CHAPTER TOW

LITERATURE REVIEW

2.1 Introduction

The advancement and progress of nations is measured by the possibility of their use and application of latest invented technologies in all aspects of life. Control engineering is one of the aspects which have been given a great deal by many researchers. It became to a great concerns in many areas such as industry, agriculture, medicine, education and infrastructure. Automatic control systems have emerged as an integrated part in telecommunications, electricity, fuel and other applications. This research is devoted to the use of control systems in parking systems. The control system will play a major role in organizing the entry to and exit from the parking lots. In the modern world, where parking-space has become a very big problem, it has become very important to avoid the wastage of space in modern big Automatic rotary car parking system helps to minimize the car parking area companies and apartments.

There are two major types of car parking systems: traditional and automated. In the long term, automated car parking systems are likely to be more cost effective when compared to traditional parking garages. Automated car park systems are less expensive. Since they tend to require less building volume and less ground area than a conventional facility with the same capacity. This research is devoted to the automated rotary car parking system.

2.2 Types Of Car Parking

There are many types of car parking system we have mention five types:

2.2.1 On street parking

On street parking means the vehicles are parked on the sides of the street itself. This will be usually controlled by government agencies itself. Figure (2.1) shows on street parking.

Figure 2.1 On street

2.2.2 Off street parking

Off street parking means vehicles are parked off the street. And this will be usually controlled by commercial. Figure (2.2) shows off street parking.

Figure 2.2 Off street

2.2.3 Parallel parking

The vehicles is parked along the length of road, here there is no backward movement involved while parking or un parking the vehicle. Hence, it is the safest parking from the accident perspective. However, it consumes the maximum curb length and therefore only minimum number of vehicles can be parked for a given kerbed length. This method of parking produces least obstruction to the on-going track on the road since least road width is used. Figure (2.3) shows parallel parking.

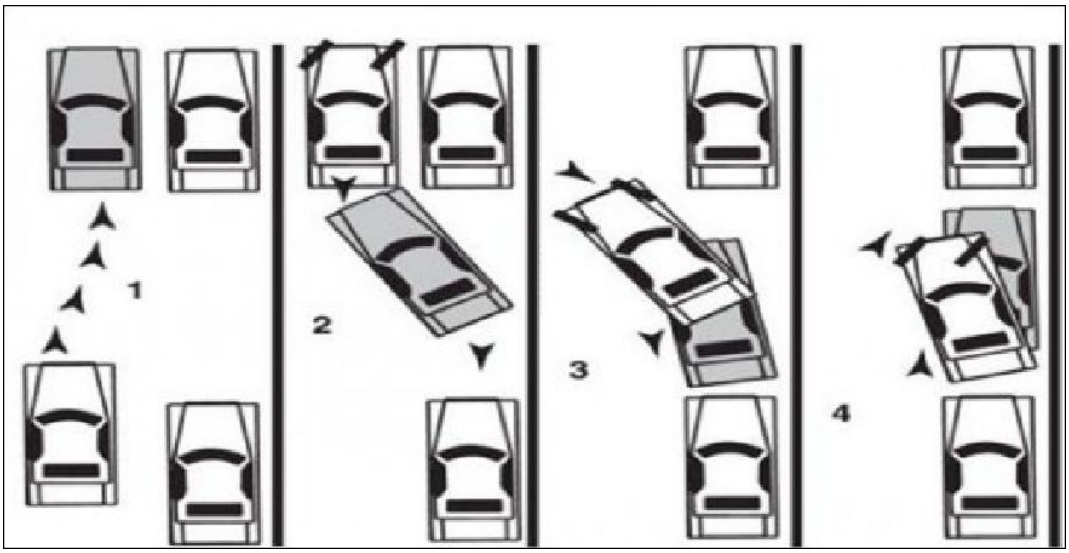

Figure 2.3*Parallel* Street

2.2.4Angle parking

It is parking spaces that are at an acute angle to the kerb or wall. In almost all cases you drive in forwards and reverse out. The reversing part is dangerous because the view up the road is obscured by the rear pillar. For this reason, cyclists pay special attention to vehicles when they are cycling past angle parks. As the angle of parking increases, more number of vehicles can be parked. Figure (2.4) shows angle parking.

