



PRACTICAL CONTROL SYSTEMS ENGINEERING

A HANDS-ON-EQUIPMENT SEMINAR | JUNE 16 - 20, 2014



*Alpha Omega Engineering, Inc.
San Luis Obispo, California*

ABOUT THE PROGRAM

Control systems engineering is a little-understood topic in industry due to its highly mathematical nature. Many control loops operate non-optimally due to this lack of understanding of the technology. This seminar brings control systems engineering down to earth and presents it with a very practical, common-sense approach. It utilizes the very successful, lab-based approach developed and utilized at Cal Poly over the past decade.

In conjunction with the Mechanical Engineering Department, this course is presented by Alpha Omega Engineering, an engineering-based company in San Luis Obispo, California. Alpha Omega Engineering focuses on a variety of technologies centered on control and on the dynamics of systems. It was founded in 2011 by Dr. Frank Owen, a professor of Mechanical Engineering at Cal Poly.

ABOUT THE LAB

There will be some classroom lecture (1/3 of program) but primarily staged in Cal Poly's modern mechanical control systems laboratory with electro-mechanical, electro-hydraulic, electro-pneumatic motion control and a tank-level control system.

SKILLS TAUGHT

This is a lab-based course that focuses on classical controls engineering, showing participants how to model systems in Simulink and then how to design PID controllers for these systems. Emphasis is placed on the link between real, physical systems and the Simulink models that are used to simulate them and used to design controllers for them.

At the end of the course the participant will:

- Know the basics of modeling in Simulink
- Know the basic anatomy on a control loop, how the standard pieces fit together
- Know the difference between a positioner loop and a regulator loop
- Know what a transfer function is
- Be able to determine the transfer function of a system from its step response
- Be able to assess the stability of a system
- Understand steady-state error
- Know how to construct the root locus of a system and interpret its meaning
- Understand frequency response and know how to use it to assess system behavior
- Know how to use the root locus and the Bode plot to design a PID controller for a system
- Understand how a PID controller works
- Understand how to tune a PID controller for a given system

TESTIMONIALS

"I would recommend this course to others as I learned a great deal, created contacts with others in industry, observed others' problems and how they were solved, and learned a lot about control theory as well as practice."

"All of the labs were informative and useful, especially to someone like me with zero background and zero formal instruction in controls."

"I would absolutely recommend to others that they take this course! I thought it was an excellent intro to the material, yet I think those who have substantial experience with controls also got a lot out of the class as well. It was a good mix of theory and application..."

"I had a great time and learned a large amount of information backed by actual lab work which solidified the principles being taught."

COST

\$3,299 for 35 hours of instruction in small groups.
(\$300 discount available if you register before 6/2/14)

QUESTIONS

Contact Frank Owen with Alpha Omega Engineering at (805) 441-3995 or via email at fowen@aoengr.com

INSTRUCTORS



Hemanth Porumamilla, PhD,
Mechanical Engineer

Dr. Hemanth Porumamilla joined Cal Poly in 2007 as a lecturer for one year, an Assistant Professor from 2008-2014 and recently promoted to a tenure-track professor. At Cal Poly, Dr. Porumamilla has worked on multiple research projects

individually as well as in collaboration with fellow faculty in the Mechanical Engineering Department. In the process he has advised several undergraduate students on their senior projects and graduate students on their masters theses. Dr. Porumamilla's interest is both in teaching lab-oriented courses in Control System Design and working on projects in applied research that aim to address the needs of the real world.



Daniel Gonzalez, Masters Student
Mechanical Engineering

Mr. Daniel Gonzalez is a masters student in Mechanical Engineering specializing in Control Systems Engineering, working with Professor Frank Owen, who started the industry course Practical Control

Systems Engineering. Mr. Gonzalez is a hands-on Mechatronics expert who has done a great deal of R&D in the M.E. Controls Lab, developing new systems with more modern components and control architecture to upgrade the lab for the years to come. Mr. Gonzalez has also worked as an intern for Toyota Technical Center in Torrance, California.

SCHEDULE

Time/Day	Monday	Tuesday	Wednesday	Thursday	Friday
8:30 a.m.	Introductions, outline of course	Control loop anatomy positioner vs regulator	Modeling tanks, hydraulic positioner	Root locus	PID controller: practical aspects
9:00 a.m.	Introduction to Simulink Getting "feet wet" with Simulink	Modeling a real system - Motomatic	Tank/Positioner Labs	Tank/Positioner Labs	PID - focused lab
10:00 a.m.					
11:00 a.m.	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH
12:00 p.m.					
1:00 p.m.	Simulink exercises	Transfer functions	Stability, steady-state error	Bode plots	Wrap-up
2:00 p.m.		Motomatic - speed control, position control	Tank/Positioner Labs		Bode plots generation
3:00 p.m.					
4:00 p.m.					

LECTURE LAB

REGISTRATION



To register for this course on the web and submit payment via Paypal or credit card, please go to:

www.aoengr.com/Seminars/PracCntlSys/index.html

To submit payment for this course via check, please mail your payment to:

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