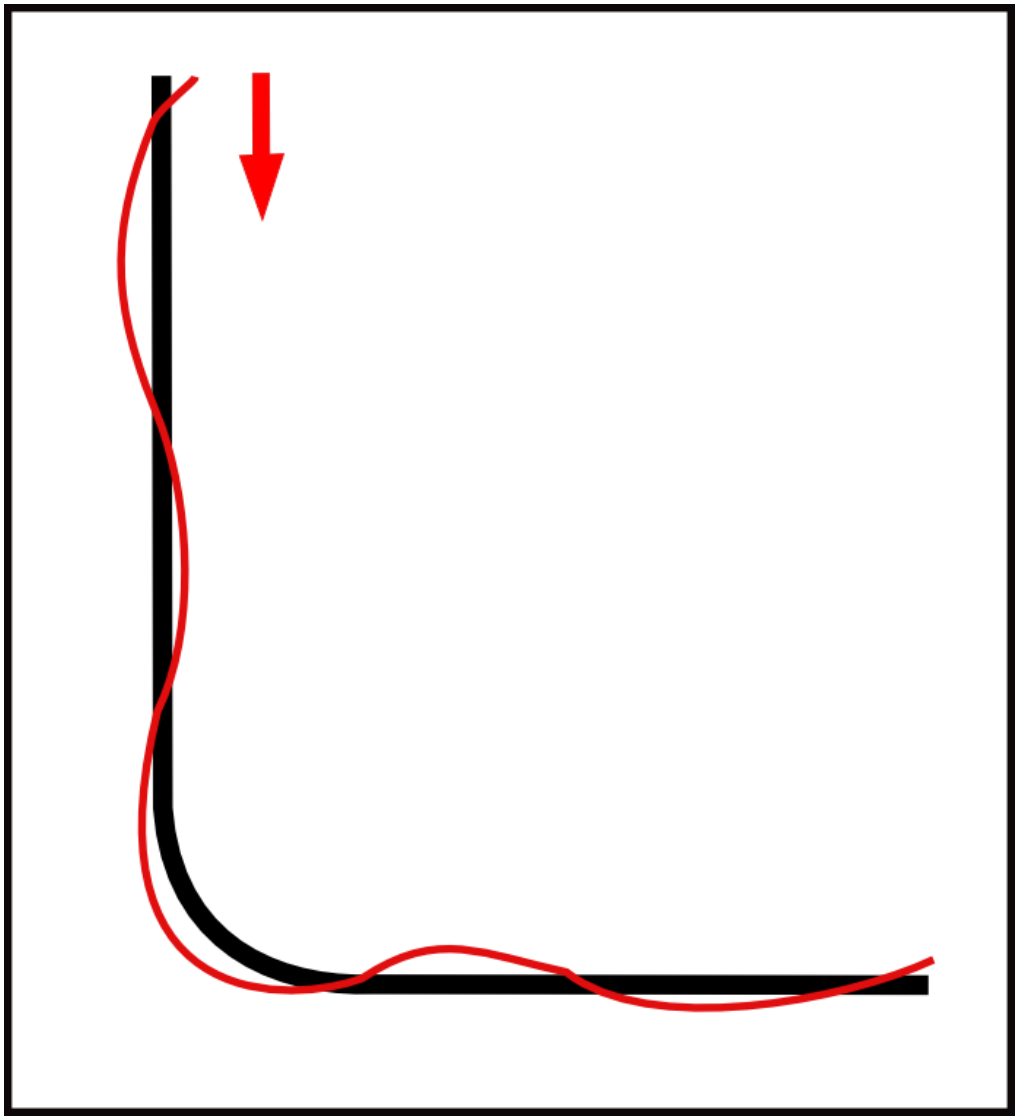
EEE243 – Applied Computer Programming

Introduction to Control Theory

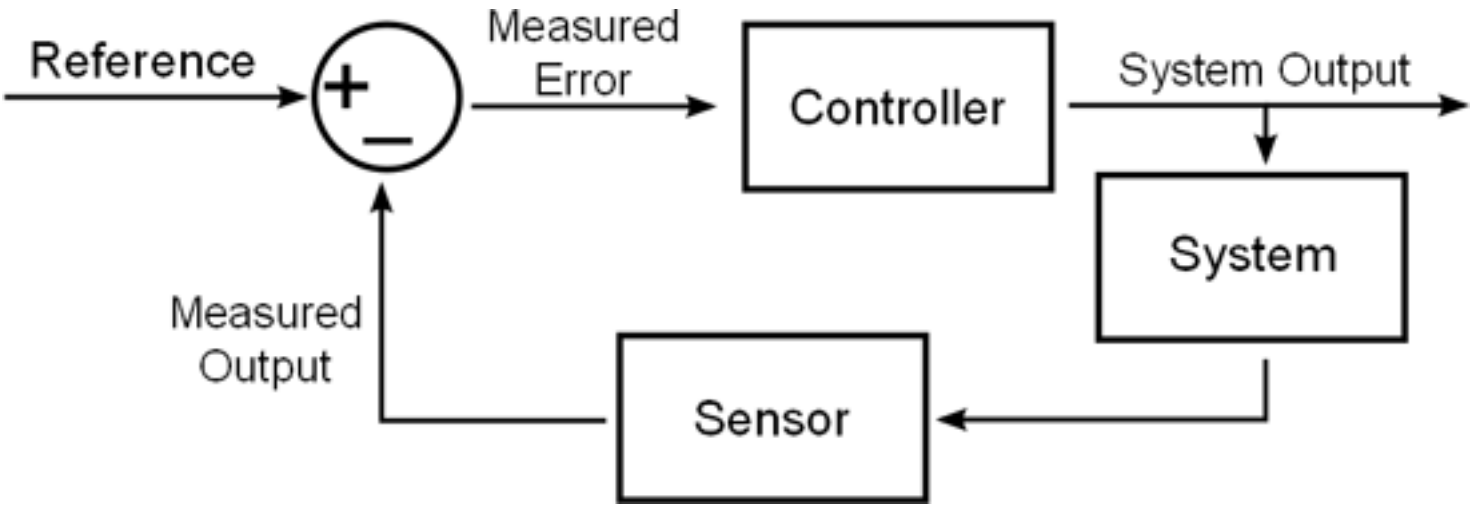
Outline

- Problem
- Control Systems
- Robot control