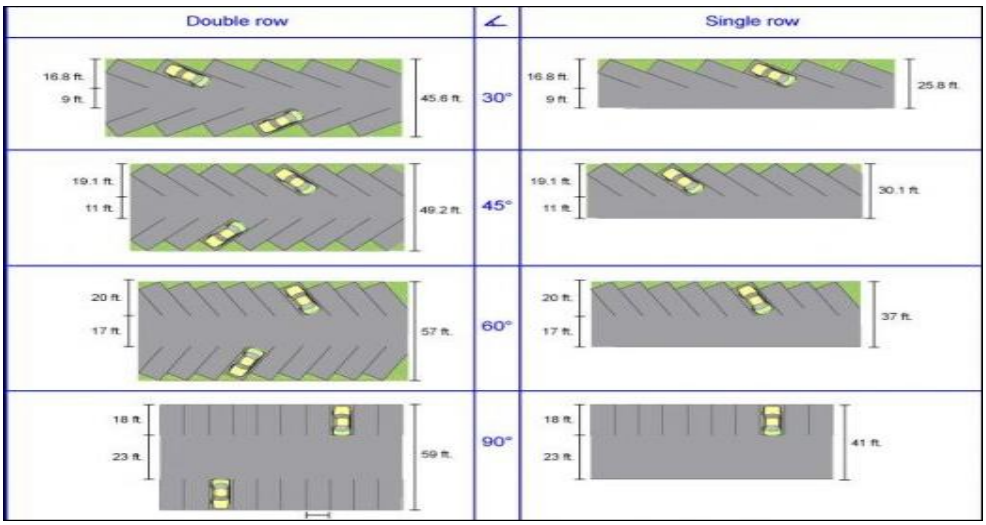

Figure 2.4 Angle street

2.2.5 Smart car parking

Automated Car Parking is a method of automatically parking and retrieving cars that typically use a system of pallets and lifts. The intention is to compact more cars in the same space, reduce the space needed to park the same number of cars. Automated car parks can be situated above or below ground or a combination of both. Figure 2.5 shows multi level car parking as type of smart parking.

Figure 2.5 multilevel car parking

2.3 control System

Control has played a vital role in the advance of engineering and science, In addition to its extreme importance space-vehicle systems, missile-guidance systems, robotic systems Automatic, and the like. Automatic control has become an important and integral part of modern manufacturing and industrial processes. For example, automatic control is essential in the numerical control of machine tools in the manufacturing industries, in the design of autopilot systems in the aerospace industries, and in the design of cars and trucks in the automobile industries. It is also essential in such industrial operations as controlling pressure, temperature, humidity, viscosity, and flow in the process industries. Since advances in the theory and practice of automatic control provide the means for attaining optimal performance of dynamic systems, improving productivity, relieving the drudgery of many routine repetitive manual operations, and more, most engineers and scientists must now have a good understanding of this field.

- Historical Review, The first significant work in automatic control was James Watt's centrifugal governor for the speed control of a steam engine in the eighteenth century. Other significant works in the early stages of development of control theory were due to minorsky, Hazen, and nyquist, among many others. In 1922, minorsky worked on automatic controllers for steering ships and showed how stability could be determined from the differential equations describing the system. In 1932, Nyquist developed a relatively simple procedure for determining the stability of closed-loop systems on the basis of open-loop response to steady-state sinusoidal inputs. In 1934, Hazen, who in- traduced the term servomechanisms for position control systems, discussed the design of relay servomechanisms capable of closely following a changing input. During the decade of the 1940s, frequency-response methods (especially the Bode diagram methods due to Bode) made it possible for engineers to design linear

