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Microprocessor-based control system for cooling and trapping ^{6}Li atoms[1] LEVI SALYARDS, JONATHAN JEFFREY, Georgia Inst of Tech, ANDREW S. BLOUNT, The Pennsylvania State University, YUN LONG, COLIN PARKER, Georgia Inst of Tech — We present an electronic control system for laser cooling and trapping experiments. The system is responsible for all signal generation and timing used to generate a magneto-optical trap (MOT) of ^{6}Li, and for subsequent optical trapping and imaging. Our system is capable of driving acousto-optical modulators (AOMs), controlling magnetic fields, stabilizing laser intensities, and operating cameras, all of which are synchronized to a sub-microsecond interval. This improves upon other systems by incorporating a feedback element to the AOM (which allows laser intensity stabilization), by centralizing control to one computer, and by allowing simultaneous adjustment of all devices in the control system. Having a centralized control system permits us to both image the atomic trap and manage any beam from a single computer. Our control system is realized by pairing a microprocessor with each electronic device, allowing the user to tune system parameters quickly and efficiently. Communicating with the microprocessors is a two-step process. We first use TCP/IP communications to transmit to an Ethernet-capable microprocessor, which then uses serial UART communications to disseminate commands to the individual devices. Finally, we have developed a user interface that streamlines the process of controlling an experiment and removes the need for users to program a sequence.

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