstances, get regular feedback about the incomes and outcomes of the market and make the place much more secure.

System components

Casher system:

System can do calculation, ability to get the price of the product by its barcode, store in the memory the current amount of money in the memory and open the

locker by password,. Hence the security is enhanced and getting feedback became easier.

Air-condition System

System controls the temperature of the market by using sensors.

Security System

Dedicates to secure place with cameras inside and outside the market and with alarm devices.

Doors System

System controls opening and closing the doors of the market. The main doors open by password and the inside doors open automatically using sensors that can detect peoples motion.

Implementation of Barcoding in Businesses

The advent of barcode technology has greatly reduced the hassles of tracking supply and commodity sale records for retailers across the globe. Over the years, the technology has been consistently improved and made more efficient. Currently, barcode solutions are being used across various domains owing to their exponential capabilities in systematically recording information such as product count, date of manufacturing, date on which the product was supplied to the retailer and selling price. Moreover, the emergence of e-commerce and intra-regional markets that offer specialised services to a wide range of sectors has further

expanded its application base. Future Market Insights (FMI) in its latest report titled “**Barcode Scanner Market: Global Industry Analysis and Opportunity Assessment, 2017–2027**” reveals that use of barcode technology is rapidly rising in both retail and manufacturing industries. Barcode scanners have become one of the best solutions for recording product information without making any major manual effort. The technological advantages and cutting-edge features of barcode scanners are also making them popular in the healthcare industry. Barcode technology can help rectify medication errors, medical practitioners and physicians can easily get information about medicines as well as their manufacturing dates.

The report further cites that the global [barcode scanners market](#) will expand at a CAGR of 7.6% over the forecast period (2017–2027) and account for US\$ 10.8 Bn by 2027-end. During the same duration, the market is also expected to reflect a CAGR of 6.4% in terms of volume, reaching 38.7 Mn units over 2027-end. Around 20.7 Mn units of barcode scanners are expected to be sold by the end of 2017.

Additional Highlights of the report Include:

In 2017 and beyond, laser-based scanner is expected to remain as the prime technology. Laser scanners are widely used in regions with established manufacturing and retail sectors such as Western Europe and North America. By the 2017-end, laser scanners are estimated to accounts for 32.3% revenue share of the market and will continue to be the most preferred barcode reader technology throughout the assessment period. However, camera-based reader is anticipated to see the fast adoption as these scanners are innovative and configured with advanced 2D imaging technology. Based on product type, portable/handheld scanners are expected to remain top choices of barcode scanners amongst consumers over the forecast period. Owing to characteristics such as faster print speed and versatility, demand for portable/handheld barcode scanners is rapidly increasing in various parts of the world. Use of barcode scanners in the retail and commercial sector continues to be the highest and is expected account for a major chunk of revenue over the forecast period. Meanwhile, the healthcare industry is swiftly adopting the barcode technology as well.

Amongst regions, markets in Asia Pacific excluding Japan (APEJ) and North America are expected to exhibit high growth potentials. In APEJ, China and India are projected to achieve impressive growth of their barcode scanner market. By 2017-end, the region is projected to account for a revenue share of 29.5%, which is expected to increase to 33.8% towards the end of the forecast

period. Market players are targeting APEJ as their key sales region. Zebra Technologies Corporation, Honeywell International Inc., DataLogics S.P.A, Cognex Corporation, OCOM Technologies, Wasp Barcode Technologies, JC Square Inc., SATO Holdings Corporation, Scandit AG and Toshiba TEC Corporation are some of leading companies profiled in the FMI report.

Top Eight Benefits of Barcodes

Barcodes are often overlooked as a method for cutting costs and saving time. A valuable and viable choice for businesses looking to improve efficiency and reduce overhead, barcodes are both cost-effective and reliable.

1. Barcodes eliminate the possibility of human error. The occurrence of errors for manually entered data is significantly higher than that of barcodes. A barcode scan is fast and reliable, and takes infinitely less time than entering data by hand.
2. Using a barcode system reduces employee training time. It takes only minutes to master the hand-held scanner for reading barcodes. Furthermore, employees do not have to gain familiarity with an entire inventory or pricing procedure. This also makes employee training less expensive, since they do not have to be paid for extra training time, and another employee does not have to be compensated for training them.
3. Barcodes are inexpensive to design and print. Generally they cost mere pennies, regardless of their purpose, or where they will be affixed. They can be customized economically, in a variety of finishes and materials.
4. Barcodes are extremely versatile. They can be used for any kind of necessary data collection. This could include pricing or inventory information. Additionally, because barcodes can be attached to just

about any surface, they can be used to track not only the products themselves, but also outgoing shipments and even equipment.

