CMOS TEMPERATURE SENSORS

The basic outline of the tutorial is as follows:

1) Introduction, overview and application requirements of Temperature sensors.

2) Temperature sensing elements for the standard CMOS process (This might also cover off-chip elements like NTC).

3) System design requirements for temperature sensors.

4) Typical temperature sensor Front-End circuits.

5) Signal paths: typical requirements and examples (low/moderate power, moderate/high accuracy, etc.).

6) Signal path techniques like chopping, DEM and CDS, etc.

7) Details of ADCs used for data conversion.

8) Calibration requirements and physical limitations.

9) Future Research areas and Conclusion.

Speaker Profiles:

A.G.Krishna Kanth

A.G.Krishna Kanth has been working in the field of Analog Design for the past 15 years and has successful track record of delivering first-pass analog IC tapeouts. He received his Bachelors and Masters degrees from IIT Bombay with specialization in Microelectronics. He was the recipient of President of India Shankar Dayal Sharma Gold medal in 2002. He started his career in Texas Instruments India as an analog design engineer. He worked with QualcoreLogic heading the analog team, ensuring the success of many analog IPs. He started working for AMS from 2006 as Group Lead for the Analog design team and is currently heading all the analog product development activities in India. He is also pursuing his part-time PhD research work from IIIT Hyderabad. He has three patents and three IEEE publications. His research interests include Power management circuits, sensor interfaces, amplifiers, filters and precision analog circuits in the Sensor and Sensor Interfaces Division in India.

V.Veeresh Babu

V. Veeresh Babu has 13 years of experience in the field of CMOS Analog design. He completed his M.Tech from IIT Bombay in 2003. He got all India 4th rank in GATE 2001. He worked as Team lead M.T.S at QualcoreLogic during 2003 to 2006. During this period he has successfully taped out many PLLs IPs and a clock chip. He started working for AMS from 2006 as Analog design engineer. Experience in AMS includes high precision analog circuits such as voltage references, SAR ADC, SDM ADC, high precision temperature sensor, DCDC converter focused on automotive design flow. He has a published patent,
three IEEE publications and is the recipient of best paper award in VLSI design conference. He is currently working as a senior engineer in AMS and also pursuing his part-time PhD research work with BITS Hyderabad. His research interests include Battery management systems, high precision band gap references and analog signal processing.

Chandra Nyshadham

Chandra Nyshadham received his Bachelor of Engineering in Electronics from Andhra University, Vishakhapatnam, India, in 2004. He received his Master of Technology in VLSI Design from GGS Indraprastha University, New Delhi and was University Gold Medalist for the academic years 2005-2007. From 2007 to 2010, he worked on integrated PLLs and CMOS I/Os at QualCoreLogic, Hyderabad. He joined AMS in 2010 and is currently designated as Staff engineer-Analog. His experience at AMS comprises core analog circuits from comparators, opamps, rail to rail analog buffers, biases and references, etc. to On-chip Oscillators, Voltage Regulators, Automotive Transceivers, High Voltage CMOS design, Front-ends for Temperature Sensors, Active RC filters, Switched Capacitor circuits, etc. He is currently working in the role of technical lead for sensor interface products. His research interests include sensor interface design, precision reference design, amplifiers, data converters, voltage regulators and EMC issues in analog circuit design.

Presenters have experience in designing silicon-proven high performance CMOS temperature sensors of Automotive grade (-40degC to 150degC temperature) in many ASSP products and custom made ASICs (examples from public domain information indicated below)

AS8510: [http://www.ams.com/eng/Products/Sensor-Interfaces/Data-Acquisition-Front-End/AS8510](http://www.ams.com/eng/Products/Sensor-Interfaces/Data-Acquisition-Front-End/AS8510)