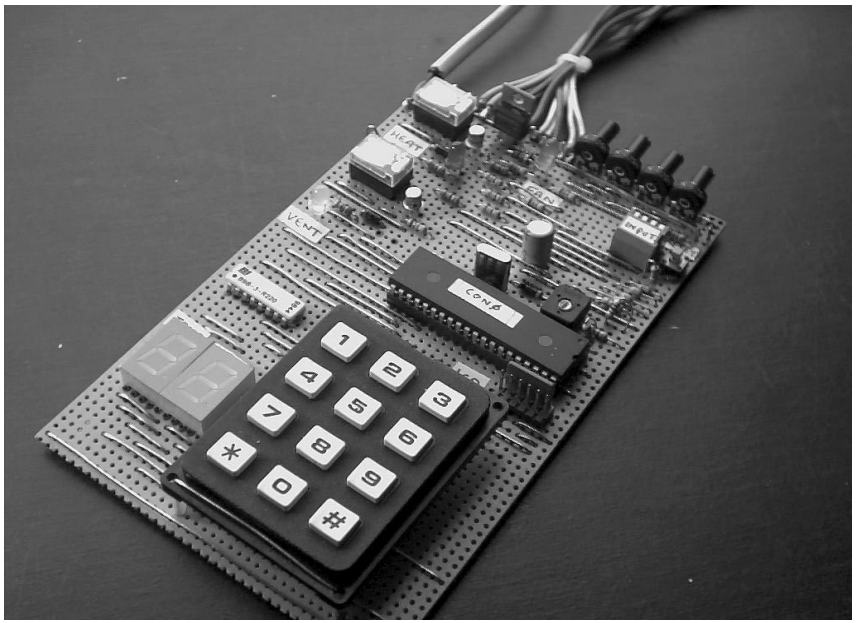
Interfacing PIC Microcontrollers

Embedded Design by Interactive Simulation



Design Schematics and Source Code Listings

These designs are provided free of charge as a learning resource for students, lecturers, enthusiasts and trainee electronic systems designers, and to support the detailed content of 'Interfacing PIC Microcontrollers, Embedded Design by Interactive Simulation'.

The schematics and source code for all the main sample applications are included in this set of PDFs. The download INTAPPS2.ZIP file contains all the project files which allow circuits to be simulated in Proteus VSM (Version 8), if a suitable license is obtained.

The PIC 16F877A is used in these designs as a reduced cost licence for this MCU model is available at the time of publication. This may be replaced by the 16F887, or suitable alternative 8-bit PIC MCU, in any hardware implementation. Appropriate minor modifications to the firmware may be needed.

If VSM is not available, the code may be tested in the simulator provided within MPLAB, the Microchip freeware development system. Suitable input stimulus files must be created, to represent the input devices, and the the output interpreted according to the peripheral attached.

It is recommended that MPLAB8 is used to test these applications as the project management is simpler (the assembler directive CODE 0 must be commented out in this case). However, MPLABX is used for projects LED2.X and LED3.X to illustrate its features.

Martin Bates, September 2013

PIC Interfacing Projects, Chapters 1-5 BASIC INTERFACING

1.1	LED1	Simplest possible output application	MPLAB8
2.1	*LED2.X	Basic controlled binary count	MPLABX
2.2	*LED3.X	Controlled count with assembler directives	MPLABX
3.1	*LED2	Controlled count with interactive simulation	Proteus VSM8
3.2	*LED3	Controlled count simulation with directives	Proteus VSM8
4.1	*COUNT1	Counts input pulses with delay debouncing	Proteus VSM8
4.2	*COUNT2	Counts input pulses with timer debouncing	Proteus VSM8
4.3	*COUNT3	Output count captured on interrupt	Proteus VSM8
4.4	KEYPAD2	Displays keypad input on 7-segment display	Proteus VSM8
4.5	LCD2	Outputs to alphanumeric LC display	Proteus VSM8
5.1	CALC2	Simple calculator with keypad and LCD	Proteus VSM8
5.2	PARMEM2	PIC MCU parallel memory expansion	Proteus VSM8

** All use same LED2 hardware*

PIC Interfacing Projects, Chapter 6 ANALOGUE INTERFACING

6.1	ADC8BIT2	Reads and displays an 8-bit analogue input
6.2	ADC10BIT2	Reads and displays an 10-bit analogue input
6.3	AMPS2	Illustrates a range of op-amp input configurations
6.4	GOFF2*	Gain and offset adjustment
6.5	AUDIO2*	Amplifier with controlled bandwidth
6.6	COMP2*	Simple, trigger and window comparator circuits
6.7	INSTAMP2	Schematic for instrumentation amplifier input stage
6.8	CLOOP2*	A current loop interface for long input signal connections
6.9	DIODE2*	Op-amp with non-linear feedback
6.10	LOGAMP2*	Logarithmic amplifier for decade scaling of input signal
6.11	PEAK2*	Basic peak detector circuit for detecting maximum siganl voltage
6.12	DACS2	Demonstrates digital to analogue output options

**Proteus VSM project with interface circuit only, not included in PDF*

PIC Interfacing Projects, Chapter 7 POWER OUTPUTS

7.1	POWER2	Output interfacing with relay, opto-isolator and oscillator
7.2	TRANS2*	Transistor output circuit analysis
7.3	PULSE2	Generates a timed output pulse
7.4	TIMIN2	Measures the period of an input pulse signal
7.5	BRIDGE2*	Bipolar transistor half bridge and FET full bridge outputs
7.6	MOTORS2	Control outputs for DC motor, DC position servo and stepper motor
7.7	BLDC2	Output interface for a brushless DC motor
7.8	MECH2	Schematic for Microchip PICDEM Mechatronics Board

**Proteus VSM project with interface circuit only, not included in PDF*

PIC Interfacing Projects, Chapters 8-10 SYSTEM INTERFACING

8.1	USART2	RS 232 serial communication using virtual terminal
8.2	SERSPI2	SPI port operation with master and slave transmitter and receiver
8.3	SERI2C2	I^2C port operation with serial flash memory
9.1	OPTO2*	Opto-isolator circuit analysis
9.2	ICSENS2	IC sensors: distance, temperature, humidity and pressure
10.1	BASE2	General purpose controller board
10.2	WEATHER2*	Interfaces for discrete sensors: temp, light, pressure, humidity
11.1	APPEND2*	Low pass filter and transmission line analysis

**Proteus VSM project with interface circuit only, not included in PDF*