Altair Embed®

Visual Environment for Embedded Systems

Altair Embed is an intuitive graphical environment for model-based embedded development. Diagrams are automatically converted to highly-optimized and compact code, which is essential for low-cost microprocessors and high-speed sampling rates. The code can be verified, debugged, and tuned with off-line simulation before downloading it to the target microcontroller (MCU).

Product Highlights

- Highly efficient diagram-to-code capability
  - Visual real-time operating system
  - Fast run time
  - Low memory footprint
  - Human readable code
- Interactive SIL, PIL, and HIL
  - Parameter tuning while system is in operation
  - Gaining system insight through data logging, buffering, and digital scopes
- State charts
  - Graphical editing of Finite State Machines
  - Simulation and code generation
- Scaled, Fixed-Point Algorithms
  - Fixed-point block library
  - Auto-scaling
  - Fast target code

Learn more:
altair.com/embed

Benefits

Rapid Development of Control Systems

Embed provides a complete tool chain for the development of embedded control systems covering Software-in-the-Loop, Processor-in-the-Loop, as well as Hardware-in-the-Loop simulations.

You can make changes to a control diagram, and compile and download it to the target MCU in seconds. Then, while the system is operating, you can interactively update the control parameters.

Using powerful data logging, buffering, and digital scoping blocks, you can gain insight into the control algorithms deployed on the target MCU in real time.

No Hand-Coding Required

Turning control diagrams into executable, real-time capable code used to require an experienced embedded software developer. With Altair Embed's code generator, a control design engineer can easily try out new algorithms on a target hardware without the need for hand-coding.

Affordable and Easily Configured Solution

Embed comes in the basic configuration already with most of the tools needed for embedded development including state charts, target support, fixed-point algorithms, efficient code generator, motor control libraries, and a lot more. This results in an affordable and easy configurable development environment.

Capabilities

Diagram-to-Code

Embed generates efficient and compact yet readable ANSI C code for discrete, continuous, and hybrid systems created using diagrams.

For example, code generated for closed-loop motor control – including PI controller, digital output, PWM, and encoder peripherals – runs at 300KHz on a 150MHz F28335 MCU with a memory footprint of 2095 bytes for code, 501 bytes for initialized data, and 504 bytes for uninitialized data.
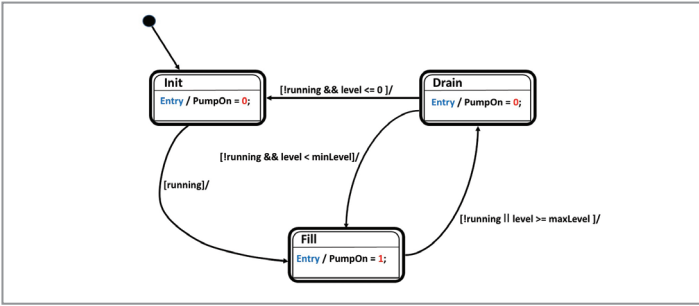
Example of draining tank logic with state charts
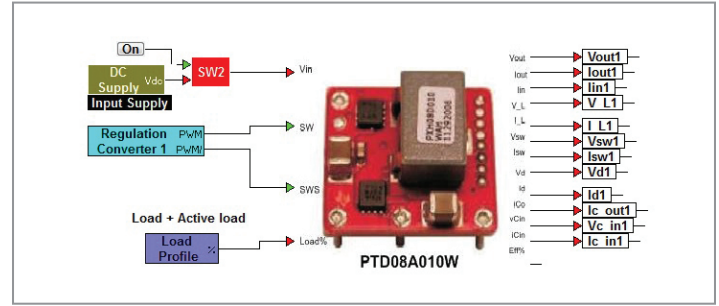
Example of digital power application

Embed allows easy integration of legacy source code and easy portability to target hardware given the generated fixed-point and floating-point code which, with automatic scaling, can be compiled on any platform with target compiler.

Diagram semantics allow users to easily configure execution of blocks using software/hardware timers, interrupts and local/global rates. Users also have the choice to use the highly efficient royalty-free scheduling scheme by Embed or to generate calls for an external RTOS.

Traceability between diagram and code makes it highly intuitive and easy to work on large diagrams with high block counts and possibly multiple layers of hierarchy.

Interactive Hardware-in-the-Loop Simulations
In MCU-in-the-loop (MIL) simulation, the plant model runs on the host computer in Embed while the control algorithm runs in real time on the target MCU.

Real-time communication between the target MCU and Embed is performed via a JTAG hotlink. Continue to use Embed's GUI while you tune parameters and monitor real-time data transfer. Embed also supports a PIL-synchronous communication mode that runs the target in lock step with the simulation, allowing easy verification of embedded algorithms.

State Charts
Embed supports OMG UML 2.1 compliant graphical state chart editing, simulation and code generation. Combined with a built-in C interpreter, this allows fast and reliable development of complex control applications.

Scaled, Fixed-Point Algorithms
The Fixed-Point block library lets you perform simulation and efficient code-generation of scaled, fixed-point operations.

Overflow and precision loss effects are easily seen and corrected at simulation time. Auto-scaling speeds fixed-point development, while in-line code generation creates fast target code.

Target Hardware Support
Embed hardware agnostic code with abilities to also extend it for using target-specific blocks for any embedded targets. With the growing list of hardware support, Embed currently supports micro-controllers from Texas Instruments (C2000, MSP430/Concerto), Atmel (Atmega 328/2560/32u4) popularly used in the Arduino, and Generic MCU support to extend to other silicon families.

Embed also provides device driver blocks that include analog ADC, ePWM, eCAP (event capture), SPI, SCI (RS232 serial), I2C, digital GPIO, QEP (quadrature encoder), and CAN 2.0.

Add-ons

Embed/Digital Power Designer
Provides a library of components and subsystem models tailored to digital power applications (including power converters, controllers, compensators, sources, and more).

Embed/Comm
Lets you model end-to-end communication systems at the signal or physical level. It provides fast and accurate solutions for analog, digital, and mixed-mode communication systems.