TI Innovation Challenge:

Europe Analog Design Contest 2014

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# what is the TI Innovation Challenge: Europe Analog Design Contest 2014?

The Texas Instruments Innovation Challenge: Europe Analog Design Contest 2014 is an initiative to encourage system-level design within universities. It is an opportunity for university students to show creativity and engineering skills whilst working on a design project using TI’s broad range of high-performance analog integrated circuits (ICs). This contest allows students to gain experience and recognition in the analog field as well as competing against other teams for cash prizes!

# what you can win

**First Round:**In the first round there will be twenty winning teams. Each of these teams will be awarded a cash prize of US$ 1,000. These twenty winning teams will progress to the second round of judging.

**Second Round:**In the second round there will be four winning teams of the contest.

The TOP 4 team prizes will be awarded as follows:

* **First place: US$ 10,000**
* **Second place: US$ 5,000**
* **Third place: US$ 2,500**
* **Fourth place: US$ 2,500**

Note: All cash prizes will be paid to the team leader of each winning team.

# deadlines and important dates

* Registration deadline: 23:59 (GMT) on 28th February 2014  
  (To register, the team leader should access the [**TI IC Europe Portal**](https://tieurope.harte-hanks.be/TIIC-EU/).)
* Tools request deadline: 23:59 (GMT) on 30th April 2014  
  (Tool requests must be submitted by the team leader through the [**TI IC Europe Portal**](https://tieurope.harte-hanks.be/TIIC-EU/).)
* Report submission deadline: 23:59 (GMT) on 31st July 2014  
  (Reports must be submitted by the team leader through the [**TI IC Europe Portal**](https://tieurope.harte-hanks.be/TIIC-EU/).)
* First round winners announced by: 30th September 2014
* Second round winners announced by: 31st October 2014

# tools

## recommended evaluation modules

Some of our tools are stocked and ready to be shipped; therefore you will be able to start working with them very quickly!

