Mixed-Signal Microcontroller

As explained in the accompanying article, HP's new family of mixed-signal test instruments is designed to meet the needs of designers of products that are partly analog and partly digital, such as antilock braking systems, camera control systems, appliance controls, and industrial control systems. Many of these products are based on single-chip microcontrollers. The producers of these products are demanding simpler and cheaper electronic assemblies from system developers, and this pressure to reduce costs is fed back to microcontroller suppliers in a number of ways, most of which can be summarized as a greater integration of mixed-signal peripherals with the microcontroller core. Thus, the microcontrollers themselves are becoming mixed-signal devices.

For example, Microchip Corporation's PIC14000 microcontroller integrates a number of peripherals that are often requested by system designers. This peripheral set, which is well-suited for slow-moving real-world analog signals, is packaged with Microchip's 14-bit microcontroller core to create the PIC14000. The peripherals are:

- Single-slope analog-to-digital converter (ADC)
  - 16-bit programmable timer with capture register
  - 16-ms maximum conversion time at maximum resolution with 4-MHz clock
  - 4-bit programmable current source
  - 8 external channels, two with selectable level-shift inputs
  - 6 internal channels
- On-chip temperature sensor
- Two comparators with programmable references
- Internal bandgap voltage reference
- Voltage regulator control output
- On-chip low-voltage detector.

Wes Reid
Senior Applications Engineer
Standard Microcontroller & ASSP Division
Microchip Corporation