5. Inventory control improves. Because barcodes make it possible to track inventory so precisely, inventory levels can be reduced. This translates into a lower overhead. The location of equipment can also be tracked, reducing the time spent searching for it, and the money spent replacing equipment that is presumed lost.
6. Barcodes provide better data. Since one barcode can be used for inventory and pricing information, it is possible to quickly obtain data on both. Furthermore, barcodes can be customized to contain other relevant information as needed. They provide fast, reliable data for a wide variety of applications.
7. Data obtained through barcodes is available rapidly. Since the information is scanned directly into the central computer, it is ready almost instantaneously. This quick turnaround ensures that time will not be wasted on data entry or retrieval.
8. Barcodes promote better decision making. Because data is obtained rapidly and accurately, it is possible to make more informed decisions. Better decision making ultimately saves both time and money.

Both inexpensive and user-friendly, barcodes provide an indispensable tool for tracking a variety of data, from pricing to inventory. The ultimate result of a comprehensive barcoding system is reduction in overhead.

System Description

How does a supermarket control its inventory?

The computer knows what is supposed to be in the store, and where it is. So many are supposed to be on the shelf, the rest are in one (ideally) or more locations in the stockroom.

As merchandise is purchased, scanning the UPC bar code on each product informs the computer of what has been sold. It will regenerate a replenishment list of what needs to be pulled out of the stockroom, if any is there, and placed out on the sales floor. If the quantity on hand falls below a certain amount, then an order for at least another case is automatically made.



The Module of Operations

Account Configuration:

Items: Here the Admin can add any new items present in the supermarket. He also has the right to modify or delete it from the database.

Stock entry: The items bought from the vendor will be entered here and this will be added to the stock.

FUNCTIONS OF THIS SYSTEM:

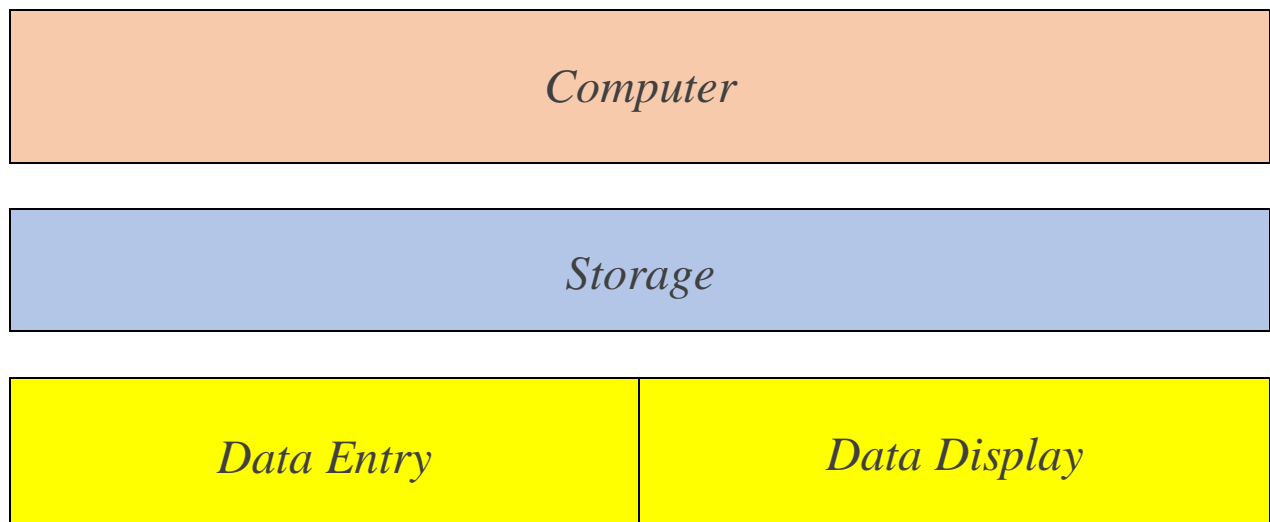
This system provides list of various products