|  |  |
| --- | --- |
| analog  tools | **ADC (Analog to Digital Data Converters)**   * ADS1258EVM, ADS8332EVM, ADS7864M-EVM: The EVM provides a quick and easy way to evaluate the functionality and performance of this low power, high resolution, Analog to Digital Converter (ADC). The EVM provides a serial interface header to easily attach to any host microprocessor or TI DSP base system. * [THS1206M-EVM](http://www.ti.com/tool/ths1206m-evm): This EVM can accommodate all eight devices of the THS1206 family of data converters. This family consists of high-speed, low power, 10 and 12-bit ADCs that operate from independent 5V, Avdd, and 3.0-5.25V, DVdd, supplies. Independent buffer supply, BVdd, eliminates the need for level-shifting circuitry when the device is used with low voltage host controllers.   **DAC (Digital to Analog Data Converters)**   * [DAC8411EVM](http://www.ti.com/tool/DAC8411EVM): Evaluation module designed for the prototyping and evaluation of the DAC8411, DAC8311, DAC7311, DAC6311 and DAC5311 digital to analog converters (DAC). These 8 to 16-bit, string DACs operate with a high speed serial clock (up to 50MHz) and offer excellent performance with power consumption as low as 2.5uW.   **Power Management**   * [TPS60400EVM-178](http://www.ti.com/tool/tps60400evm-178): The TPS60400EVM-178 is a evaluation tool for the TPS6040x family of SOT23-5 inverting charge pumps. These devices generate an unregulated negative output voltage from an input voltage in the range of 1.6 V to 5.5 V with an output current of up to 60 mA. * [TPS54233EVM-373](http://www.ti.com/tool/TPS54233EVM-373): The TPS54233 dc/dc converter is designed to provide up to a 2 A output from an input voltage source of 3.5 V to 28 V. This evaluation module is designed to demonstrate the small printed-circuit-board areas that may be achieved when designing with the TPS54233 regulator. The high-side MOSFET is incorporated inside the TPS54233 package along with the gate drive circuitry. * [TPS2490EVM-001](http://www.ti.com/tool/TPS2490EVM-001): Hot Swap Power Manager integrated circuits (ICs) ensure the hot-swap safety and add protection during fault conditions for boards or modules in +48-V hot swap environments. The ICs feature programmable current and power limiting, electronic circuit breaker, adjustable undervoltage-lock enable input, and power-good reporting output. * [TPS54231EVM-372](http://www.ti.com/tool/tps54231evm-372): The TPS54231 dc/dc converter is designed to provide up to a 2 A output from an input voltage source of 3.5 V to 28 V. This evaluation module is designed to demonstrate the small printed-circuit-board areas that may be achieved when designing with the TPS54231 regulator. |
| processors  (digital tools) | **DSP**   * [TMDX5515EZDSP](http://www.ti.com/tool/tmdx5515ezdsp), [TMDX5535EZDSP](http://www.ti.com/tool/tmdx5535ezdsp), [TMDX5505EZDSP](http://www.ti.com/tool/tmdx5505ezdsp): These USB Stick Development Tools are a small form factor, very low cost USB-powered DSP development tools which includes all the hardware and software needed to evaluate the industry's lowest power 16-bit DSP.   **MCU (Microcontrollers)**   * [TMDS28027USB](http://www.ti.com/tool/tmds28027usb): The innovative Piccolo controlSTICK allows quick and easy evaluation all of the advanced capabilities of TI’s new Piccolo microcontroller for just $39. Slightly larger than a memory stick, the Piccolo controlSTICK features on board JTAG emulation and access to all control peripherals. Example projects walk the user through the advanced functionality of Piccolo, from simply blinking an LED to configuring the high resolution ePWM peripherals. * [MSP430 LaunchPad Value Line Development Kit](http://www.ti.com/tool/msp-exp430g2): The LaunchPad is an easy-to-use flash programmer and debugging tool. It features everything you need to start developing on a MSP430 microcontroller device, with an on-board emulation for programming and debugging and features a 14/20-pin DIP socket, on-board buttons and LETs & BoosterPack-compatible pinouts that support a wide range of plub-in modules for added functionality such as wireless, displays & more. * [MSP-EXP430FR5739](http://www.ti.com/tool/msp-exp430fr5739): The MSP-EXP430FR5739 Experimenter supports this new generation of MSP430 microcontroller devices with integrated Ferroelectric Random Access Memory (FRAM). The board is compatible with many TI low-power RF wireless evaluation modules such as the CC2520EMK. The Experimenter Board helps designers quickly learn and develop using the new MSP430FR57xx MCUs, which provide the industry's lowest overall power consumption, fast data read /write and unbeatable memory endurance. The board can help evaluate and drive development for data logging applications, energy harvesting, wireless sensing, automatic metering infrastructure (AMI) and many others. * [BeagleBone Black Development Board (BEAGLEBK)](http://www.ti.com/tool/beaglebk): BeagleBone Black is a low-cost, open source, community-supported development platform for ARM Cortex-A8 processor developers and hobbyists.  