UBM Electronics

Plastics perk up flexible electronics 7

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Ten technologies that will change the world in 2013

By R. Colin Johnson

The technologies and people changing the world of electronics in 2013 are hawking innovations that range from new consumer electronics user interfaces to new semiconductor virtual prototyping tools.

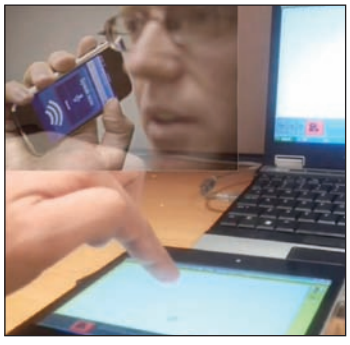
Many of these innovations are focused on the explosive mobile information and communications revolution. In fact, the number of online devices already outnumbers the people on the Earth, according to Cisco, and over 1.2 billion more mobile smartphones and tablets

will be added next year, according to Gartner.

The total market for information and communications technologies will exceed $3 trillion in 2013, according to IDC. As a result, many of the technologies and people that define that electronics landscape in 2013 will be those that affect a large segment of those information- and communications-device users -- from touchscreen innovations for smartphones and tablets to wireless health monitors for disease management and aging-in-place elderly. Here are ten technologies *EE Times* predicts will make a significant impact in 2013:

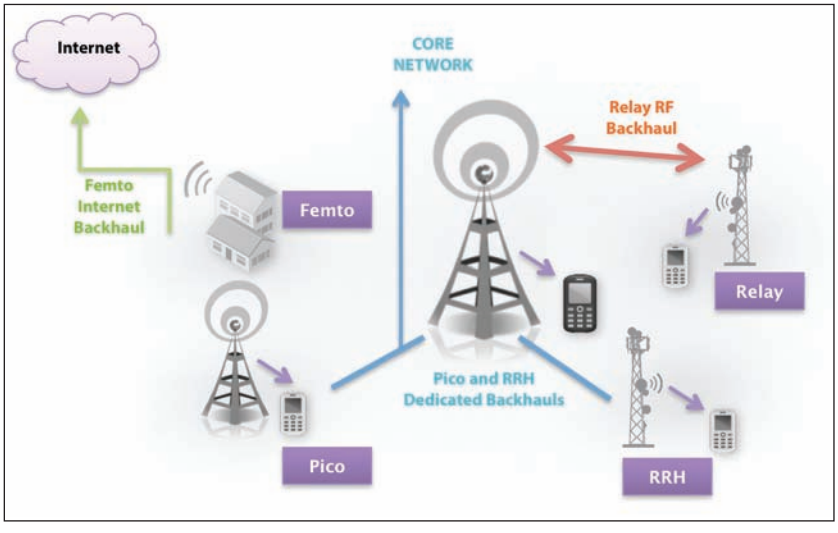
3-D gestures

Users will be able to perform very fine adjustments that are not possible using today's finger-on-glass user interface. STMicrosystems' General Manager Analog, MEMS & Sensors Group Benedetto Vigna (shown here giving voice commands, upper left) demonstrates a capacitive multi-touch screen controller chip that will sense the finger while it hovers above the touchscreen (see circular dot below Vigna's finger, bottom).



SOURCE: ST MICROELECTRONICS

Taps, drags and menu selection are all handled by voice commands.



SOURCE: UBM TECH

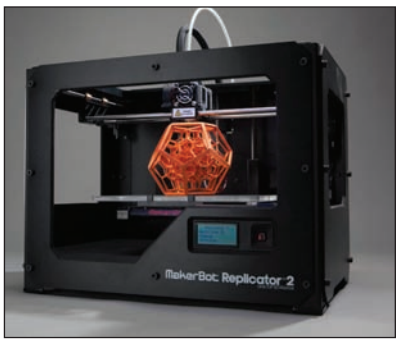
Heterogeneous nets

Heterogenous networks (HetNets) will practically solve the current data deluge problem caused by wildly proliferating smartphones, tablets and Internet-of-Things (IoT) devices. HetNet basestations make the current 4G roll-out more affordable by virtue of both lower capital and operational expenditures. Choosing the right size cell – Femto (up to 16 users), Pico (up to 100 users), Metro (up to 256 users), or Macro (1000 users) – enables remote radio heads (RRH) to handle optimal backhaul to the core network.

