System Design 1

It has been said that if you do not know where you are going, you will not know when you get there. Success experts tell us that the first step in achieving anything is to establish a goal—to be debt free in one year or to pay off the car in six months.

Like most things in life, the process of designing an embedded microprocessor system begins with a goal—the definition of the product. The product definition describes what the product is to be and do. The product definition is the first element in a process that is key to any successful electronics system design: documentation. The documentation describes what you are going to build and how you are going to build it. It tells marketing people what product they will have to sell, and it tells the engineering team how to implement that product. Since this book is about embedded systems, it will focus on documenting embedded systems. The development documents that I have found useful in designing embedded systems are as follows:

- **Product Requirements**: Describe what the product is.
- **Functional Requirements**: Describe what the product must do.
- **Engineering Specification**: Describes how the design will be implemented and how the requirements will be met.
- **Hardware Specifications**: Describe how specific hardware is designed.
- **Firmware Specifications**: Describe how the firmware for specific processors will be designed.
- **Test Specifications**: Describe what must be tested and how to verify that the system operates correctly.

Figure 1.1 shows how each of the documents relates to the overall design. The embedded design process generally follows these steps:

Product requirements definition

Functional requirements definition

Processor selection

Hardware/software specifications