Boot Linux in under 10-seconds and get started on Sitara AM335x ARM Cortex-A8 processor development in less than 5 minutes with just a single USB cable. * [BeagleBone Development Board (BEAGLEBN)](http://www.ti.com/tool/beaglebn): The BeagleBone is a low-cost, community-supported development platform for ARM Cortex-A8 processor developers. BeagleBone's capabilities can be extended using plug-in boards - called capes - that can be plugged into the BeagleBone's two 46-pin dual-row expansion headers. Capes are available for DVI-D, VGA, LCD, motor control, prototyping, battery power and other functionality. * [Stellaris LaunchPad Evaluation Kit (EK-LM4F120XL)](http://www.ti.com/litv/pdf/spmu289c): The Stellaris LaunchPad Evaluation Kit is a low-cost evaluation platform for ARM® Cortex™-M4F-based microcontrollers from Texas Instruments. The board features an 80MHz LM4F120H5QR microcontroller, on-board emulation and BoosterPack XL format expansion pins making it easy and simple to expand the functionality of the Stellaris LaunchPad when interfacing to other peripherals with Texas Instruments' MCU BoosterPacks. * [C2000 Piccolo LaunchPad (LAUNCHXL-F28027)](http://www.ti.com/tool/launchxl-f28027): The LaunchPad is based on the Piccolo TMS320F28027 with unique features such as 64KB of on board flash, 8 PWM channels, eCAP, 12bit ADC, I2C, SPI, UART, and much more. With all the hardware and software needed to start development, users can focus on learning or developing real-time control systems in areas such as digital lighting, motor control, digital power conversion or precision sensing.   **MCU & LPRF (low-power RF)**   * [EZ430-CHRONOS-868](http://www.ti.com/tool/ez430-chronos): The eZ430-Chronos is a highly integrated, wearable wireless development system based for the CC430 in a sports watch. It may be used as a reference platform for watch systems, a personal display for personal area networks, or as a wireless sensor node for remote data collection. * [EZ430-RF2500](http://www.ti.com/tool/ez430-rf2500): The eZ430-RF2500 is a complete wireless development tool for the MSP430 and CC2500 that includes all the hardware and software required to develop an entire wireless project with the MSP430 in a convenient USB stick. The tool includes a USB-powered emulator to program and debug your application in-system and two 2.4-GHz wireless target boards featuring the highly integrated MSP430F2274 ultra-low-power MCU.   **BoosterPack**   * [430BOOST-C55AUDIO1](http://www.ti.com/tool/430boost-c55audio1): The Audio Capacitive Touch BoosterPack is a plug in board for the MSP430. The kit offers a complete reference design for capacitive touch solutions, using the capacitive touch I/O ports of select MSP430 Value Line microcontrollers. This reference design allows designers to easily control the C5000 ultra-low-power DSP using TI’s MSP430 microcontroller for crystal clear playback and record of MP3 audio/voice files. * [430BOOST-CC110L](http://www.ti.com/tool/430boost-cc110l): The CC110L RF BoosterPack is a low-power wireless transceiver extension kit for use with the Texas Instruments MSP-EXP430G2 LaunchPad development kit. Based on the CC110L device, the on-board Anaren Integrated Radio (AIR) A110LR09A radio module with integrated antenna operates in the European 868-870MHz band. * [430BOOST-SENSE1](http://www.ti.com/tool/430boost-sense1): The Capacitive Touch BoosterPack is a plug in board for the MSP430. This BoosterPack features several capacitive touch elements including a scroll wheel, button and proximity sensor. Also, on- board are 9 LEDs that provide instant feedback as users interact with the capacitive touch elements. * [BOOST-CCEMADAPTER](http://www.ti.com/tool/boost-ccemadapter): This BoosterPack kit contains one "EM Adapter BoosterPack". The purpose of the EM adapter board is to provide an-easy-to-use bridge between any of the TI MCU LaunchPads and the vide variety of TI RF evaluation modules (EM), for instance the CCxxxx Low-Power RF evaluation modules. * [BOOSTXL-C2KLED](http://www.ti.com/tool/boostxl-c2kled): The C2000 LED BoosterPack demonstrates the control of 3 boost converters to drive 3 LED (Red, Green, and Blue) strings. A variety of user interface options are provided included capacitive touch control using an MSP430 and the MSP430 Cap Touch as well as a PC GUI application. This BoosterPack is ideal for real time digital control techniques and LED lighting. |

