Embedded Systems: Controls Review

Overview

- Quiz review
- Quiz Q&A
- Control Systems intro
- Feed-forward vs Feedback
- PID: What is it?
  - Demo
  - Discussion
- Physics review
- Actuators overview
- Sensors overview
- Parts suppliers
- Q&A

Quiz review

- 2 methods possible for < 3 Hz PWM output
  - Timer 0,2 -> Use phase-correct mode!
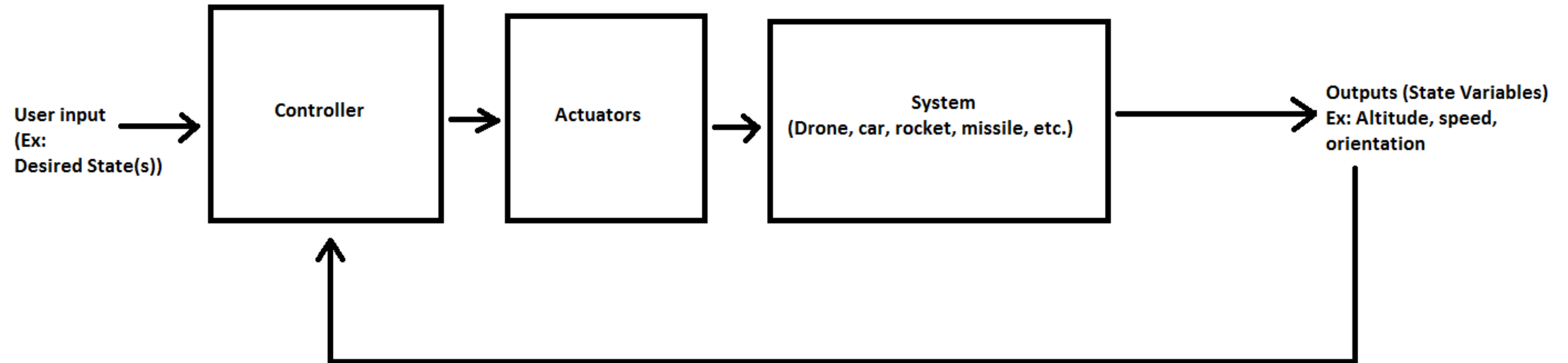 - Timer 1 -> Self-explanatory
- Code review and demo

Control Systems intro

What's the common theme?

- Many systems in nature are unstable
  - Possible to model everything in advance and apply pre-determined inputs
  - Example: Driving manually and maintaining throttle input to have constant speed on the highway
    - Disadvantage?
- Alternatively, use **sensors** to figure out actual **state** of our system, and **actuators** to change state
  - Actuator: Motor, servo, heater, electromagnet, et. al.
  - Sensor: Potentiometer, wheel encoder, gyroscope, accelerometer…

Feedback Control Systems

PID Controller