SOURCE: BLACK & DECKER

Motion enablers

MEMS sensors will integrate sensor data about the user's proximity and environment, enabling every device used by humans – from power tools to vehicles – to become enabled by motion. The first example of this gigantic emerging market is Black & Decker's gyroscope-enabled electric screwdriver which automatically switches the direction it turns a screw just by flicking your wrist in that direction.



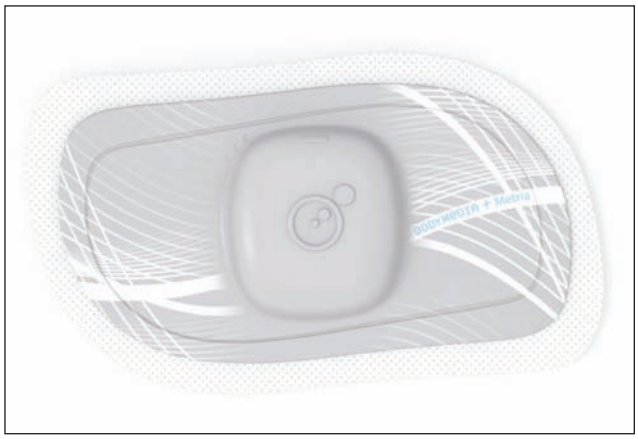
SOURCE: MAKERBOT

3-D printers

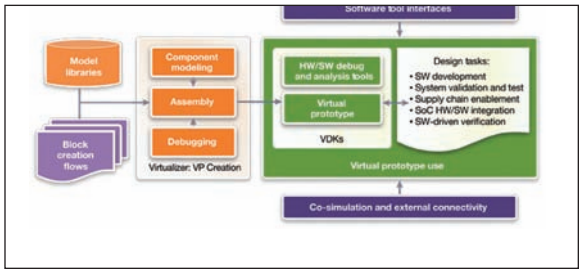
3-D printing will enter the mainstream as consumer-grade printers costing under $2000 will enable home-brewed personalized products, such as the Cube 3-D printer from 3-D Systems Corp. (Rock Hill, N.C.) and the Replicator 2 from MakerBot Industries (Brooklyn, N.Y.). By the end of 2013, a dozen different manufacturers will be competing in consumer-grade 3-D printers which extrude plastics from an ink-jet-like head with sub-millimeter-scale accuracy.

Disposable health monitors

BodyMedia already has successfully marketed a MEMS-enabled wrist-watch-like activity monitor for fitness buffs that combines an accelerometer with a skin conductance sensor, a heat-flux sensor and a temperature sensor – with plans to add an ECG sensor in 2013. Disposable MEMS-based patches used for health and fitness, as well as a host of other disposable applications such as smart pills with sensors inside, represents a vast new medical market for MEMS chips in 2013.



SOURCE: BODYMEDIA

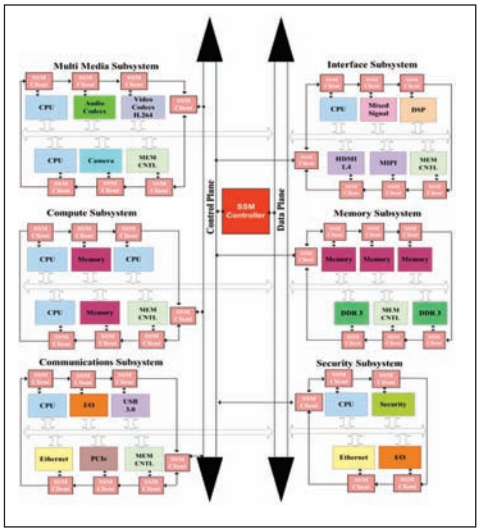


SOURCE: SYNOPSYS

Virtual SoC prototypes

Virtual prototypes (VPs) allow designers to save development time as well as cut costs. For instance, Synopsys' Virtualizer (center above) creates VPs from its EDA model libraries and block-creation flows. VPs are then submitted to Synopsys' hardware/software analysis tools to verify SoC performance.