## recommended parts

The amount of different ICs from TI can be overwhelming. Please see the following list for short overview of recommended devices.

How to get the ICs? Find out [here](#_how_to_order).

|  |  |
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| data converters  ICs | **General-Purpose ADC**   * [THS1206M](http://www.ti.com/product/ths1206): 12-bit, 6-MSPS A/D converter, quad-channel, integrated 16x FIFO, channel autoscan, low power.   **Instrumentation ADC**   * [ADS1258](http://www.ti.com/product/ads1258): 24-bit, fast channel cycling ΔΣ ADC   **High-Speed ADC**   * [ADS1605](http://www.ti.com/product/ads1605): 16-bit, 5-MSPS ΔΣ A/D converter * [ADS1606](http://www.ti.com/product/ads1606): 16-bit, 5-MSPS single-channel ΔΣ ADC with FIFO   **General-Purpose DAC**   * [DAC8554:](http://www.ti.com/product/dac8554)16-bit, quad channel, ultra-low glitch, voltage output D/A converter Projects: Portable instrumentation, closed-loop servo-control.   **High-Precision DAC**   * [DAC8534:](http://www.ti.com/product/dac8534)2.7-V to 5.5-V, quad-channel, 16-bit, serial input DAC Projects: Portable instrumentation, programmable attenuation, and PC peripherals.   **High-Speed DAC**   * [DAC8581](http://www.ti.com/product/dac8581): 16-bit, high-speed, low-noise, voltage output D/A converter Projects: CRT projection/TV digital convergence, waveform generation and ultrasound projects. |
| power management  ICs | **Low-Dropout Regulator (LDO)**   * [TPS73501](http://www.ti.com/product/tps73501): Single-output LDO, 500-mA, adjustable, low quiescent current, low noise, high PSRR   **Multi-Cell Li-Ion Charger**   * [bq24750A](http://www.ti.com/product/bq24750a): Host-controlled, multi-chemistry battery charger w/integrated system power selector. Projects: Notebook PCs, portable DVD players.   **Power Sequencer**   * [UCD9080](http://www.ti.com/product/ucd9080): Power supply sequencer and monitor. Projects: Telecommunications switches, servers, networking equipment and test equipment   **LED Driver**   * [TLC5940](http://www.ti.com/product/tlc5940): 16-channel LED driver w/EEprom dot correction and grayscale PWM control Projects: Mono-color, multi-color, and full-color LED displays, LED signboards and display backlighting   **AC/DC Controller**   * [UCC28600](http://www.ti.com/product/ucc28600): 8-pin quasi resonant flyback green-mode controller  Projects: Supplies for LCD monitors, LCD-TV, PDP-TV and set-top boxes, AC/DC adapters and offline battery chargers   **Buck/Boost for Portable Applications**   * [TPS63000](http://www.ti.com/product/tps63000): 96% buck-boost converter with 1.8-A current switches in 3x3 QFN Projects: Portable audio players, PDAs, cellular phones and personal medical apps * [TPS62400](http://www.ti.com/product/tps62400): Dual, adjustable, 400-mA and 600-mA, 2.25-MHz step-down converter with 1-wire interface in QFN * [TPS61200](http://www.ti.com/product/tps61200): 0.3-V input voltage boost converter with 1.3-A switches and down mode in a 3x3 QFN  Projects: Portable media players, digital radio, digital cameras, fuel cell- and solar cell-powered projects   **Wide-Input Buck**   * [TPS5430](http://www.ti.com/product/tps5430): 5.5-V to 36-V, 3-A, 500-kHz step-down SWIFT™ converter * [TPS40200](http://focus.ti.com/docs/prod/folders/print/tps40200.html): Wide input non-synchronous buck DC/DC controller Projects: Set-top boxes, DVD, industrial and car audio power supplies, distributed power systems and DSL/cable modems   **High-Current Buck**   * [TPS54010](http://focus.ti.com/docs/prod/folders/print/tps54010.html): 2.2-V to 4.0-V, 14-A synchronous step-down SWIFT™ converter * [TPS40055](http://www.ti.com/product/tps40200): Wide input (8V-40V) up to 1-MHz frequency synchronous buck controller, source/sink Projects: Broadband, networking, optical communications infrastructure and industrial servers   **MOSFET**   * [CSD16413Q5A](http://www.ti.com/product/tps40200): N-channel NexFET™ power MOSFET |
| Amplifiers  ICs | **Instrumentation Amp**   * [INA118](http://www.ti.com/product/ina118): Precision, low-power instrumentation amp   **Op Amps**   * [OPA277](http://www.ti.com/product/opa277): High-precision op amp, single * [OPA2277](http://www.ti.com/product/opa2277): High-precision op amp, dual * [OPA4277](http://www.ti.com/product/opa4277): High-precision op amp, quad |
| Switches  ICs | * [TS12A4517](http://www.ti.com/product/ts12a4517): Low-voltage, low on-state resistance SPST CMOS analog switches |
| Low-Power RF  ICs | **LPRF devices cover 2 frequency ranges:**   * [CC10XX](http://www.ti.com/product/cc1000)/[CC11xx](http://www.ti.com/product/cc1101) - Sub 1GHz, ISM (Industrial, Scientific and Medical) and frequency bands at 315, 433, 868 and 915MHz * [CC24xx](http://www.ti.com/product/cc2400) and [CC25xx](http://www.ti.com/product/cc2500) -2.4GHz, ISM and SRD band: 2,400 - 2,483.5MHz |

