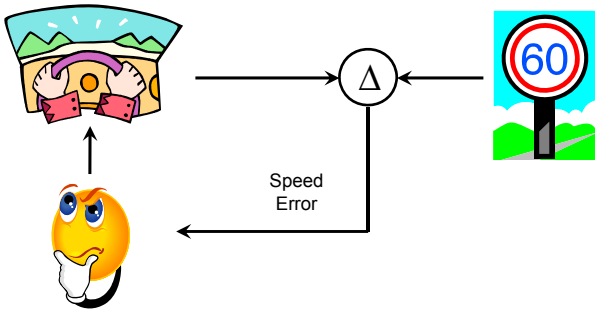
Intro to PID Control

Don David
CIRES / CHEM Instrument Facility
Univ. of Colorado Boulder

CHEM-5161 / CHEM-5181 Joint Labview Lectures – Fall 2013

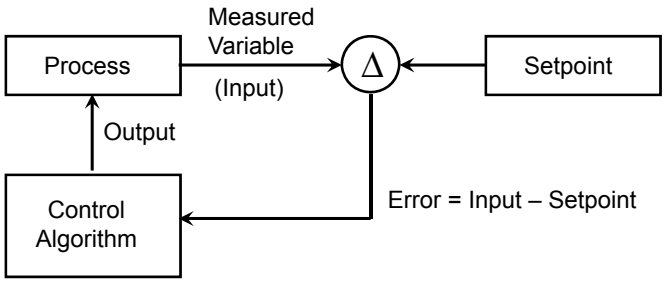
Manual Process Control Loop



Manual Mode: **You** adjust the output.

Basic Automatic Process Control Loop

Automatic Mode: A control algorithm manipulates the output to hold the process variable at the setpoint.

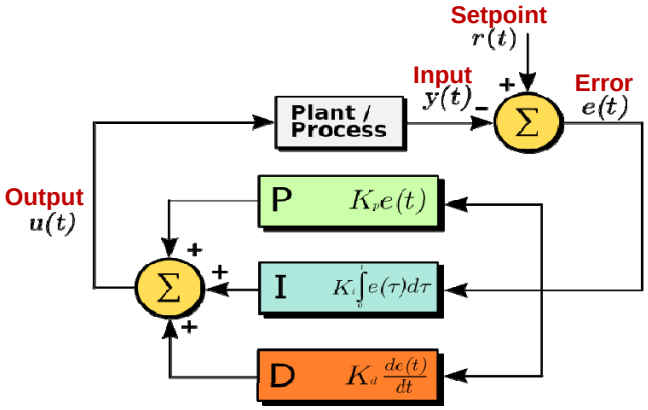


Some Types of Control Algorithms

Type	Use	Comments
On-Off	Ovens Water level HVAC	Simplest Hysteresis Poor accuracy
PID*	General purpose Linear processes	Relatively easy to use Well known method Highly adaptable Good accuracy
Custom	Critical industrial processes Nonlinear processes	Specific Requires detailed info Complex Best accuracy

*A PID controller has Proportional, Integral, & Derivative terms which must to be tuned for each application.

PID Block Diagram



http://en.wikipedia.org/wiki/PID_controller

PID Pseudocode

```
previous_error = 0
integral = 0
Start:
        error = setpoint – input
        integral = integral + error*dt
        derivative = (error – previous error)/dt
        output = Kp*error + Ki*integral + Kd*derivative
        previous_error = error
        wait (dt)
Goto Start
```

Not all three terms need be used. PI controllers are most common.