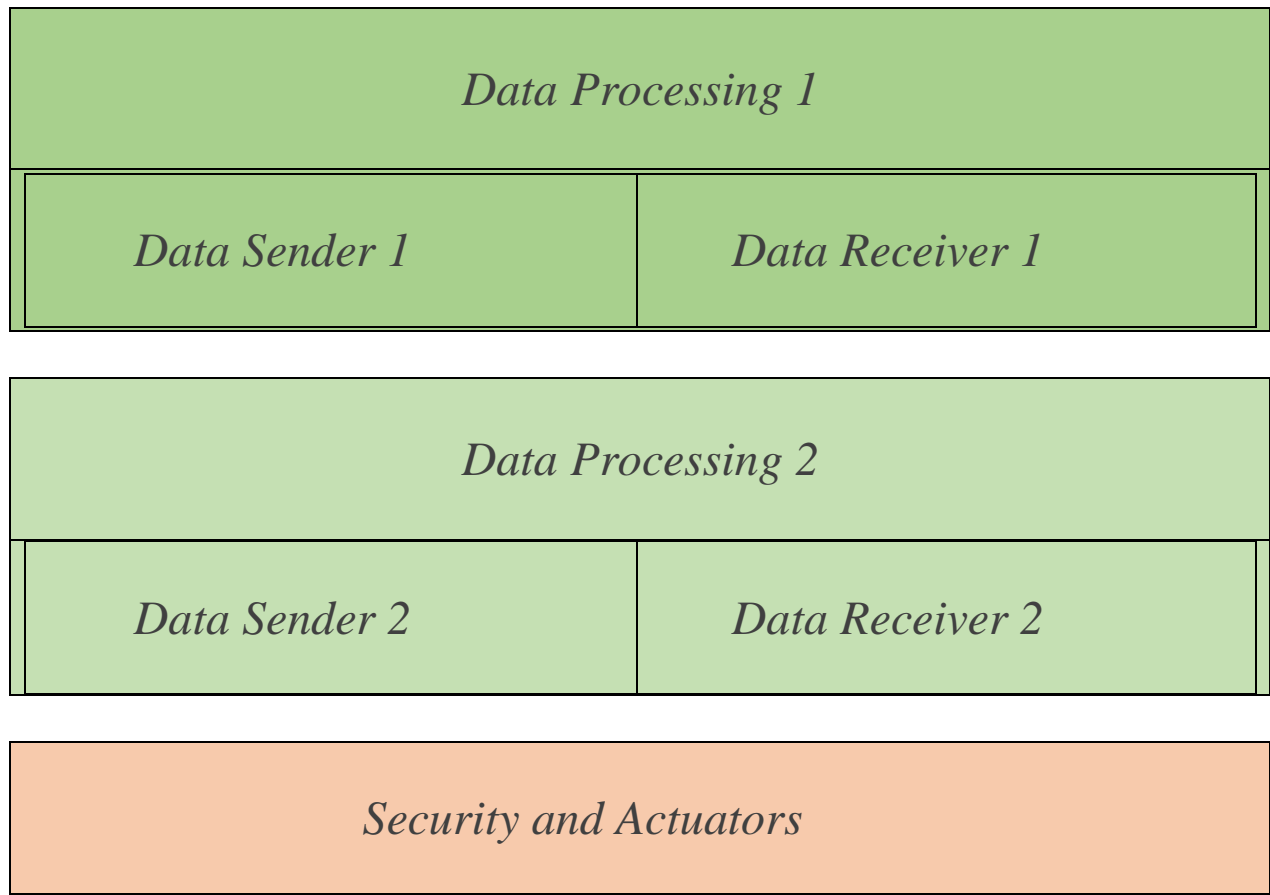
System Architecture

Market Control system offers many services and provides storage to store data used in Kasher system and to save the passwords used to lock the doors or the lockers of the market. Also it uses 2 processing units to analyze the data and take actions according to this data. Also, it can use modules to send data to mobile to enable remotely control.

The system consists of following modules:

1. Computer to update data
2. Storage
3. Data Entry
4. Data Display
5. Data Processing 1
6. Data Sender and Receiver 1
7. Data Receiver and Sender 2
8. Data processing 2
9. Security and Actuators





Computer

We will use a computer to create a .text file so we insert in this file the names of the products and their prices ,and using the programming we will give the microcontroller commands to store these info in the storage. Also ,we can easily update the information in this file.

Storage

We will use external EEPROM to store : the names of the products and their prices and the passwords of the internal doors and the lockers .

Data Entry

We will use a Keypad to allow the security manager to set the password of both the doors or the lockers .

Data Display

We will use LCD module so that the Microcontroller displays instructions to interact with the client and displays some choices so the it takes actions according to the choices of the client. It is used to display the numbers entered by the client wither to set or change the password ,or to enter the barcode of a certain product to get its price displayed on the screen.