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| Processors  ICs | **MSP430 Ultra-low Power MCUs**   * [MSP430FG4618](http://www.ti.com/product/msp430fg4618): Integrated signal chain: ADC, DAC, op-amps, 16MHz, LCD controller * [MSP430F5438](http://www.ti.com/product/msp430f5438): Next-generation MSP430, ADC, 256-KB memory, 25MHz * [MSP430F169](http://www.ti.com/product/msp430f169): General-purpose MCU, ultra-low power, 64-KB memory * [MSP430F2013](http://www.ti.com/product/msp430f2013): DIP package available, ultra-low power, smallest MSP430, easy to use   **C2000 Real-Time Control MCUs**   * [TMS320F28335](http://www.ti.com/product/tms320f28335): Floating point, 150MHz w/ hi-res PWMs |

## recommended software

There are several software tools that could be useful in your project. You can download software (limited versions) for free from the TI website. Just follow the links by clicking on the software name.

|  |  |
| --- | --- |
| software | **Design**   * [Code Composer Studio](http://www.ti.com/tool/ccstudio): Integrated development environment for Texas embedded processor families. CCStudio comprises a suite of tools used to develop and debug embedded applications. Please use time-limited or code-limited license. * [WEBENCH Power Designer](http://www.ti.com/ww/en/analog/webench/power.shtml): You can use WEBENCH to create customized power supplies or DC-DC converters for your circuits. This environment gives you end-to-end power supply designs and prototyping tools. * [SmartRF Studio](http://www.ti.com/tool/smartrftm-studio): Can be used to evaluate and configure Low Power RF-ICs from Texas Instruments. The application will help designers of RF systems to easily evaluate the RF-ICs at an early stage in the design process. * [WEBENCH SensorAFE Designer & WEBENCH Sensor Designer Tools](http://www.ti.com/lsds/ti/analog/webench/sensors-overview.page): These tools provide complete sensor circuit design for common sensing, transmitter, and transducer applications. You can start with an industry standard sensor or specify your own sensor requirements to create your own custom sensor. WEBENCH sensor tools provide you with optimized signal path performance, bill of materials, budgetary cost, and links to evaluation boards and other tools for testing and validating your simulated solution. * [WEBENCH Filter Designer](http://www.ti.com/lsds/ti/analog/webench/webench-filters.page): The WEBENCH Filter Designer lets you design, optimize, and simulate complete multi-stage active filter solutions within minutes. Create optimized filter designs using a selection of TI operational amplifiers and passive components from TI's vendor partners.   **Tools**   * [GRACE](http://www.ti.com/tool/grace): GUI-based configuration tool for setting up ADCs, OpAmps, Timers, Clocks, GPIO, Comparators, Serial Communication, and other MSP430 peripherals. Generates easy-to-understand C code that properly configures your device * [Stellaris PinMux Utility](http://www.ti.com/tool/lm4f_pinmux): Allows a Stellaris developer to graphically configure the device peripherals in an intuitive and rapid manner. The tool provides an easy-to-use interface that makes setting up alternate functions for GPIOs easy and error-free. * [Tiva C Series MCUs PinMux Utility](http://www.ti.com/tool/tm4c_pinmux): The Tiva C Series PinMux Utility allows a Tiva C Series MCU developer to graphically configure the device peripherals intuitively and rapidly. This tool provides an easy-to-use interface that makes setting up alternate functions for GPIOs easy and error-free.   **Simulation**   * [TINA TI](http://www.ti.com/tool/tina-ti): Easy-to-use, powerful circuit simulation tool based on a SPICE engine. TINA-TI is a fully functional version of TINA, loaded with a library of TI macromodels plus passive and active models.   **Software & Code Packages**   * [MSP430 Ware](http://www.ti.com/tool/msp430ware) (already part of CCS installation): Collection of code examples, datasheets and other design resources for ALL MSP430 devices delivered in a convenient package - essentially everything developers need to become MSP430 experts! * [Stellaris Ware](http://www.ti.com/lsds/ti/microcontroller/arm_stellaris/code_examples.page): Extensive suite of software designed to simplify and speed development of Stellaris-based microcontroller applications. All StellarisWare software has a free license and royalty-free use to allow the creation of full-function, easy-to-maintain code. * [Control Suite](http://www.ti.com/lsds/ti/microcontroller/32-bit_c2000/software.page): Cohesive set of software infrastructure and software tools designed to minimize software development time. From device-specific drivers and support software to complete system examples and technical training, controlSUITE™ provides libraries, examples, and support at every stage of development and evaluation. * [TivaWare for C Series](http://www.ti.com/tool/sw-tm4c): TivaWare software for C Series is an extensive suite of software tools designed to simplify and speed development of Tiva C Series-based MCU applications. All TivaWare for C Series software has a free license, and allows royalty-free use so users can create and build full-function, easy-to-maintain code. |