- Proportional control

Problem



Control Systems

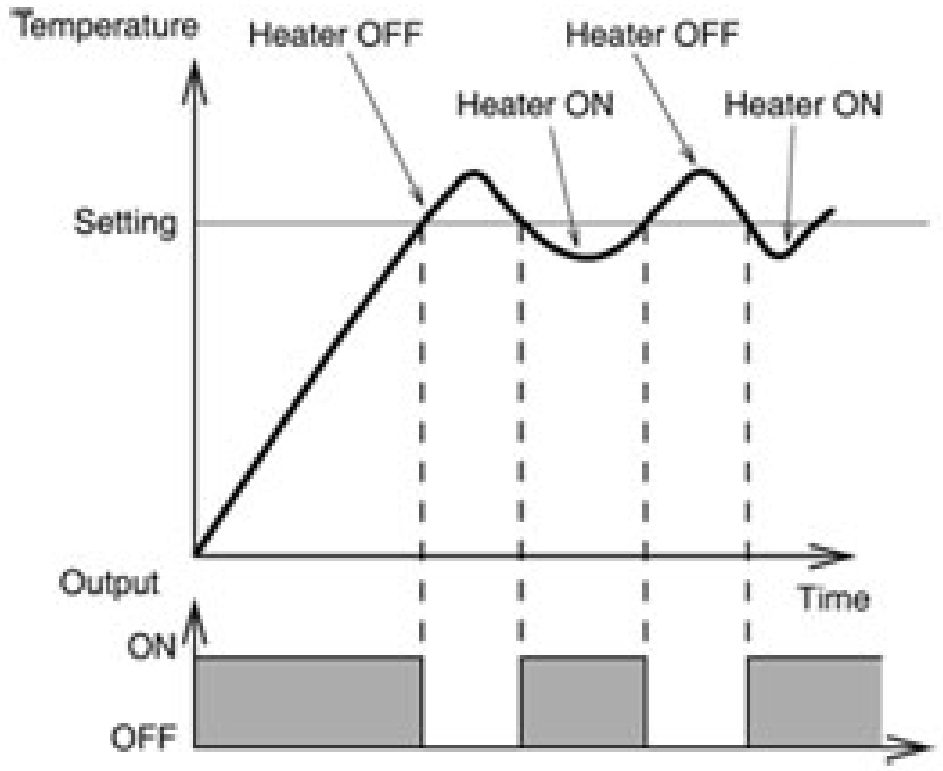


Control Systems

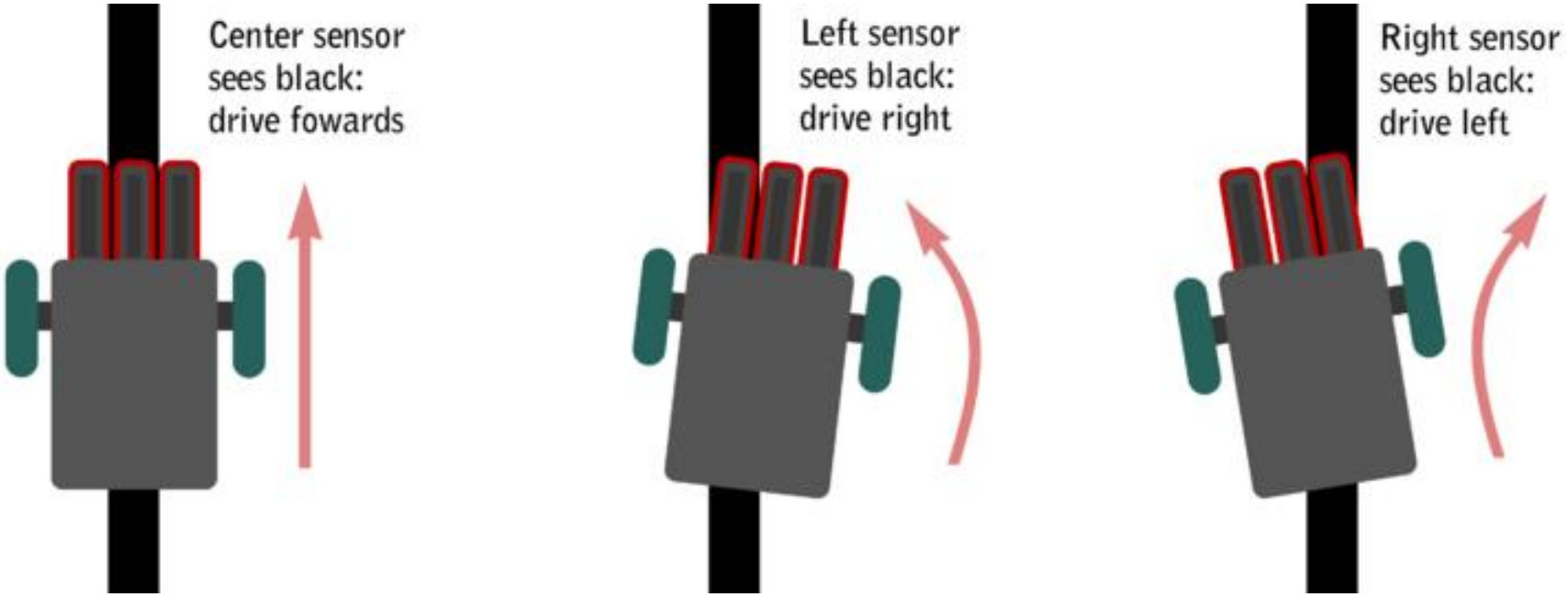
- Corrects the behaviour of a system
- Tries to bring error to zero
- Control can be very simple
  - On-off control
  - State machine
  - Proportional control
- More complicated
  - PID control
- Even more complicated…
  - Adaptive control
  - Predictive control
  - …

