

Control Systems-Quiz

1. What is the primary purpose of a control system?

- A. To manage and regulate system behavior to achieve a desired outcome
- B. To collect data about the environment
- C. To improve computational performance
- D. To reduce hardware cost

2. How does a feedback control system work?

- A. It continuously compares output to a reference and adjusts accordingly
- B. It uses only predefined inputs with no sensor measurements
- C. It operates without actuators
- D. It requires no mathematical modeling

3. Why are control systems critical in autonomous vehicles (AVs)?

- A. They regulate steering and speed to track lanes and ensure safety
- B. They eliminate the need for sensors
- C. They replace the need for planning algorithms
- D. They prevent communication with infrastructure

4. Which of the following is **not** a common vehicle state variable used in modeling AV dynamics?

- A. Tire temperature
- B. Heading angle
- C. Lateral velocity
- D. Longitudinal velocity

5. What is lateral error in vehicle control?

- A. Perpendicular distance between vehicle center and the lane centerline
- B. Difference between desired and actual speed
- C. Difference between vehicle orientation and road tangent
- D. Difference between planned and predicted curvature

Control Systems-Quiz

6. What is one major limitation of PID control in AV applications?

- A. It cannot handle actuator or lane boundary constraints explicitly
- B. It is computationally expensive
- C. It requires a detailed vehicle dynamics model
- D. It does not work at low speeds

7. What key feature makes Model Predictive Control (MPC) suitable for AV trajectory tracking?

- A. It solves an optimization problem considering constraints and predictions
- B. It ignores future vehicle states
- C. It requires no real-time computation
- D. It only uses proportional control

8. How does roadway geometric design influence AV control performance?

Sharp curves and poor sight distances increase control difficulty

It has no significant impact on AV control

Road geometry only affects human drivers

Control systems eliminate geometric constraints entirely

9. What is the main control objective when tracking a reference path?

- A. Minimizing deviation from the desired trajectory while maintaining stability
- B. Maximizing energy efficiency
- C. Maintaining constant speed
- D. Minimizing computation time

10. Which of the following is a benefit of using simulation in AV development?

- A. Enables safe evaluation of control algorithms under extreme or rare situations
- B. Eliminates the need for physical testing
- C. Ensures perfect accuracy in all weather conditions
- D. Removes the need for real-time control hardware