I/O Systems

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9.1 INTRODUCTION

Input/Output (I/O) systems are used to connect a computer with external devices called peripherals. In a personal computer, the devices typically include keyboards, monitors, printers, and wireless networks. In embedded systems, devices could include a toaster's heating element, a doll's speech synthesizer, an engine's fuel injector, a satellite's solar panel positioning motors, and so forth. A processor accesses an I/O device using the address and data busses in the same way that it accesses memory.

This chapter provides concrete examples of I/O devices. Section 9.2 shows the basic principles of interfacing an I/O device to a processor and accessing it from a program. Section 9.3 examines I/O in the context of embedded systems, showing how to use an ARM-based Raspberry Pi single-board computer to access on-board peripherals including general-purpose, serial, and analog I/O as well as timers. Section 9.4 gives examples of interfacing with other common devices such as character LCDs, VGA monitors, Bluetooth radios, and motors. Section 9.5 describes bus interfaces and illustrates the popular AHB-Lite bus. Section 9.6 surveys the major I/O systems used in PCs.

The rest of this chapter is available online as a downloadable PDF from the book's companion site: http://booksite.elsevier.com/9780128000564.