On-off control

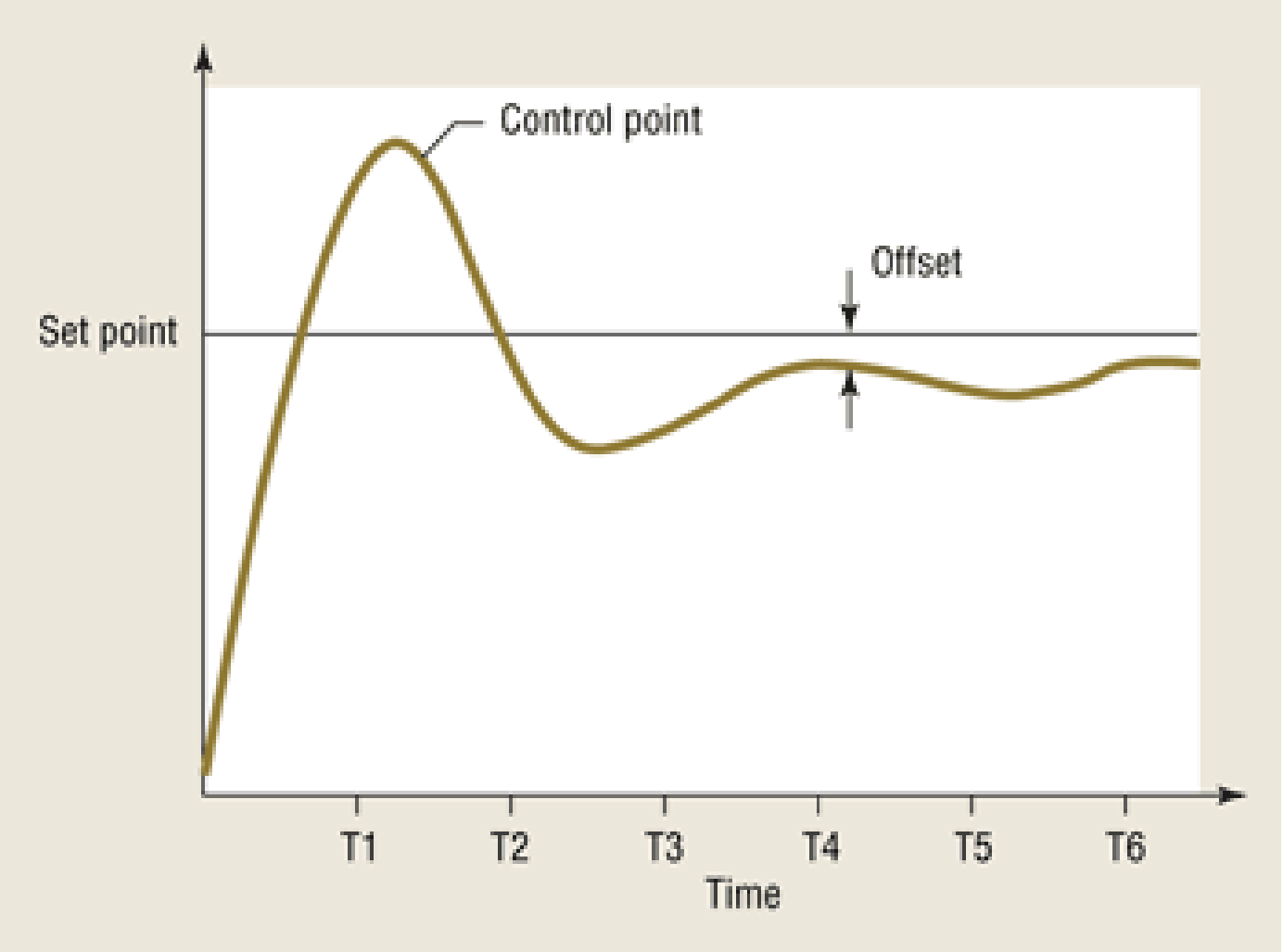
ON/OFF Control



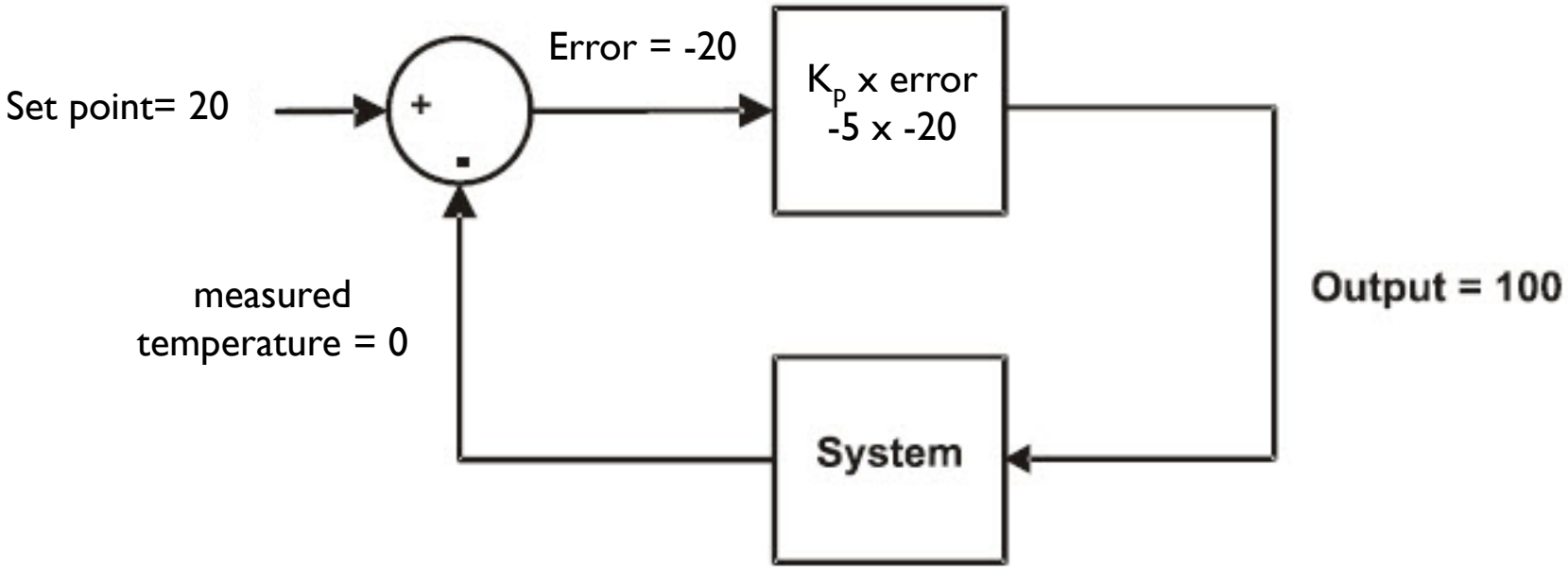
On-off control



