Chapter 1

Introduction

1.1 Background of project

Coupled tank water level system consists of double tank mounted on a reservoir for water storage. In the centre of the double tank placed a baffle to divide it into two different small tanks. At the base of each tank there are a flow valve connected to reservoir. Each of the small tanks has water pump to pump water from reservoir. Capacitance sensor is used to detect the level of the water and as visual a scale placed in front of the tank. This equipment widely use in the food processing and chemical industries.

Using State Feedback control system to control the level of the water return to the reservoir as wanted. State feedback will control the water pump so that water in tank 1 in is maintained as required.

The DAQ card is used as the interface between the controller and the coupled tank system. As suggestion, use software such as Visual Basic 6 and MATLAB/SIMULINK has been used as graphic user interface and as simulation.

1.2   Problem Statement

Nowadays, many of countries in this world facing the same problem because of the world economy are down. So to overcome this problem, many of factories must cut cost in term of workforce to maintain the same price or to reduce the price of their product. The thing that can overtake human responsibility is a computer. But the computer cannot working itself without human setting the suitable program for it, so the program that been used is called controller.

All equipment in this world wanted to be automatically operated without human observation. To do this, we use a controller, so that the machine or equipment can run itself according to what we want. To do this we must have a medium to control so that it can run automatically. Normally controller such as PID and Fuzzy Logic are widely used to control many of the instrument or machines, but in this project the controller that have been used is the Integral Control State Feedback Controller.

The Integral Control State Feedback Controller will control the liquid level at tank 1 at real time. This plant system are in second order system and the Integral Control State Feedback Controller will be derived directly from the plant using pole placement method, by using this method we can not manipulate anything of the controller value that we get. It is different between PID or LQR controller because it can simply be tuned to get the result as desired.

We need continuous data from the plant as the feedback. Therefore, to overcome this problem, an Advantech DAQ card has been used as the interfacing between the hardware and software.

1.3 Objectives

There are several objectives that must be achieved in order to make this project successful:

i.   To control Coupled Tank liquid Level (Tank 1) Using Integral Control State Feedback Controller.

ii. To compare result between experiment and simulation

1.4 Scope of The Project

i.   To design Integral Control State Feedback Controller

ii.   To analyze system performance using MATLAB/SIMULINK

iii. To use MATLAB to verify modeling.

iv.   To develop GUI using Microsoft Visual Basic 6

v.   To Implement controller using VB on couple tank water level system

vi.   To assemble the coupled tank until it working.