## 

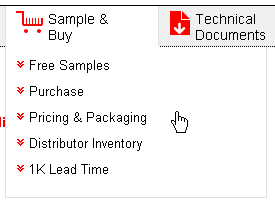
## how to order tools and samples?

* Samples - chips produced by TI
* Tools - development boards sold by TI to evaluate its chips

Both samples and tools are different products and must be ordered differently.

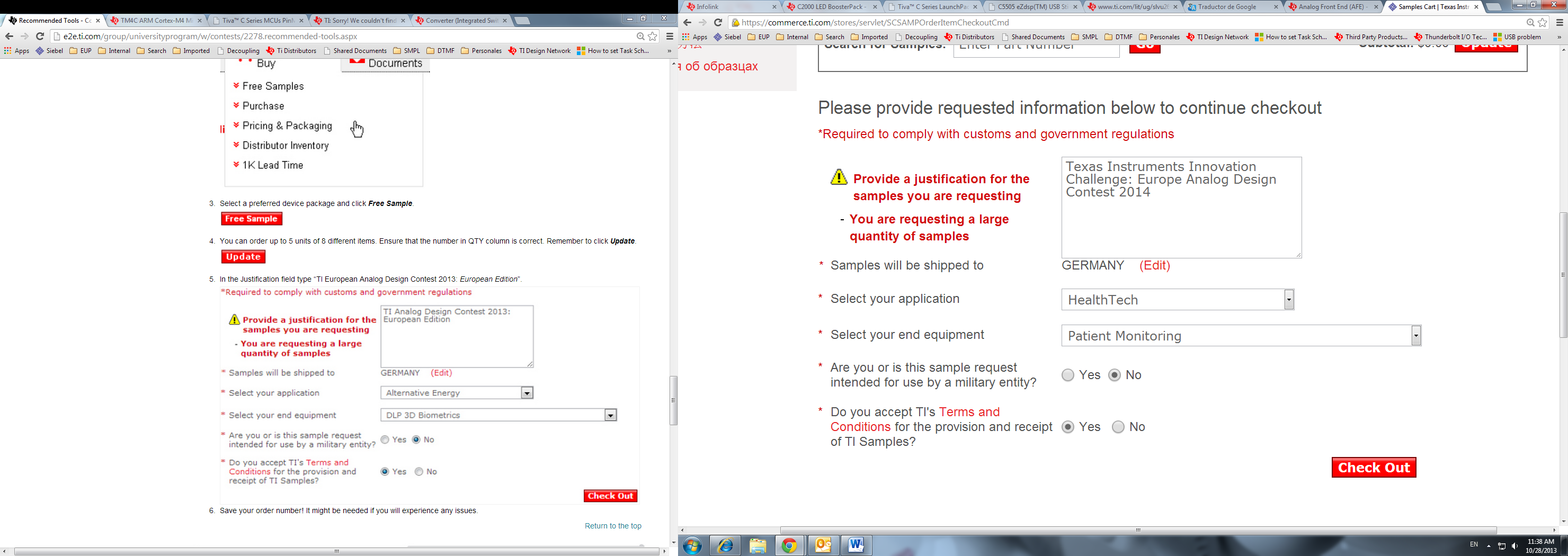
### ordering samples

Please ask your **Professor** to order samples for your team as students may face problems. You will find a guideline for ordering tools in the next section of this document. The European University Program does not send any samples. All samples are provided through TI’s sampling program and the standard TI sampling rules apply.

1. If your Professor is not registered on [my.ti.com](http://my.ti.com), they must register with a university .edu email address.
2. Find a product page on [ti.com](http://ti.com). Click Free Samples under Sample & Buy button.  
   
3. Select a preferred device package and click Free Sample  
   
4. You can order up to 5 units of 8 different items. Ensure that the number in QTY column is correct. Remember to click Update.



1. In the Justification field type “Texas Instruments Innovation Challenge: Europe Analog Design Contest 2014”.



1. Save your order number! It might be needed if you will experience any issues.

### ordering tools

### The team leader must login to the tool request page on the [TI IC Europe Portal](https://tieurope.harte-hanks.be/TIIC-EU/) and submit the teams’ tool request online. The tool request must be $100 or less and must only include tools. ICs are not allowed to be ordered and will not be accepted as part of the tool request. Tool requests must be made before the deadline: 23:59 (GMT) on 30th April 2014.

We advise you to firstly check the **Recommended List** available on the tool request page of the [**TI IC Europe Portal**](https://tieurope.harte-hanks.be/TIIC-EU/) for the most popular tools. If the tool you want is not on the Recommended List, use the **Freeform** and fill in the part number, website hyperlink and price.

**Notes:**

* No PO Box Addresses will be accepted in the shipping address.
* Do not order samples this way.

<http://www.ti.com/tool/> 🡨 This is a valid tool page.  
<http://www.ti.com/product/> 🡨 This is not a valid tool page. Requests from such pages will be rejected.

