The use of **print statements** is a popular and effective means for functional debugging. One difficulty with print statements in embedded systems is that a standard “printer” may not be available. Another problem with printing is that most embedded systems involve time-dependent interactions with its external environment. The print statement itself may be so slow, that the debugging process itself causes the system to fail. In this regard, the print statement is usually **intrusive**. Therefore, in this chapter we will develop debugging methods that do not rely on the availability of a standard output device.

There are three limitations of using print statements to debug. First, many embedded systems do not have a standard output device onto which we could stream debugging information. A second difficulty with print statements is that they can significantly slow down the execution speed in real-time systems. The bandwidth of the print functions often cannot keep pace with the real-time execution. For example, our system may wish to call a function 1000 times a second (or every 1 ms). If we add print statements to it that require more than 1 ms to perform, the presence of the print statements will cause the system to crash. In this situation, the print statements would be considered extremely intrusive. Another problem with print statements occurs when the system is using the same output hardware for its normal operation, as is required to perform the print function. For example, your watch may have an LCD, but that display is used to implement the watch functionality. If we output debugging information to the LCD, the debugger output and normal system output are intertwined.

Help