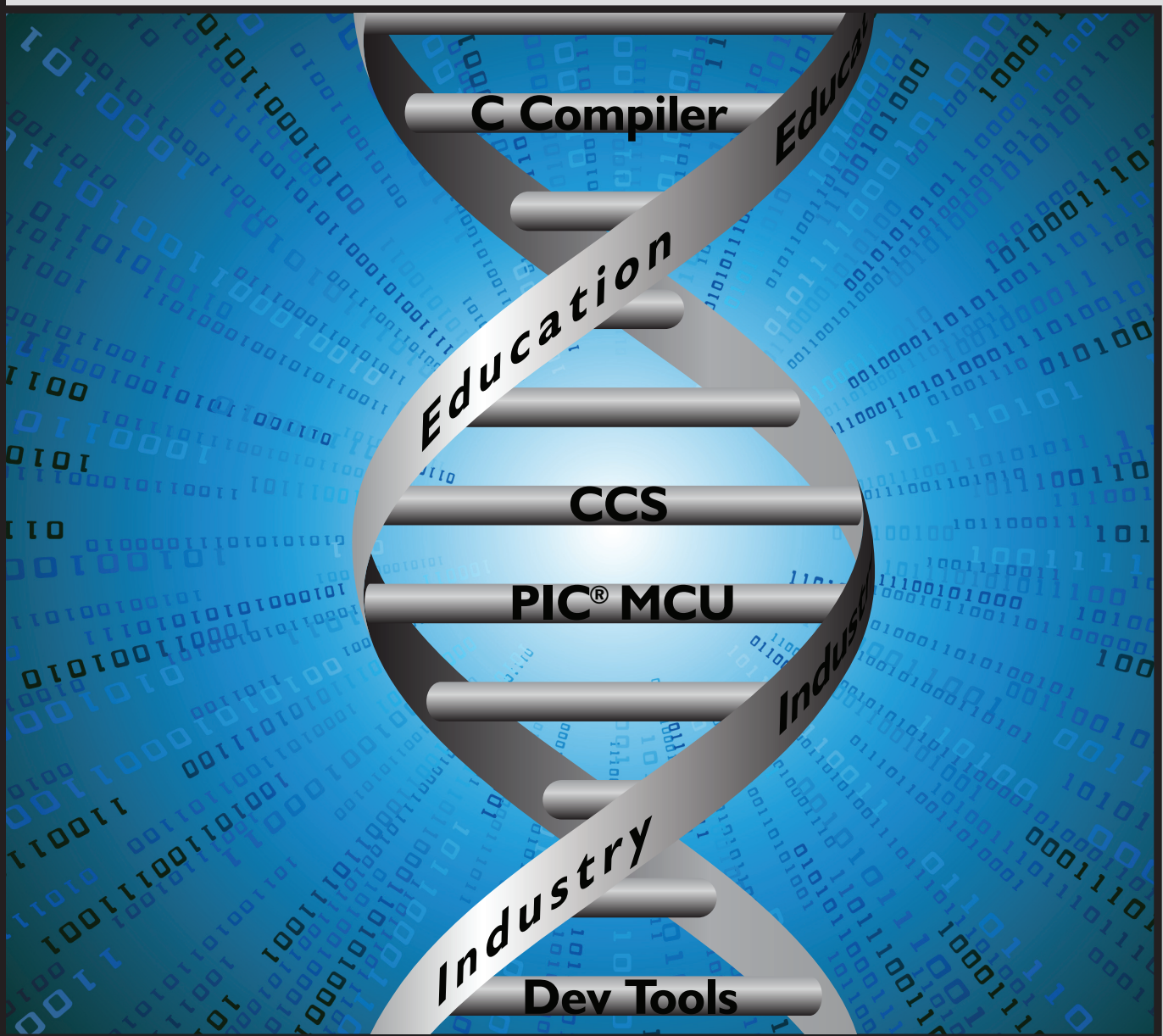


CCS Embedded PIC[®] MCU Educational Tools

Blueprint For Teaching Embedded Design



www.ccsinfo.com/sigcse
sales@ccsinfo.com
Phone: 262.522.6500
Sales x35
Tech Support x32



CCS is Your Resource for Preparing the Next Generation of Software Engineers

Microchip is the most widely used 8-bit microcontroller in the world for products supporting USB, LCD, CAN, Ethernet, Capacitive Touch Sensing, and many other emerging technologies. CCS assists educators to teach the fundamentals necessary to work with these leading edge technologies. Students are able to gain hands-on experience with technologies used in today's most innovative and energy conserving products. C programming language is the new industry standard for embedded design, and CCS leads the way with C development tools that enable students to master fundamental engineering concepts.

Why Teach C for Embedded Design?

According to Michael Barr, columnist for Embedded Systems Design,

“C remains the dominant language in the fast growing field of embedded software development [because it] offers just the right mix of low level and high level features for programming at the processor and driver level.”