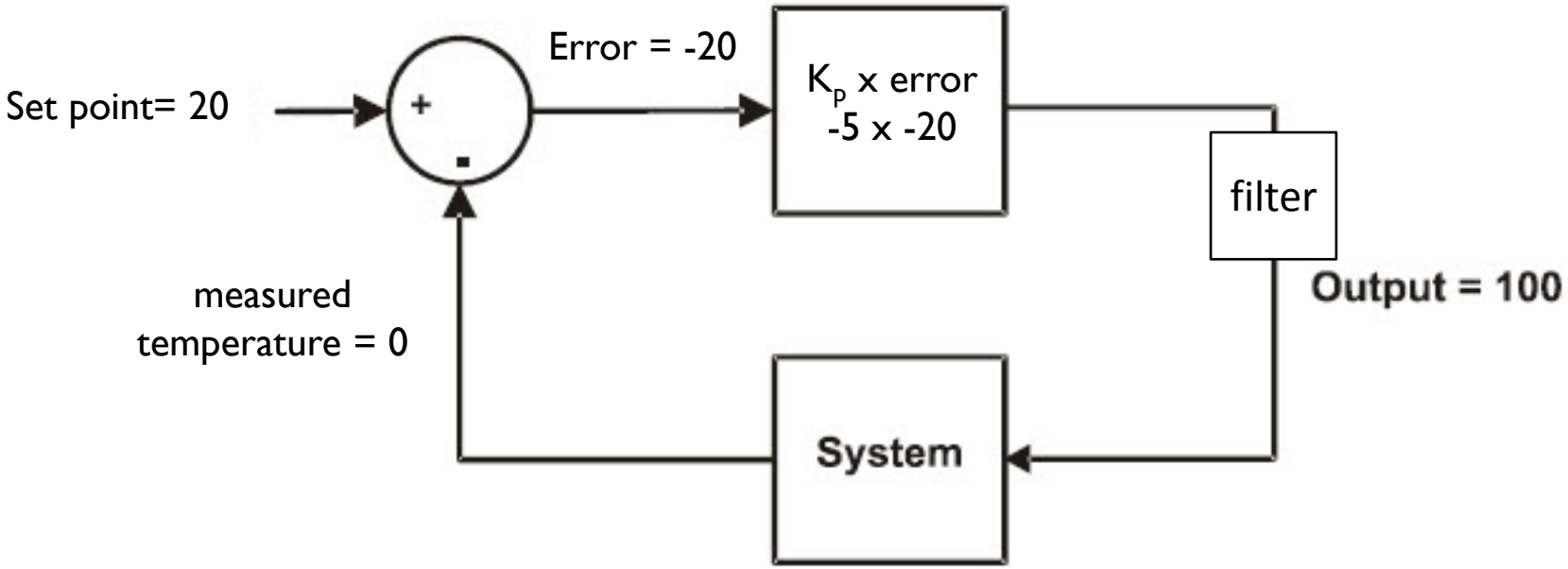
Proportional control



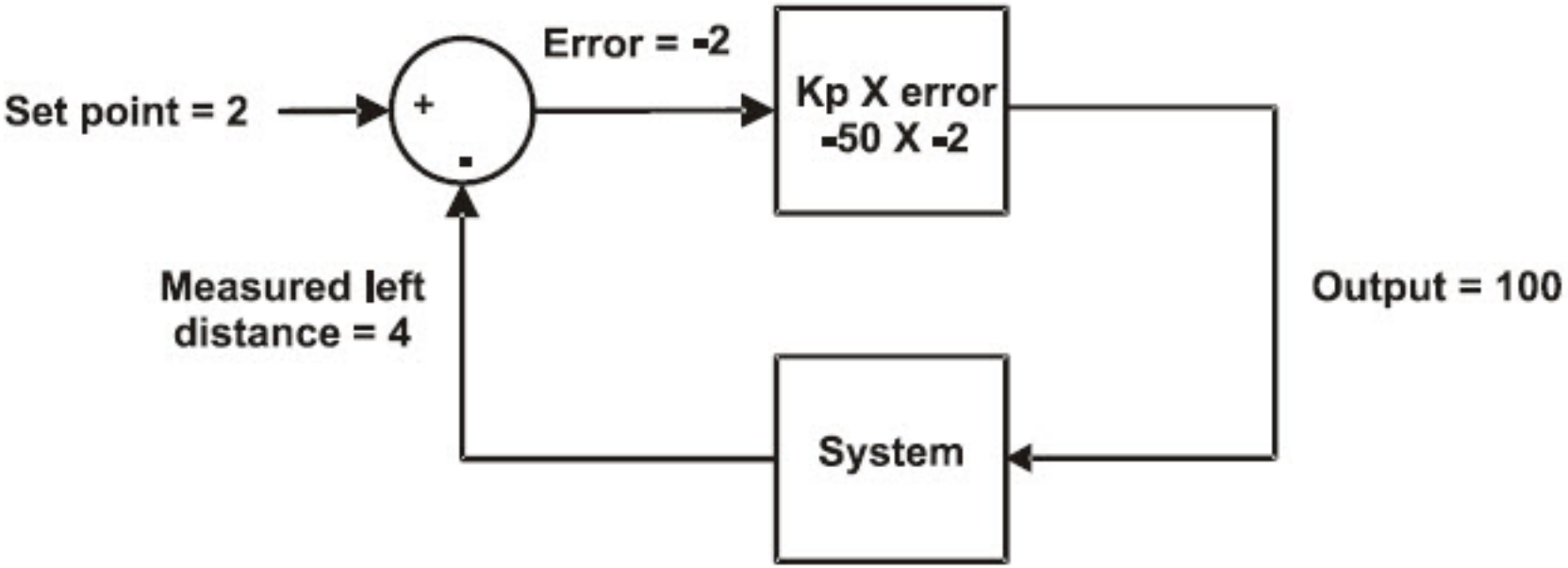
Proportional control



Proportional control



Proportional control

