# K-16 Committee

**Heat Transfer in Electronic Equipment**  
*A joint committee of the Heat Transfer Division (HTD) and the Electrical and Electronic Packaging Division (EEPD)*

(All contact info is current as of July 2009 unless otherwise noted)

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Associate Professor of Mechanical Engineering  
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Research interests: phase change materials, transient thermal management of electronics, nanomaterials, carbon nanotubes, carbon nanofibers, two phase flow, jet impingement cooling, experimental and numerical heat transfer |

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<tr>
<th>Vice Chair</th>
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| **Gamal Refai-Ahmed, Ph.D.**  
Fellow ASME  
AMD Fellow and Chief Thermal Architect  
Graphics Product Group  
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Dr. Gamal Refai-Ahmed, ASME Fellow, obtained his M. A. SC. and Ph. D. from the University of Waterloo, Canada. He is specialized in the thermal management of electronic and optical packaging, where he developed innovative electronic packaging products in Nortel, Astec-Emerson, Cisco, Ceyba and ATI Technologies. Currently, he is the AMD Fellow and Chief Thermal Architect of the Graphics Products Group. He has over 55 technical papers and 20 patents/patents pending. He is also the vice chair of the electronic and photonic packaging division committee, EPPD, ASME as well as the vice chair of the electronic packaging committee, K-16, Heat transfer Division, ASME. |

<table>
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<tr>
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| **Samuel Graham**  
Assistant Professor  
College of Engineering  
School of Mechanical Engineering  
e-mail: sam.graham@me.gatech.edu  
Tel: 404-894-2264 |  
Synthesis and Characteristics of Nanomaterials |
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<th>Member Name and Address</th>
<th>Description</th>
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| **Amanie N. Abdelmessih, Ph.D.**  
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Tel: (360) 438-4532  
Fax: (360) 438-4548  
Email: abdelmessih@stmartin.edu | Convective (natural and forced) heat transfer, and absorption cycles cooling |
| **Professor Dereje Agonafer**  
Director  
Electronics, MEMS & Nanoelectronics Systems Packaging Center  
Mechanical and Aerospace Engineering Department  
500 West First St, Rm 211A  
Woof Hall  
University of Texas at Arlington  
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Phone: 817-272-7377 Fax: 817-272-5010  
Email: agonafer@uta.edu | The research at the Electronics, MEMS, and Nanoelectronics Systems Packaging Center is multidisciplinary and focuses on a variety of topics related to thermo/mechanical issues in Microelectronics, MEMS and Nanoelectronics with broad applications including computers, telecommunications and bio-fluidics. The EMNSPC microsystems reliability is located at UTA’s Automation & Robotics Research Institute (ARRI). The team uses the fabrication capability at UTA’s NanoFab Research and Training Facility. |
| **Cristina H. Amon, SC.D.**  
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Institute for Complex Engineered Systems  
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| **Ann M. Anderson, PhD**  
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Department of Mechanical Engineering  
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TEL: (518) 388-6537  
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Email: andersoa@union.edu | Forced and free convection air cooling of electronics with emphasis on temperature prediction methods. Experimental and numerical modeling studies of heat transfer in electronics. |
| **Avram Bar-Cohen**  
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<tr>
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<th>Research Interests</th>
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<td>Mulugeta K Berhe, Ph.D</td>
<td>Senior Thermal Engineer, Intel Corporation</td>
<td>Computational Heat Transfer and Fluid Flow</td>
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<tr>
<td>Sushil H. Bhavnani</td>
<td>Alumni Professor, Auburn University</td>
<td>Direct immersion cooling, enhancement of natural convection, fundamentals of heat transfer from structured surfaces, boiling from cavity-enhanced heat sinks, web-based electronics thermal management education</td>
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<tr>
<td>David Copeland, DrEng</td>
<td>Sun Microsystems</td>
<td>Thermal management of servers, Air, liquid, and refrigeration cooling, Heatsink and coldplate optimization, Temperature dependence of power</td>
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</tbody>
</table>
| Tonapi Sandeep, Ph.D.         | Avneshak                                                      | - Thermal management of notebook/personal computers, workstations, and large system servers  
|                               | http://www.anveshak.com                                      | + Air/liquid cooling, refrigeration, thermoelectrics, heat pipes, etc.              |
|                               | Tel: 1480-518-7393                                           | + Cooling at the device, package/module, and system level                          |
|                               | E-Mail: sandeep.tonapi@anveshak.com                          | - Thermo-mechanical aspects of electronic packaging                                |
| Michael J. Ellsworth, Jr. P.E.| Senior Technical Staff Member, Advanced Thermal Laboratory IBM Corporation | - Numerical analysis: FEA, CFD                                                       |
**Timothy S. Fisher**  
Associate Professor of Mechanical Engineering  
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Research interests: small-scale heat transfer and fluid dynamics, direct energy conversion, thermal phenomena in semiconductors, molecular electronics, electron field emission, synthesis of carbon nanotubes, inverse computational methods, and finite- and boundary-element methods.

