Final Project for LabVIEW laboratory

1. Project Title

Control tank water level with PID controller using LabVIEW

2. Project goal

In this project, you have to understand the components of a Virtual Instrument, and use LabVIEW to create an application to control the water level with PID controller. As we can see from Fig.1, the reference signal is set by the set point controller and tank level indicator shows the level value, the value is the input for controlling the water level and the leakage is a constant which is the load parameter in the plant. Thus, you need to tune the PID parameters to control the water level to follow the reference signal simultaneously and stably.

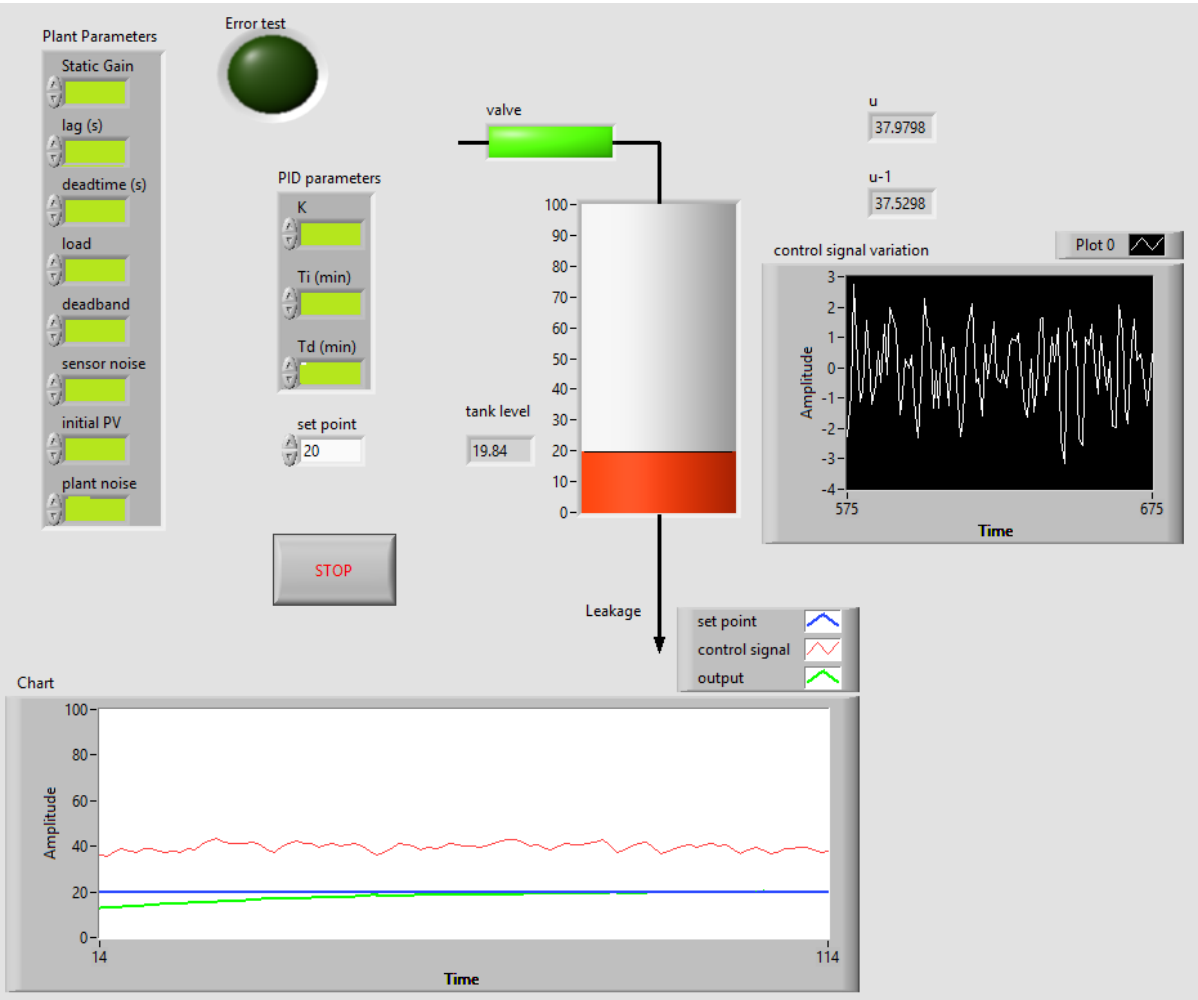

Fig 1. The interface of this application

3. Project requirement

a) The current states (i.e., set point, control signals, output) should be shown in the chart with time-x-axis and amplitude-y-axis.