## non-EU participants

### import charges?

TI ships tools from its European (EU) warehouse. This means that for non-EU participants, shipments of tools could be subject to local import duties (such as VAT) and customs clearance charges on arrival in your country. These charges are your responsibility. **They will not be paid by TI under any circumstances!**

### what can you do to avoid import charges?

In order to try to avoid such charges we recommend the following:

* Use your professor and your University as the shipping address, rather than your home or lodging address.
* Purchasing the tools you need from a Local Distributor in your country may be easier for some items and avoids all import charges (We do not give teams cash. You will have to pay for the tools yourself).

# help

1. We encourage you to have a discussion with your professor.
2. TI E2E™ community [e2e.ti.com](http://e2e.ti.com/)

# report

You can use software of your choice in order to write your report but your report **must** be submitted in **PDF, DOC or DOCX-format**with a maximum size of **30MB**. Your team leader must login to the [**TI IC Europe Portal**](https://tieurope.harte-hanks.be/TIIC-EU/) and submit the project report online by **23:59 (GMT) on 31st July 2014**.

We recommend following structure:

1. Title page
2. Introduction
3. Motivation for project
4. Theoretical background
5. Implementation
6. Experimental results
7. Conclusions
8. Summary
9. Future plans
10. Bill of materials

## technical requirements

Please remember that projects that do not meet the requirements might receive lower points from the judges.

* Total 10 pages maximum (plus 1 page extra, only for complete bill of materials).
* Font size must be equal to or greater than 12pt (except for the abstract where the minimum is 10pt.)
* Language: English
* Page size: A4 (ISO 216)
* Margins: Top, Bottom, Left and Right: 1” (Normal)
* File format: PDF, DOCor DOCX-format
* Must include:
  + Detailed written description of the design and a specific description of how each Texas Instruments analog IC or processor benefited the overall design.
  + Clear block diagram of device
  + List of **all** components used in your project (part manufacturer, part number and quantity)
* Maximum file size is **30MB**

Your project should follow typical guidelines for technical paper: clear & simple technical language, schematics & plots should be properly marked. Remember that visual appearance is important.

