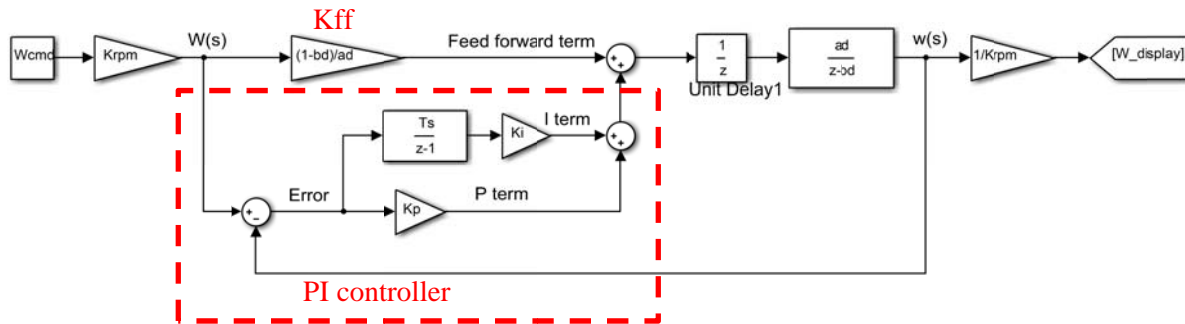The code for implementing PID controller is simple; it only takes two or three lines as shown below.   The trick is not in the coding; it is about knowing how to determine the control constants and how to justify your choices of these constants.   That is why 80% of the materials in the lecture note is devoted to that.

PI controller coding
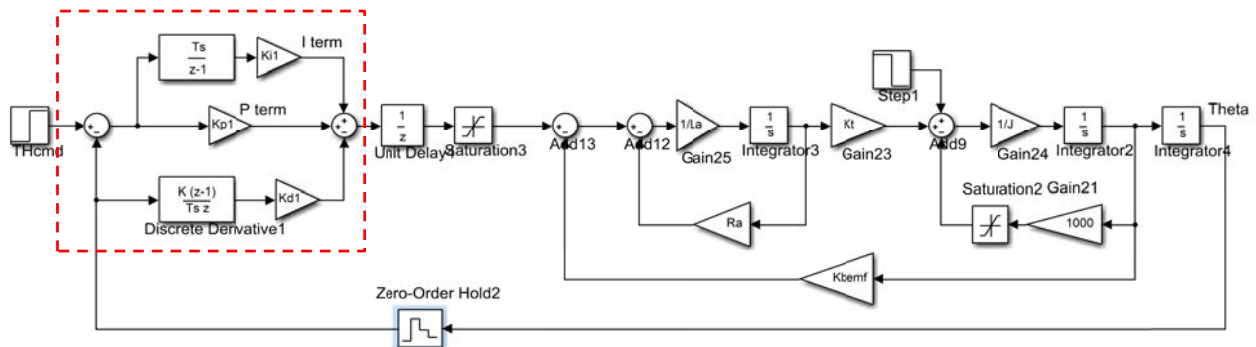

The following is the code for PI controller + feedforward term (as represented in the dashed box above).

```
        :
   Input(w);                               //  w=speed ,  input from encoder input function.
   Error = wcmd-w;                         // wcmd= speed cmd
   Integral = Integral + Ts*Error;         // Integration,  Ts=sampling interval
   y= Kff*wcmd + Ki*Integral + Kp*Error;   //Kff is the feed forward gain. How do you
                                           // determine the value of Kff?
   output(y);                              // output to PWM control  function
        :
```

PID controller coding

The following is the code for PI controller + feedforward term (as represented in the dashed box above).

```
        :
   Input(p);                          //  p=posiiton ,  input from encoder input function.
   Error = pcmd-p;                    // pcmd= position cmd
   Integral = Integral + Ts*Error;    // Integration
   Diff= (p-p1)/Ts;                   // Diff is in fact, the speed.
   y= Ki*Integral + Kp*Error + Kd*Diff;
   output(y);                         // output to PWM control  function
   p1=p;                              // save the current position.
        :
```