CHAPTER 1

INTRODUCTION

1.1 General

The positional remote controller is used extensively in many fields where the position of an object has to be controlled remotely. Methods[1,2,3] of controlling the position of a remote object in terms of the type of signals can be classified as :-

1. Continuous - data control systems.
2. Discrete - data control systems.

1.2 Continuous - data control system

The conventional method of position control is the continuous data system.

A continuous - data control system is one which the signal at various parts of the system are all functions of the continuous time variable. The signal may be modulated, which is called a-c carrier system, or unmodulated, which is called d-c system.

A typical d-c control system is shown in Figure 1.1 . The error detector comprises a battery and two potentiometers. One potentiometer is used as a reference input and it is coupled to a dial for setting the required angular position. The other potentiometer is used as a feedback potentiometer which coupled to the load. If the angular positions of the two potentiometers are different, a potential difference, acting as an error signal, is generated. The error signal is fed to a d-c amplifier which turns the motor, thereby changing the position of the load. In effect the angular position of the feedback potentiometer is changed in such a direction that the error signal is eventually reduced to zero, the motor then stops.

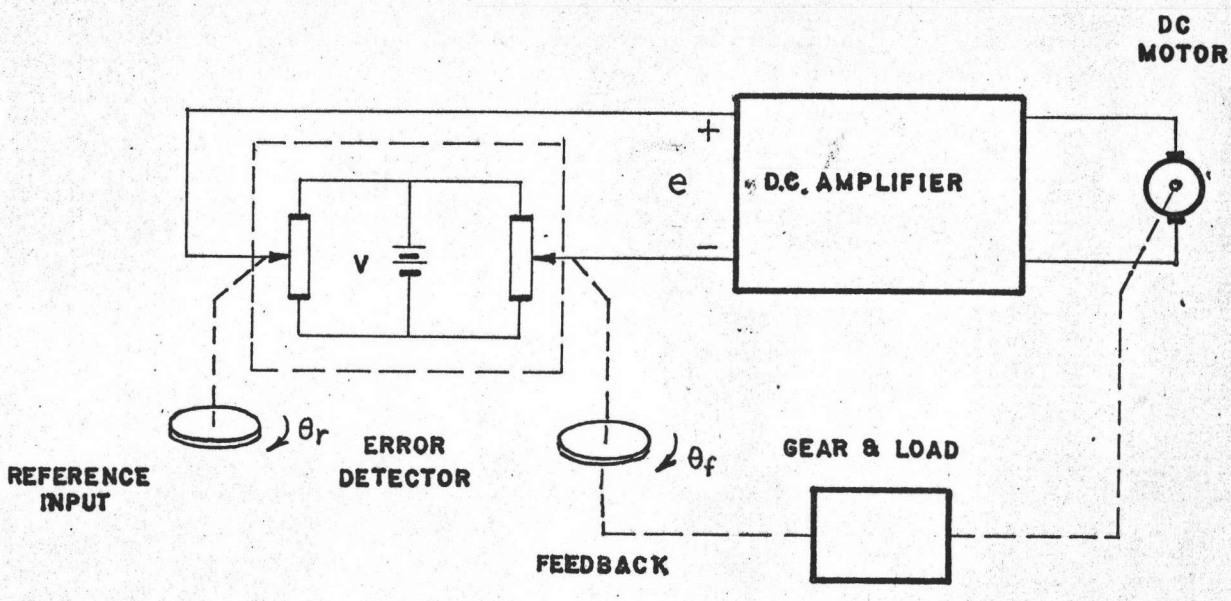

FIGURE 1.1 A D.C. CONTROL SYSTEM

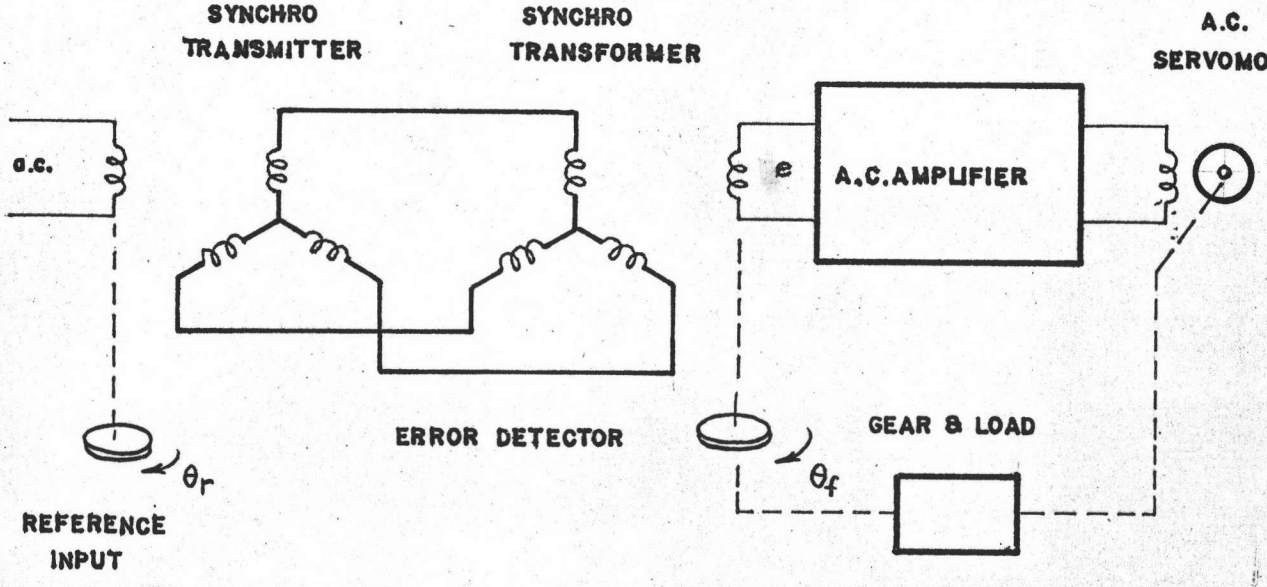

FIGURE 1·2 AN A.C. CONTROL SYSTEM

A typical a-c control system is shown in Figure 1.2. The operation is similar to the d-c control system, but two synchros are used instead of potentiometers , the error signal generated is modulated by an a-c carrier and fed to an a-c amplifier, A two phase a-c servomotor is employed.

