INTRODUCTION TO THE PID CONTROLLER AND ITS SOFTWARE IMPLEMENTATION — LECTURE GOALS

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At the end of the lecture, the students will have learnt:

(1) What control is
   (a) The main notions associated with a control loops (system, controlled variable, control action, sensor, set-point, error, disturbance)
   (b) Examples of control systems in our daily lives
(2) The P (proportional) controller
   (a) The definition of a P controller
   (b) The effect of the proportional gain (K_p) on the behaviour of the controlled system
   (c) Some possible limitations of a P controller (motivation of the PD controller)
(3) The PD (proportional-derivative) controller
   (a) The definition of a PD controller
   (b) The effect of the differential (K_d) and proportional (K_p) gains on the behaviour of the controlled system
   (c) The notions of under-damping, over-damping and critical damping
(4) The PID (proportional-integral-derivative) controller
   (a) The fact that all models are wrong
   (b) The definition of offset
   (c) What the integral of the error can tell us
   (d) The definition of a PID controller
   (e) The effect of the integral gain (K_i) on the behaviour of the controlled system
(5) Digital control systems
   (a) Why digital systems are special (the concept of sampling)
   (b) Simple digital approximations of the derivative and the integral
   (c) A discrete-time version of the PID controller
   (d) Software implementation of a PID controller

At the end of the lecture, we will do a short quiz on kahoot at https://kahoot.it/.

For questions you may reach me by email at p.sopasakis@gmail.com or in person in Office No. ... during office hours. Last updated: February 4, 2019.