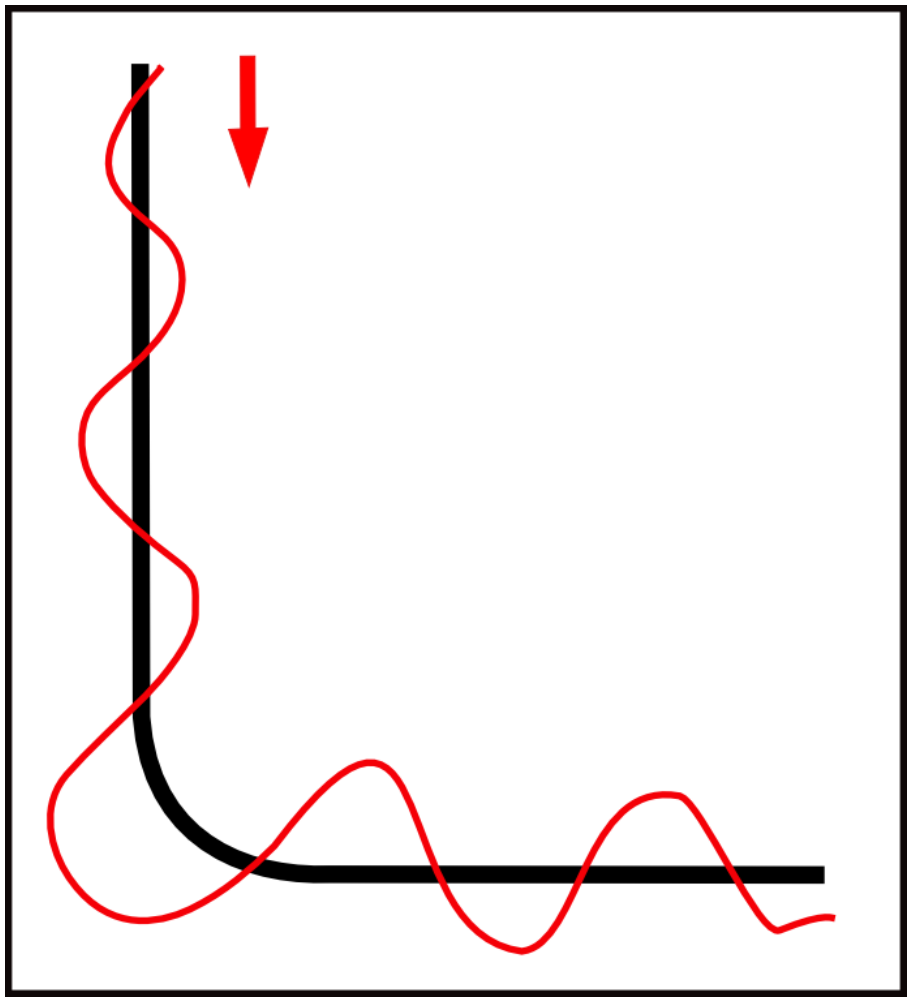


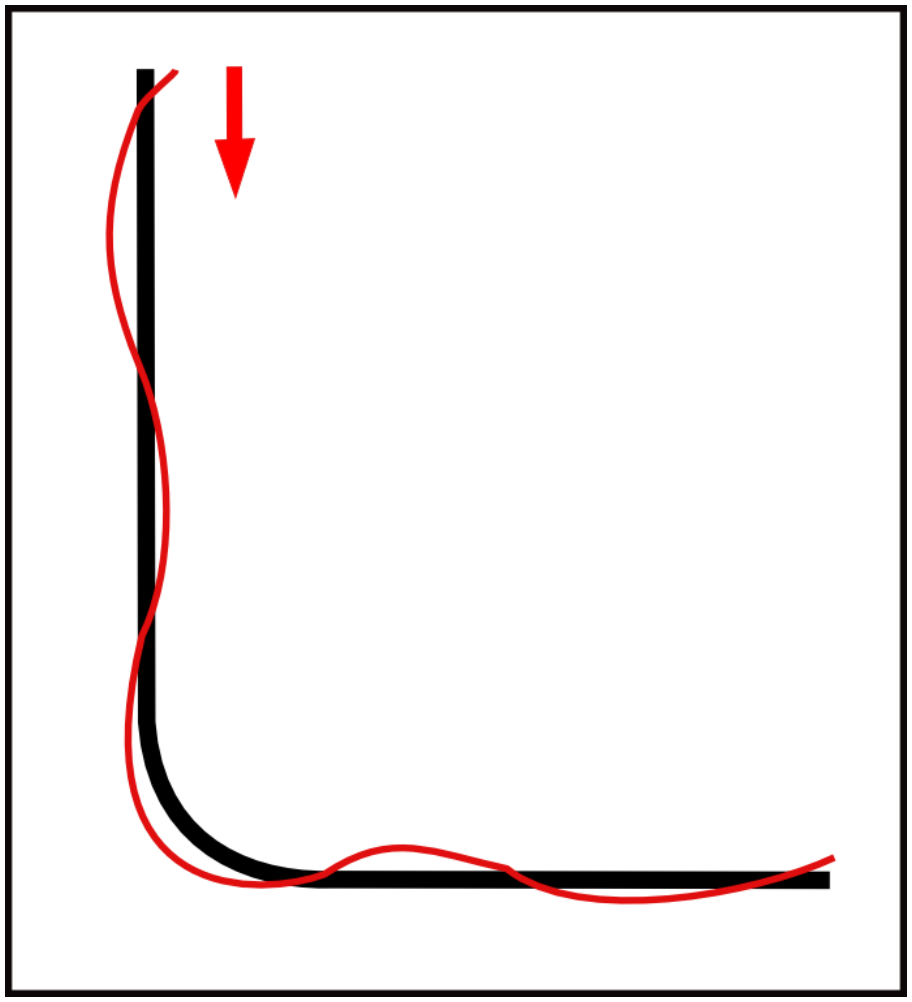
Code

```
void proportional_control (double setpoint) {
   double measurement;
   double error;
   double control;
   double Kp;

   while(1) {
      measurement = take_reading();
      error = setpoint - measurement;
      control = Kp * error;
      control = filter(control);
      set_input_to_system(control);
   }
}
```

Quality comparison





Questions?