closed- loop control systems that satisfied performance requirements. From the end of the 1940s to the early 1950s, the root-locus method due to Evans was fully developed. The frequency-response and root-locus methods, which are the core of classical control theory, lead to systems that are stable and satisfy a set of more or less arbitrary performance requirements. Such systems are, in general, acceptable but not optimal in any meaningful sense. Since the late 1950s, the emphasis in control design problems has been shifted from the design of one of many systems that work to the design of one optimal system in some meaningful sense. As modern plants with many inputs and outputs become more and more complex, the description of a modern control system requires a large number of equations. Classical control theory, which deals only with single-input-single-output systems, becomes powerless for multiple-input-multiple-output systems. Since about 1960, because the availability of digital computers made possible time-domain analysis of complex systems, modern control theory, based on time-domain analysis and synthesis using state variables, has been developed to cope with the increased complexity of modern plants and the stringent requirements on accuracy, weight, and cost in military, space, and industrial applications. During the years from 1960 to 1980, optimal control of both deterministic and stochastic systems. As well as adaptive and learning control of complex systems, were fully investigated. From 1980 to the present, developments in modern control theory centered around robust control, H, control, and associated topics. Now that digital computers have become cheaper and more compact, they are used as integral parts of control systems. Recent applications of modern control theory include such non engineering systems as biological, biomedical, economic, and socioeconomic systems.[1]

2.4 Microcontrollers

Sometimes abbreviated (µC, MCU) is a small computer on a single integrated circuit containing a processor core, memory, and programmable (I/O) peripherals. Program memory in the form of Ferroelectric RAM, NOR flash or OTP ROM is also often included on chip, as well as a typically small amount of RAM. Microcontrollers are designed for embedded applications, in contrast to the microprocessors used in personal computer or other general purpose applications. Microcontrollers are used in automatically controlled products and devices, such as automobile engine control systems, implantable medical devices, remote controls, office machines, appliances, power tools, toys and other embedded systems. By reducing the size and cost compared to a design that uses a separate microprocessor, memory, and input/output devices, microcontrollers make it economical to digitally control even more devices and processes. Mixed signal microcontrollers are common, integrating analog components needed to control non-digital electronic systems. Some microcontrollers may use four-bit words and operate at clock rate frequencies as low as 4 kHz, for low power consumption (single-digit - mill watts or microwatts). They will generally have the ability to retain functionality while waiting for an event such as a button press or other interrupt; power consumption while sleeping (CPU clock and most peripherals off) may be just non watts, making many of them well suited for long lasting battery applications. Other microcontrollers may serve performance-critical roles, where they may need to act more like a digital signal processing (DSP), with higher clock speeds and power consumption [2]. And figure (2.6) shows outside of microcontroller (PIC).

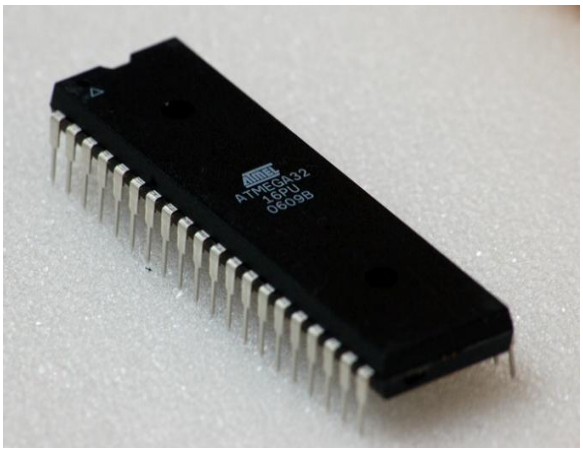

Figure 2.6 PIC microcontroller

2.4.1 Microcontroller basics structure

Any electric appliance that stores, measures, displays information or calculates comprise of a microcontroller chip inside it. The basic structures of µC as shown in figure (2.7).

