Using the simple circuit in Figure 1, you can control the light intensity in your room or work area from your PC. The heart of the circuit is a low-power D/A converter that converts digital words from a computer's parallel port to analog-voltage signals. To isolate the dc low-voltage part of the circuit from the high-voltage part, the circuit uses an optoisolator, which prevents any direct electrical connection between the two sections. The optoisolator triggers triac $T_1$, which behaves like a switch. In each power cycle, $T_1$ switches on, the ac supply voltage connects to the load (lamps), and current starts flowing in the triac. At the end of a half-period, when the current drops to zero, $T_1$ turns off and awaits another trigger in the opposite direction. This additional trigger occurs in the second half-period of the power cycle. A lower triggering voltage makes $T_1$ conduct at an earlier point in and stay on for a larger fraction of the cycle. The larger fraction corresponds with transferring more power to the lamp, resulting in a higher intensity.

The output voltage of the D/A converter sets the triggering point. The DAC, after one stage of buffering, provides enough current to drive the optoisolator. IC₃ generates a 2.5V reference; the crystal oscillator and capacitors $C_1$ through $C_4$ set the DAC's timing characteristics. The DAC1220 (Burr-Brown Corp, www.burr-brown.com) connects to the parallel port with three wires for serial transfer of the digital codes. The Pascal program of Listing 1 reads the PC's keyboard; when you press Q or W, the routine increments or decrements a digital code and sends it to the DAC. The DAC then controls the lamp's intensity. Upon power-up, the DAC receives a digital code of zero, which corresponds to a 2.5V output (the reference voltage). You then adjust potentiometer $R_3$ such that the lamp is half on. Using the keyboard, you can change the light intensity to the desired level. The dc part of the circuit consumes only approximately 5 mA. (DI #2401).