Data Processing 1

We will use a Microcontroller that takes the instructions from the client entered through the keypad and takes actions according to these instructions .

Data Sender & Receiver 1

In the microcontroller there is an embedded USART module , we will use it to interact with the second microcontroller : sending and receiving data.

Data Processing 2

We will use a Microcontroller that receives the data from the first one and taking action according to these data . It will either send data to the first one if it asked about the correctness of the password or the price of a product or turn on the alarm if there is a robbery on the market.

Data Sender & Receiver 2

In the microcontroller there is an embedded USART module , we will use it to interact with the first microcontroller : sending and receiving data.

Security & Actuators

This system will be provided with an alarm which will be turned on if there is a robbery , and actuators will be used to open the locker if the entered password was right.

System Features

- Input data
- Simple output
- Customer's change calculation
- Security
- Handling wrong data
- Sale rate for all products
- Storage data
- Low priced
- Temperature indication
- Robust Hardware
- Maintenance ease
- Electricity and batteries usage

Data Input

The data entered may be a product barcode or new product data like price and par code. The Barcode consists of 6 decimal digits so the product numbers that can be entered in the system are too much. Also the price has six decimal digits. The data entered by a key pad; it's very simple.

Simple output

The output will be very simple; the screen used is Nokia LCD. When you get started you have to enter the password then the menu appears, now you have many options, you can check the product price by its barcode, making receipt, adding new product, modify a product data, modify password or product rating.

Customer's change calculation

The system has a simple calculator to calculate the receipt, it is flexible and any modification on the receipt automatically modify the net balance, also you can use it as a calculator, There are many times you will find yourself in need to make a quick decision in front of a customer; this is going to help you too much.

Security

It is important to acknowledge that all new systems do have some levels of risk when it comes to security. To access the safe you have to enter a password; if the entered password is wrong three times in series, an alarm will operate as indication to an unsecured activity. To modify the product data-the price for example- you have to enter another password but there is no alarm in this case, just try after certain time which increases after every wrong entry.

Handling wrong data

The entered data must have a certain value barcode or price with constraints that are mentioned in the input section, but if the data is out of the constraints the system doesn't fail; it just gives out a message to enter the data again.

Sale rate for all products

You may buy similar product from different companies; so you need to know what's sold more than the other so that you buy from that one company, the system gives you the availability for such a process.

At any time you can check the sale rate for any product at a day or month, sale rating will be the number of sold products at a certain time.

Data Storage

You can store many products' data on the system and it will be safe if the system fails, the data is the product data, sale rate and the net balance also you can clear or modify any data, just enter the password and do what you like.

Temperature indication

For sure you want to protect your market from any accident; and the most accident you may face is the fire. The system has a temperature sensor always displays the temperature on the LCD and operates the alarm at a certain temperature which will indicate to a fire, then the system will stop automatically

Low priced

The system is multi-functional; it is not only a cashier machine, it also can work as a fire alarm. So you don't have to buy two systems to perform such a functionality because you have all you need in such one system. Even the components are very cheap; just key pad, LCD, controller and some simple electronic components. The net price is nothing compared to the value from such a project.

Robust Hardware

Your hardware is going to get handled by lots of people, and most of the time their hands will be covered by food and stains. You want hardware capable of holding up to the task, so that you don't have to replace it every couple of years. So the hardware will be strong enough to work under stress which will help you not to buy new one or even think of its maintenance.

Maintenance ease

Knowing the fact that our system is reliable and can handle many things, but surely it will need a periodic maintenance check to make sure of the best performance. The point is the technology used is not that complicated; so it will be an easy process to maintain such a system