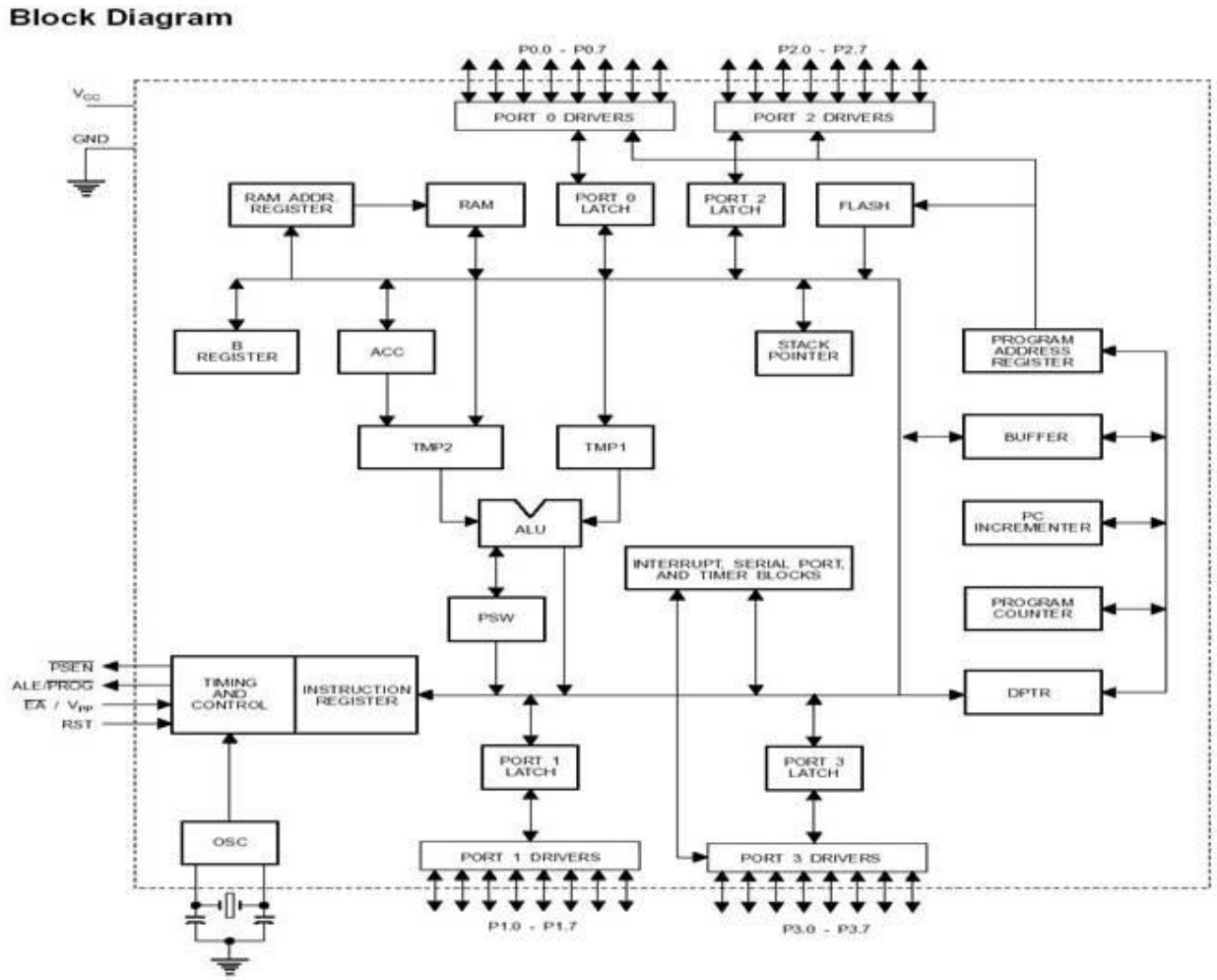

Figure: 2.7 Block Diagram

The basic structures of a µC are comprised of:

