TIME TRIGGERED PID CONTROLLERS

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PID Controllers

- Feedback controller used in industrial control systems
- Attempts to minimize error
- Relies on Position, Integral, Derivative Terms
- Requires limited system knowledge



Formulation

Kp*P + Ki*I + Kd*D
Position (P) term

Feedback based on current error

Integral (I) term

Feedback based on the aggregate error

Derivative (D) term

Feedback based on the rate of change of error

System Examined

- Velocity Controller
- $\bullet V' = a + F$
- F is a random force
- Considered safe if Vmin <= v <= Vmax</p>
- PID velocity controllers used in industrial systems
 - Ex European Train Control System

Proof

- Ensure that P term dominates at Vmin and Vmax
- Constrain the Integral term –Imax <= I <= Imax
 Common approach in PID implementation

Results

- Proved Safety of PID velocity controller
- Guarantees proper operation of systems using PID velocity controllers
- Provides insight into hybrid controllers with a PID velocity controller
- Provides bounds on Kp,Ki,Kd that can be used for online calibration