Electricity and batteries usage

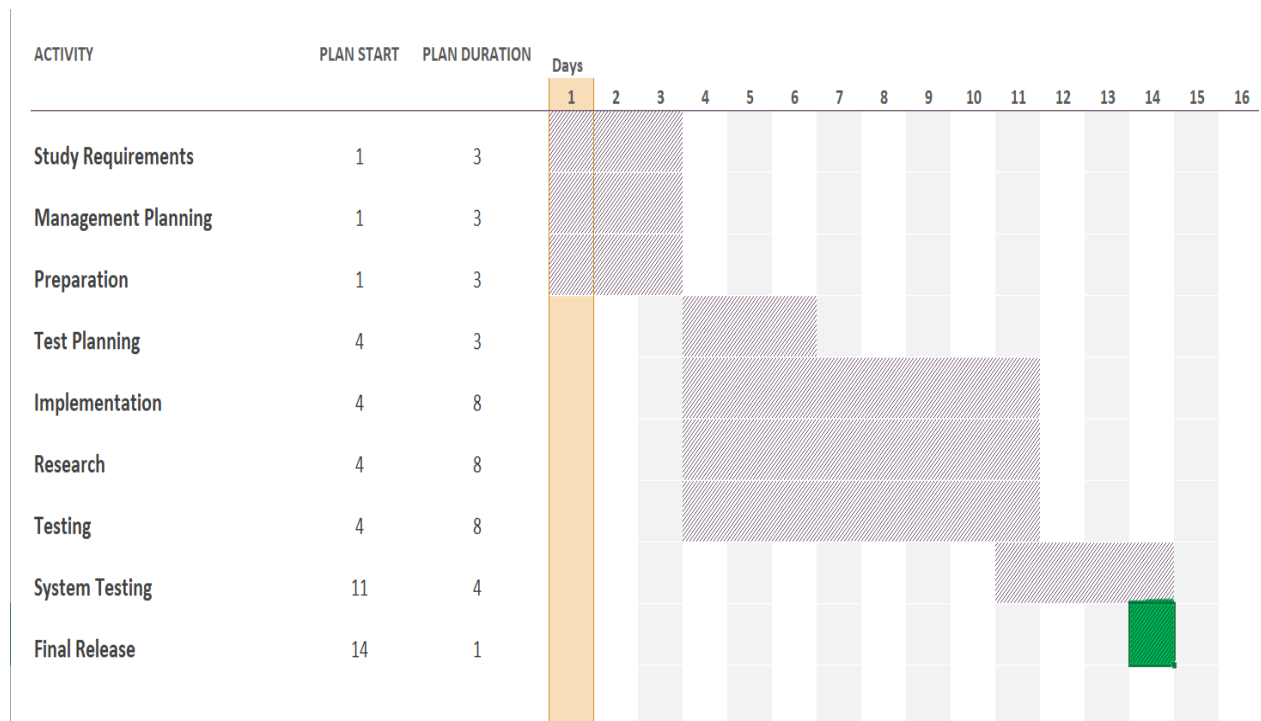
There are too many technologies you may find to perform such a task, but there is always a concern which is how much you will pay for its electricity consumption. The system needs 5 volts which is low voltage, you can use a battery or adaptor for such a purpose. This will help largely in decreasing the electricity consumption then the extra costs.

System Development and Operation:

Overview:

The system is developed using Agile Technique . Initially , R&D is applied to tools and techniques that are intended to be used . Later , during development phase , continuous R&D will take place alongside the development . First prototype will be available by the end of the second week . On finishing this prototype , the system should enter an initial operation phase that lasts for six weeks . During that time , development team will be communicating and getting feedback from operating and business teams to make sure that the system fulfills all agreed requirements and will be solving any stuck issue . Lastly , system will enter final operation and maintenance phase during which indirect technical support will be provided by a minor development team .

1. Development Plan:



2. Operation Plan:

ACTIVITY	PLAN START	PLAN DURATION	PERIODS									
			1	2	3	4	5	6				12
Marketing	1	12										
Operation	1	12										
Maintenance	1	6										

3. Team Structure:

Team	Role	Number of Members
Management Team	Project Manager	1
Business Team	Business Analysts	1
	Marketing Members	1
Development Team	Team Leader	1
	R&D Engineers	2
	System Developers	4
	Quality Assurance Engineers	1
Testing Team	Team Leader	1
	Quality Control Engineers	2
Operation Team	System operator	2
Maintenance Team	Team Leader	1
	Developer	3
	QC Member	1

4. Tools:

Market Control System will be developed using open source tools, languages and servers. Commercial tools will be used in case there is no open source alternative. This will decrease the cost especially for long term operation.

While development only online tools will be used for management, tracking, testing and source control. This will increase the collaboration between team members even they are not located at the same place. Also, this will allow external teams and members to participate.

Operation	Recommended Tool
Source Control & Versioning	Git,GitHub
Tasks & Issues Tracking	GitHub
IDE	Atmel Studio
Programming Language	C

5. Cost:

The Project is expected to cost 30000 EGPs.

6. Assumptions:

The system completely depends on free open source tools and languages.

Appendices

Appendix A: Mazidi text book

References

1. www.extremeelectronix.com
2. www.maxembedded.com
3. www.academia.edu/10159567/DESIGN_AND_IMPLEMENTATION_OF_SUPERMARKET_MANAGEMENT_SYSTEM