- ✓ CPU – Microcontrollers brain is named as CPU. CPU is the device which is employed to fetch data, decode it and at the end complete the assigned task successfully. With the help of CPU all the components of microcontroller is connected into a single system. Instruction fetched by the programmable memory is decoded by the CPU.
- ✓ Memory – In a microcontroller memory chip works same as microprocessor. Memory chip stores all programs & data. Microcontrollers are built with certain amount of ROM or RAM (EPROM, EEPROM, etc) or flash memory for the storage of program source codes.
- ✓ Input/output ports – I/O ports are basically employed to interface or drive different appliances such as- printers, LCD's, LED's, etc.
- ✓ Serial Ports – These ports give serial interfaces amid microcontroller & various other peripherals such as parallel port.
- ✓ Timers – A microcontroller may be in-built with one or more timer or counters. The timers & counters control all counting & timing operations within a microcontroller. Timers are employed to count external pulses. The main operations performed by timers' are- pulse generations, clock functions, frequency measuring, modulations, making oscillations, etc.
- ✓ ADC (Analog to digital converter) – ADC is employed to convert analog signals to digital ones. The input signals need to be analog for ADC. The digital signal production can be employed for different digital applications (such as- measurement gadgets).
- ✓ DAC (digital to analog converter) – this converter executes opposite functions that ADC perform. This device is generally employed to supervise analog appliances like- DC motors, etc.
- ✓ Interpret Control- This controller is employed for giving delayed control for a working program. The interpret can be internal or external.
- ✓ Special Functioning Block – Some special microcontrollers manufactured for special appliances like- space systems, robots, etc, comprise of this special

function block. This special block has additional ports so as to carry out some special operations.

2.4.2 Types of microcontroller

Microcontrollers are divided into categories according to their memory, architecture, bits and instruction sets.

According to their memory they are divided to: External Memory Microcontroller, and Embedded Memory Microcontroller. And According to their architecture they are divided to: Princeton Memory Architecture Microcontroller, and Harvard Memory Architecture Microcontroller. And According to their bits they are divided to: 8 bits microcontroller, 16 bits microcontroller, and 32 bits microcontroller. And According to their instruction sets they are divided to: CISC- CISC means complex instruction set computer, and RISC- RISC means Reduced Instruction Set Computers.

There are many families of microcontroller like, 8051 microcontroller, PIC microcontroller, ARM microcontroller, and AVR microcontroller. And every one of these families has its own characteristic and architecture.

2.4.3 Microcontroller applications

Microcontrollers have many applications such as: mobile phone, light sensing and controlling devices, Temperature sensing and controlling devices, Industrial instrumentation devices, Volt Meter, Current meter, and Process control devices.

2.5 Motors

An electric motor is an electrical machine that converts electrical energy into mechanical energy. In normal motoring mode, most electric motors operate through the interaction between an electric motor's magnetic field and winding currents to generate force within the motor. Found in applications as diverse as industrial fans, blowers and pumps, machine tools, household appliances, power tools, and disk drives. Electric motors may be classified by electric power source

type (DC OR AC), internal construction, application, type of motion output, and so on.

2.6 Inputs Device

Input device is a peripheral (piece of computer hardware equipment) used to provide data and control signals to an information processing system such as a computer or information appliance. Examples of input devices include keyboards, mice, scanners, digital cameras and joysticks.

2.7 Outputs Devices

An output device is any piece of computer hardware equipment used to communicate the results of data processing carried out by an information processing system (such as a computer) which converts the electronically generated information into human-readable form. Examples of output devices (screen, speaker).

2.8 Power Supply

A power supply is an electronic device that supplies electric energy to an electrical load. The primary function of a power supply is to convert one form of electrical energy to another and, as a result, power supplies are sometimes referred to as electric power converters. There are two types of power supply (DC and AC).