

ME430 Course Outline/Overview/Review:

Everyone learned 2 ways to control outputs based on inputs:

1. Microcontrollers (PIC)
2. Programmable Logic Controllers (PLCs)

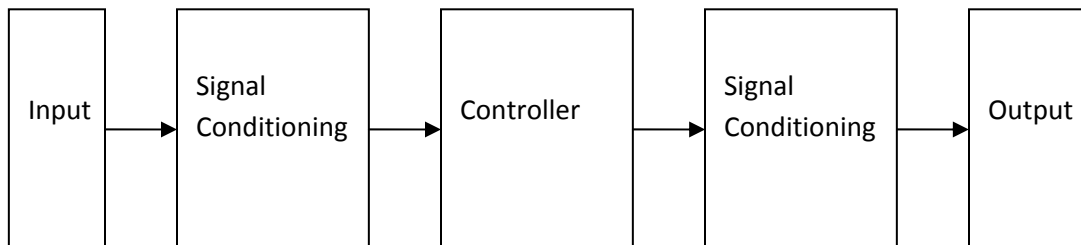
Everyone learned about 3 types of inputs and appropriate signal conditioning for them:

1. Switches
2. Potentiometers
3. IR sensors

Everyone learned to control 4 types of outputs and appropriate signal conditioning for them:

1. LEDs, including 7 segment displays
2. Motors
3. LCD displays
4. Piezoelectric buzzers

Everyone learned to use serial communication between a PC and the PIC



Controllers:

1. Microprocessors as controllers (PICs)
 - a. variable types (int, char, long) and number systems (binary, hex, decimal)
 - b. simple programming in C18 with MPLAB
 - c. functions in C18
 - d. clock frequencies, instruction frequencies, and delays
 - e. pin I/O: reading and writing inputs and output from pins
 - f. interrupts
 - i. inputs (pushbuttons)
 - ii. timers

- g. Analog to Digital Conversion (ADC)
 - h. Pulse Width Modulation (PWM)
2. Programmable Logic Controllers (PLCs)
 - a. finite state machines (FSMs) to help organize information
 - b. ladder logic programming to implement the controllers

Inputs and signal conditioning:

1. Switches
 - a. basic switch circuit
 - b. digital input for PIC
2. Potentiometers
 - a. analog input and ADC for PIC
3. IR sensors
 - a. creating the circuit and choosing the resistors
 - b. analog input and ADC for PIC

Outputs and signal conditioning:

1. LEDs, including 7 segment displays
 - a. choosing resistors
 - b. driving LEDs with individual transistors
 - c. driving LEDs with Darlington's or (similar) the 7-segment driver chip
2. Motors
 - a. DC, stepper motors, servo motors
 - b. avoiding inductive kick with snubber diodes and bypass capacitors
 - c. unidirectional control with transistors
 - d. bidirectional control with H-bridges
 - e. Pulse Width Modulation (PWM) for DC motors
3. LCD displays
 - a. using existing functions (*.c and *.h) to drive the display
4. Piezoelectric buzzers
 - a. driving with PWM

Serial Communication (UART)

1. PC to PIC
2. PIC to PC