The control system described above is not suitable for long distance control since the continuous signals are subjected to noise desturbance. The most efficient and commonly used is the a-c carrier system which utilizes synchros. The mechanism as stated above is heavy and expensive.

1.3 Discrete - Data Control System

A discrete - data control system is a system which the signals in one or more sections of the system are in the form of pulsed data or numerical code. Usually, sampled-data systems refer to a more general class of systems whose signals are in the form of pulsed data. Where as the term digital control systems implies the use of a digital computer or a digital transducer in the system.

A sampled-data control system is shown in Figure 1.3. A continuous input r(t) is applied to the system and compared with the feed back signal. The continuous error signal is sampled by a sampling device whose output is a sequence of pulses. In general, the sampling schemes [1,2] may be single rate, multirate skip-rate, ramdom rate and pulse-width modulated.

A digital control system is shown in Figure 1.4. The use of digital codes in the system requires digital - to - analog and analog-to-digital converters.

The advent of the low cost digital intergrated circuits makes the sampled-data approach for the positional control system economical and light in weight.[5]

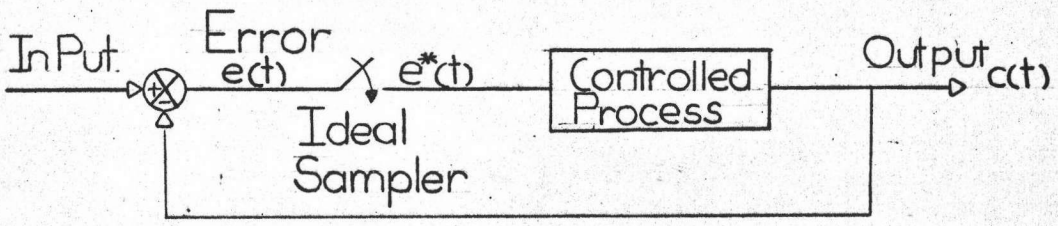

Figure1:3 A Sampled-Dala Control System

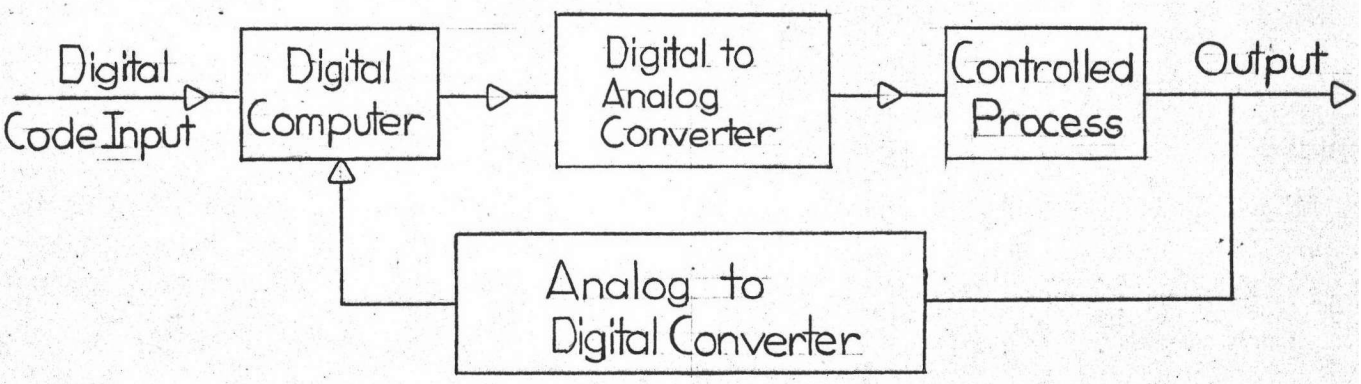

Figure 1:4 A Typical Digital Control System

1.4 The Aim of the Research

The purpose of this thesis is to design a remote positional controller using pulse-width modulation method.

Theory is presented in Chapter 2. The design is outlined in Chapter 3. The analysis is given in chapter 4. Experimental result is presented in Chapter 5. Several conclusions and suggestions for further study are contained in Chapter 6.