b) Similarly, the current control signal input and the previous one should be shown in indicator u and u-1 respectively, the difference between u and u-1 need to be displayed in the graph as well.

c) Calculate the error between the input and output and compare the error value with a threshold (e.g., 0.2). If the error exceeds this threshold then the LED (Error test) will be turned on.

d) Add an array to this front panel (which is not shown in Fig 1.), and record the time, output value and error for the last 30 seconds and update at each second. Specifically, the length of this array is 30 (rows), and 3 columns for storing these parameters. After each second, the new incoming data will replace the data in the first row and all the previous data will shift to the next row. E.g., new-> 1st row, 1st row-> 2nd row…. Finally, export these data recorded in the array to an excel file.

e) The techniques you must include in this project are event structure, sequence structure, case structure, loop structure.

4. Given Parameters

The PID function is as follows: Right click -> Control & Simulation -> PID -> PID.vi or PID Advanced.vi.

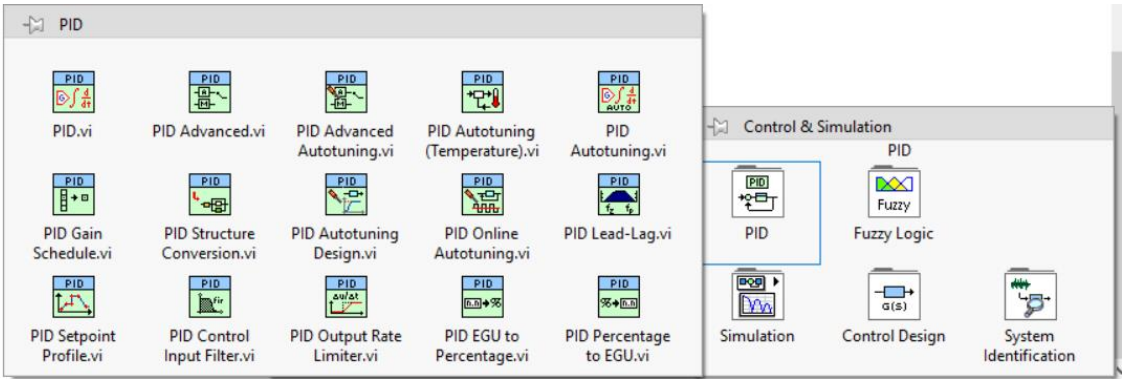

Fig 2. PID controller function

The plant.vi of the tank is attached.

The plant input parameters are given in Table 1, which is different for students. Please check it carefully.

Table 1. Plant parameters

Name	Process Parameters							
	Static Gain	lag (s)	deadtime (s)	load	deadband	sensor noise	initial PV	plant noise
Kristóf Csorba	1.5	18	0	50	1	0	0	5
Herman Aleksander Gohn	1	5	0.2	20	0	0	0	10
Türker Erbasi	2.5	4	0.1	40	2	0.25	0	1
Ghada Bourguiba	2.5	18	0	30	2	0.25	0	0
Turtogtokh Altangerel	2.5	2.5	0.01	10	0	0	30	2
Daniil Brodt	3	18	0	58	2	0.25	0	0
Khaleel Mohammad Khaleel Almousa	1.5	18	0	50	1	0	0	5
Anjan Kumar Das	1	5	0.2	20	0	0	0	10
Ahmed Raafat Abdelraouf Mohamady	2.5	4	0.1	40	2	0.25	0	1
Abir Shahriar Pranto	2.5	18	0	30	2	0.25	0	0
Ahmed Borchani	2.5	2.5	0.01	10	0	0	30	2
Haseeb Ahmed	3	18	0	58	2	0.25	0	0
Pavle Kovacevic	1.5	18	0	50	1	0	0	5
Rysaskar Salimbay	1	5	0.2	20	0	0	0	10
Munkh Orgil Batbileg	2.5	4	0.1	40	2	0.25	0	1
Ayana Satayeva	2.5	18	0	30	2	0.25	0	0
Vladimir Dukanovic	2.5	2.5	0.01	10	0	0	30	2
Minh Hoang Trinh	3	18	0	58	2	0.25	0	0
Muneeb Ali	1.5	18	0	50	1	0	0	5
Khongmeng Kormoua	1	5	0.2	20	0	0	0	10
Mohammed Shamin Yeasher Yousha	2.5	4	0.1	40	2	0.25	0	1