Introduction to Microcontrollers

It is getting harder to find products now that don't contain some form of computer chip. Automobiles, refrigerators, furnaces, even greeting cards all contain chips. These chips are forms of microcontrollers. Some of these chips are programmed once and they perform their function forever others have the ability to be erased and reprogrammed.

The Basic Stamp 2 seen in figure 1 is one such microcontroller.

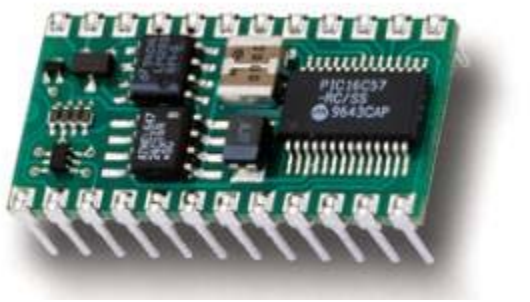

Figure 1

About half the size of a stick of gum this micro controller can be programmed to interpret input signals, make decisions, and turn outputs on and off.

Figure 2

Its small size does not limit the amount of things it can control.

Figure 3

Figure 3 shows a centipede robot whose mechanical legs and segments are under the direction of microcontrollers. In the popular TV show BattleBots, the robots all have microcontrollers.

Figure 4 shows the Diagram of what is contained on the chip.

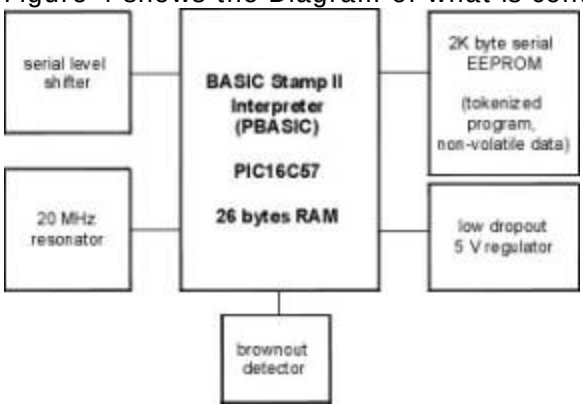

Figure 4

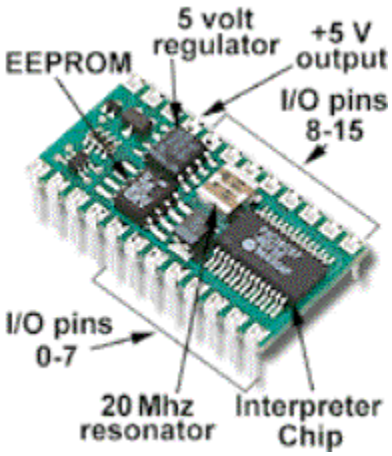

Figure 5

Figure 5 shows the various components and their location on the chip. Due to the frequent changes in chip technology your chip while resembling this one might have a different layout.

The Board of Education

In our application, the microcontroller is contained on a circuit board with many other components

that make interfacing to the outside world easy. Figure 6 shows the Board of Education. You should watch the power point about the components of the Board so you are familiar with it.

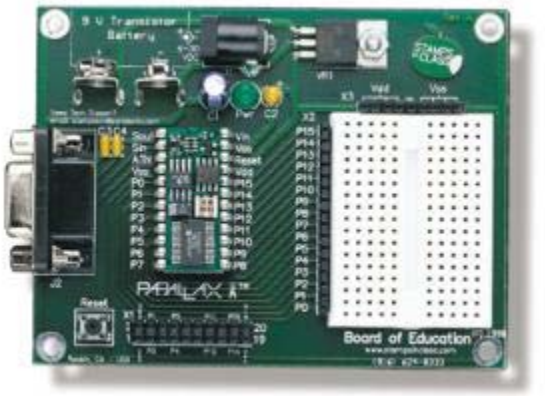

Figure 6

Watch the power point on the Board

While the board is fairly rugged care must be taken when interfacing with the outside world. The board can handle the power load of an LED but most devices draw more power than the board can safely supply. As you work on the exercises that follow, pay attention to the various buffers used to isolate the microcontroller from devices that draw more current than the chip can handle. Failure to use buffers to isolate the microcontroller will cause it to burn out. Buffers allow small devices to be insulated from a large current draw as in this industrial application.

Figure 7