### title page

The title page **must** include:

* Team leader name and email address
* Project title
* Assistant Professor name and email address
* Team member names and email addresses
* University name and Country
* Project abstract under 250 words (cannot be located even partially beyond title page)
* Part number with quantity and embedded link to product page at [www.ti.com](http://www.ti.com)
* Date of submission
* Picture of the team and picture of the project

We recommend using a **template** that is available to download at [www.ti.com/tiic-eu](http://www.ti.com/tiic-eu). You are free to change the layout as long as the requirements remain unaffected.

# judging criteria

**The Texas Instruments Innovation Challenge: Europe Analog Design Contest 2014 involves two rounds of judging:**

* **First Round:** Each design report will be judged by at least two competent TIers, who are experienced in analog and systems design. There will be twenty winning teams selected from Round 1.
* **Second Round:** The top twenty winning teams from the first round will automatically proceed to the second round of judging. These top twenty teams will compete against each other to win the “Chairman’s Award”. Each of these twenty design reports will be judged by a panel of three judges: two university professors and a competent non-TI industrial professional.

**In both rounds, the total score that the judges give each design report will determine the winning teams. All judges for the contest are required to be fair and impartial.**

Below are the judging criteria which each design report will be marked against during both rounds of the contest. The reports are judged based on 6 different criteria, on a scale from 0-10, where scores can be any number between 0-10. Each criterion is worth a maximum of 10 points, with 10 points being exceptional, 5 points being average and 0 points being no competence.

The six judging criteria are:

* **Idea/Concept/Originality**:
  + **10 Points**: A unique idea.
  + **5 Points**: An average idea that other people have used before but new ideas have been added.
  + **0 Points**: An idea used many times in the past with well-known applications.
* **Engineering**:
  + **10 Points**: High quality of engineering displayed. A deep analysis of the methods and tools chosen. Clear analysis of the results with the best approach being used to achieve the results.
  + **5 Points**: Good engineering skills displayed with some analysis of the methods and toolschosen. The methods chosen were not the best way to achieve the desired result.
  + **0 Points**: Poor engineering skills displayed with no analysis of the methods and tools chosen. No analysis of the results provided.
* **Analog:**
  + **10 Points:** High competence and ability in the Analog field. Appropriate tools have been used in the design report. Excellent understanding of analog principles.
  + **5 Points:** Some competence in the Analog field displayed. Some use of appropriate tools. Some understanding of key analog principles.
  + **0 Points:** No ability or understanding demonstrated in the Analog field and appropriate tools were not used.
* **Benefits of chosen TI tools/devices:**
  + **10 Points:** Excellent analysis of TI tools/devices chosen and the benefits that they provide. Tools/devices chosen are the most appropriate available.
  + **5 Points:** Good analysis of TI tools/devices chosen. Tools/devices chosen are a good choice but better alternatives could have been used.
  + **0 Points:** No discussion of the benefits of TI tools/devices chosen. Poor choice of tools/devices and not suitable for application.
* **Practicality**:
  + **10 Points:** Design developed and built by the team. Design worked and successfully met the objectives set out.
  + **5 Points:** Design did not fully work. Clear analysis provided as to why the design did not work or meet the desired objectives.
  + **0 Points:** Design is not built or is built but does not work. No analysis is proved as to why the design did not work or meet the desired objectives.
* **Report Quality**:
  + **10 Points:** High quality design report that clearly conveys the chosen idea and work carried out. Relevant diagrams and illustrations are used. Design report is well structured and easy to understand.
  + **5 Points:** Average quality design report with limited structure. Some diagrams and illustrations are used.
  + **0 Points:** Low quality design report which is poorly written and structured. No diagrams or illustrations are used and design report is hard to understand.