Pros

1. More expressive
2. Easier to read and debug
3. Tighter, maintainable code

Cons

1. Already have a curriculum to teach assembly

Microchip PIC® MCU - #1 Selling 8-bit Microcontroller

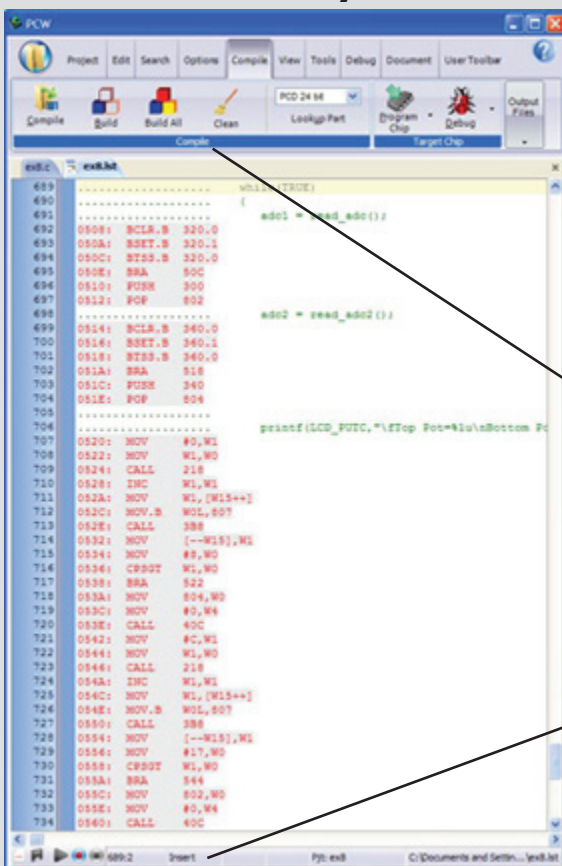
- Learn industry standard and emerging technologies
- Offer decreasing cost, small package size and low power consumption
- Highly configurable for the newest consumer electronics, automotive, medical and energy management products

CCS Products Help You Teach Effective Embedded Design

CCS provides a complete set of tools for educators teaching embedded design courses. Students can gain the experience needed in order to tackle real-world design tasks upon graduation. CCS educational tools include:

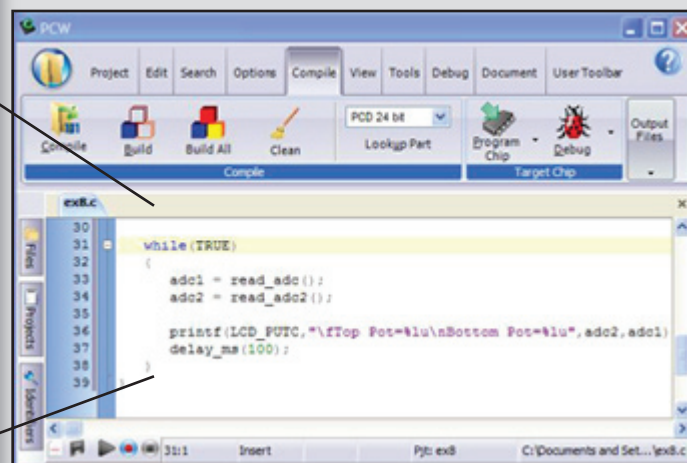
- Complete student development kits
- Software licenses for individual or lab centers
- Lab exercises suitable for teaching fundamental engineering concepts as well as the latest technologies, and solutions for lab instructors

Assembly



```
689 .....
690 .....
691 .....
692 0508: BCLR.B 320,0
693 050A: BSET.B 320,1
694 050C: BISS.B 320,0
695 050E: BRA 50C
696 0510: PUSH 300
697 0512: POP 302
698 .....
699 0514: BCLR.B 340,0
700 0516: BSET.B 340,1
701 0518: BISS.B 340,0
702 051A: BRA 518
703 051C: PUSH 340
704 051E: POP 304
705 .....
706 .....
707 0520: MOV #0,W1
708 0522: MOV W1,W0
709 0524: CALL 218
710 0526: INC W1,W1
711 0528: MOV W1,[W1++]
712 052C: MOV.B W0,W0
713 052E: CALL 388
714 0532: MOV [--W1],W1
715 0534: MOV #9,W0
716 0536: CBSET W1,W0
717 0538: BRA 522
718 053A: MOV #04,W0
719 053C: MOV #0,W4
720 053E: CALL 40C
721 0542: MOV #C,W1
722 0544: MOV W1,W0
723 0546: CALL 218
724 0548: INC W1,W1
725 054C: MOV W1,[W1++]
726 054E: MOV.B W0,W0
727 0550: CALL 388
728 0554: MOV [--W1],W1
729 0556: MOV #17,W0
730 0558: CBSET W1,W0
731 055A: BRA 544
732 055C: MOV #02,W0
733 055E: MOV #0,W4
734 0560: CALL 40C
```

