

Abstract Submitted  
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**A Low-cost, Off-the-Shelf Ready Field Programmable Gate Array diode Laser Controller With adjustable parameters** GE YANG, JOHN. F. BARRY, EDWARD SHUMAN, DAVID DEMILLE, Yale University — We have constructed a field programmable gate array (FPGA) based lock-in amplifier/PID servo controller for use in laser frequency locking and other applications. Our system is constructed from a commercial FPGA evaluation board with total cost less than \$400 and no additional electronic component is required. FPGA technology allows us to implement parallel real-time signal processing with great flexibility. Internal parameters such as the modulation frequency, phase delay, gains and filter time constants, etc. can be changed on the fly within a very wide dynamic range through an iPod-like interface. This system was used to lock a tunable diode laser to an external Fabry Perot cavity with piezo and current feedback. A loop bandwidth of 200 kHz was achieved, limited only by the slow ADCs available on the FPGA board. Further improvements in both hardware and software seem possible, and will be discussed.

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