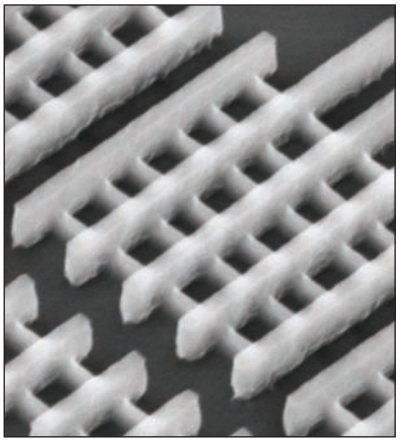
FPGA-driven emulators can be loaded directly from the VPs to allow hardware testing and third-party peripherals to be developed before the SoC is fabricated.



SOURCE: SEMICO

IP subsystems

IP subsystems will aid in the rollout of commercial subsystems in the third party IP market. Semico predicts that over 25 percent of all SoC unit shipments in 2013 will contain IP subsystems, rising to more than 65 percent by 2015. In the figure, Semico is illustrating how almost all of the functions on an SoC today can be constructed from IP subsystems under the control of an SoC System Manager.



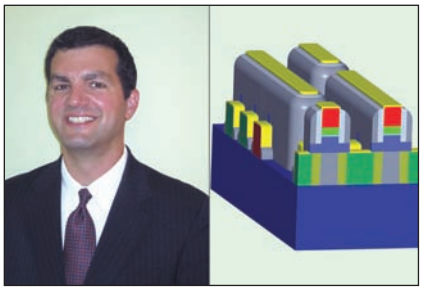
SOURCE: INTEL

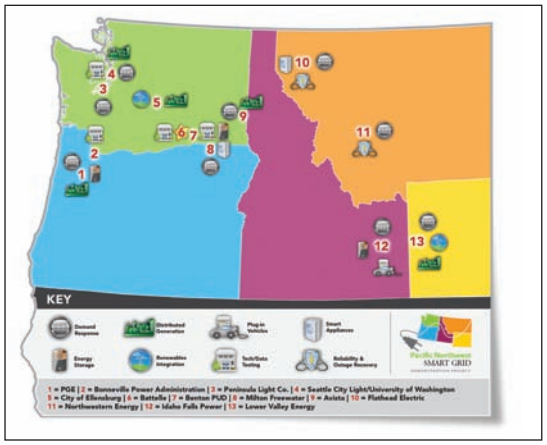
3-D FinFETs

Competitors to Intel's tri-gate 3-D FinFET transistors (pictured) will have their own 3-D FinFET architecture, or will be going with a foundry's FinFET in their quest for lower voltage semiconductors with mitigated gate-leakage. A few vendors are combining 3-D with SOI, such as IBM which recently worked with Cadence to tape out an ARM processor using 14-nanometer 3-D FinFETs on SOI.
Intel is a moving target – already talking about skipping 10-nanometer, and going directly from 14-nanometer to 8-nanometer.

Virtual foundry

David Fried, Coventor chief technology officer, was chief technologist for IBM's 22-nm process, when he worked with Conventor Inc. to reinvent its SEMulator3D – originally a tool for crafting 3-D MEMS structures as a virtual foundry for building and testing 3-D semiconductor material stacks before they are fabricated (shown here is a FinFET SRAM cell). SEMulator3D's virtual process models kick out virtual metrology data showing how yields will be affected by different film thicknesses.





SOURCE: PNW-SGDP

Smart grid

The first full year of real-time operation of the five-year $178 million Pacific Northwest Smart Grid Demonstration Project will demonstrate how grid operation can be optimized by using smart meter information that integrates renewable energy sources from local solar, wind and wave electricity generators. Lead technology partner IBM Research's main goal is to demonstrate that cyber security can go hand-in-hand with energy efficiency in a smart-grid intelligent cyber-physical system.