C



```
30 .....
31 .....
32 while(TRUE)
33 {
34     adc1 = read_adc();
35     adc2 = read_adc2();
36     printf(LCD_FUTC, "%fTop Pot=%lu\nBottom Pot=%lu",adc2,adc1);
37     delay_ms(100);
38 }
39 .....
```

CCS C Compiler

The heart of this development tool suite is the CCS intelligent code optimizing C compiler, which frees students to concentrate on learning engineering fundamentals instead of having to become an MCU architecture expert. Enhance the learning experience with software that features:

- C-Aware, context sensitive text editor cultivates C grammar and readable, maintainable code
- Over 100 design examples- perfect for illustrating syntax and keyword usage of Standard C libraries such as stdio, float, limits, etc.
- Over 300 built-in functions specific to PIC[®] MCU registers
- Source/Assembly code list file output displaying assembly code generated from each C statement
- Hex file disassembler
- Source code level debugger with single stepping and multiple break points

Development Kit Contents



Single Chip Compiler \$50

This full-featured, single chip IDE compiler can be installed on a student's laptop, as well as on a lab PC. Students have the choice of which device is supported from the PIC16 or PIC18 device families.

ICD-U40 \$35

The ICD-U40 is a low cost complete In-Circuit Programmer and Debugger. Included is CCSLOAD programming control software for stand-alone program use.

PIC18F4520 Development Kit \$135

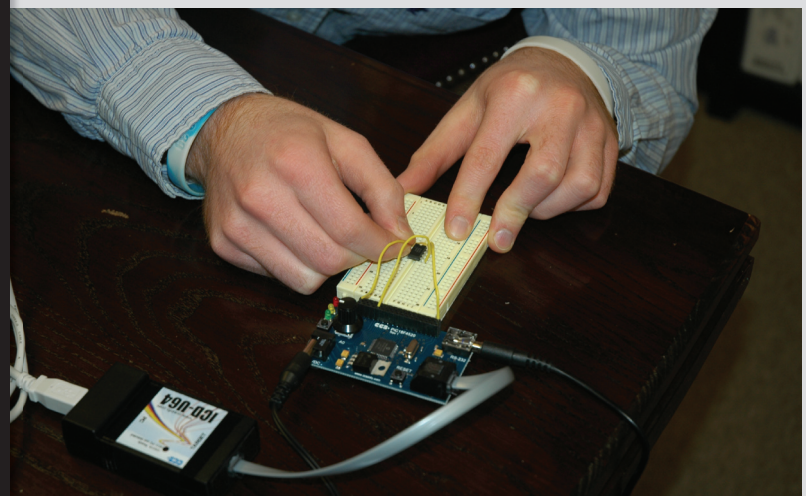
Introduce students to the recommended PIC18 family development kit - PIC18F4520 Development Kit

PIC16F887 Development Kit \$135

This development kit contains everything students need to begin development with Microchip's PIC[®] PIC16 family.

I01:C on PIC16F818 \$115

I01:C on PIC16F818 Kit is an introductory development kit for students beginning to learn programming in C. CCS recommends pairing the I01:C on PIC16F818 Kit and David Benson's C What Happens book to simplify the learning process.



Go beyond the fundamentals with one of these technology inspired development kits.

Students are able to gain hands-on experience with technologies used in today's most innovative and energy conserving products. CCS offers nine advanced technology student edition development kits that introduce students to the accelerated engineering concepts.

Development Kits	Description	Education Price
Can Bus	Supports CAN network development with the PIC18 family	\$249
Capacitive Touch	Create human touch applications with Microchip's Enhanced Mid-Range Core PIC® MCUs and mTouch™ Sensing Solution technology	\$194
DSP Analog	Demonstrates DSP features of the dsPIC33FJ128 on an audio conditioning board	\$194
Embedded Ethernet	For developing Ethernet applications with the PIC18 MCU family and ENC28J60 Ethernet transceiver	\$199
RFID	Supports RFID development with the PIC16 MCU family	\$249
USB	For developing USB interfaces with the PIC18 family	\$199
Wireless-Ember ZigBee™	Enables fast prototyping of Zigbee™ applications with the PIC18 MCU family and Ember's EM260 module	\$299
PIC18F8722 external flash	Develop applications requiring external memory and up to 2 UARTs	\$199
PIC24F for 16 MIPS	Recommended for the PIC24F family, features 2 UARTs	\$185

About CCS

CCS, Inc. is a company specializing in embedded software and hardware. Development tools are available off-the-shelf for Microchip MCUs and DSCs. In addition to a C compiler, prototyping boards, and programmers, CCS offers custom engineering services and a line of embedded ethernet devices.