Embedded Systems
4 - Case Study

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Assignment: Control System Example

Case study of a real time control system:

- execute a control loop at 200 Hz.
- the reference speed for the motor is received through UART communications. Setup baudrate at 9600 bps.
- set the voltage to the armature of the DC motor using PWM2H. Assume that the motor spins at 1000 RPM at 5V.
- simulate an analog current sensor using AN2 (potentiometer). The sensor outputs 3 V at 0 A, and has a scale of 10 A / V.
- send the current and temperature (AN3) feedback through UART at 1 Hz.
- blink D3 at 1 Hz to show that the program is running correctly.
- turn on D4 whenever the current exceeds 15 A.

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UART Protocol:

- The PC sends $MCREF,RPM*, where RPM is a value going from 0 to 1000. The references can come as fast as the baudrate allows. Example: $MCREF,400*
- The micro sends $MCFBK,CURRENT,TEMP*, where CURRENT is the current value in Amperes and TEMP is the temperature value at 1 Hz. Example: $MCFBK,4.3,22.2*