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High-performance cooling technologies  
Microelectronics packaging/cooling  
Microscale thermal phenomena  
Interface dynamics/tracking  
Electronic and composite materials processing

**Dr. Samuel Graham**  
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thermophysical property measurements, thermal metrology, lattice dynamics modeling, heat dissipation in wide bandgap semiconductors and organic electronics

**Brendon R. Holt**  
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</table>

Application of thermal analysis to the design of electronic equipment and development of thermal analysis methods.

Convection in porous media
Cooling Technology for Electronic packages
Optimum Design of Heat Exchanger, Heat Pipes and Heat Sinks

Computational fluid Dynamics and heat transfer;
Finite element analysis,
Micro/Nano scale heat transfer in electronics;
Free, forced and phase change heat transfer in electronics
<table>
<thead>
<tr>
<th><strong>Lemmy L. Meekisho, Ph.D.</strong></th>
<th>Computational Thermal and Thermal-Mechanical Phenomena in Electronics and Electronic Packaging. Materials issues and thermal management in Electronic Packaging</th>
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<td><strong>Chuck Minning</strong></td>
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<td>New Millennium Program</td>
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<td>Thermal management in printers Cooling at the device, package/module and system level Numerical analysis: FEA, CFD</td>
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<td><strong>Jayathi Murthy</strong></td>
<td>Computational fluid dynamics and heat transfer - Finite volume methods and unstructured mesh techniques - Numerical methods for radiative transport - Reduced order modeling - Numerical methods for multiphase flows - Heat and mass transfer in micromanufacturing - Microscale heat transfer - Electronics cooling - Applications in aerospace, automotive, glass, and chemical-process industries</td>
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<td><strong>Mark North</strong></td>
<td>Heat pipes for high heat flux applications Improved structures for evaporative heat transfer Single phase heat transfer in porous media Optimization of heat pipes and heat pipe systems Experimental methods for two-phase heat transfer</td>
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<td>Mark T. North, Ph.D.</td>
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Alfonso Ortega
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Research in Electronics Thermal Management focused on Experimental Methods, Advanced Air Cooled and Hybrid Air/Liquid Cooled systems, Air Cooling Limits, Conjugate Heat Transfer in electronics, Compact Thermal Models of electronic components such as packages and heat sinks, and Enhanced Cooling strategies such as Jet Impingement cooling.

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Thermal management and packaging of LED devices and systems

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Dr. Price is involved with the thermal management of military and commercial electronic systems. In addition to fundamental work on the application of porous media to liquid-cooled cold plates for phased-array radars, he has been involved in the development of adaptive numerical solution techniques to enable the transient solution of finite difference thermal models of Monolithic Microwave Integrated Circuit (MMIC) devices and modules where the scale varies over six orders of magnitude, the measurement of the thin-film thermal properties of MMIC materials, and the simultaneous measurement of MMIC electrical performance characteristics and channel temperatures.

Koneru Ramakrishna, Ph. D.
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Reliability of on-chip copper/low-k interconnects, thermal and thermo-mechanical simulation of chip backend processes, electronics cooling, thermal management of electronic packages, development of mechanistic methodologies to predict thermal characteristics of electronic packages, simulation of thermo-mechanical aspects of electronic package manufacturing processes, equipment, and reliability.

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| **Bahgat Sammakia**  
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- High performance thermal interface materials with enhanced with Nano-structures  
- Reliability of micro scale packages  
- Bio Packaging Microsystems |
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| **Jeffrey C. Suhling**  
Quina Distinguished Professor, and Director NSF Center for Advanced Vehicle Electronics (CAVE)  
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TEL: (334) 844-3332  
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unnikrishnan.vadakkanmaruveedu@intel.com | Advancement in passive cooling technologies for micro electronic packages  
Application of Carbon Nano Tubes (CNTs) for thermal systems  
Numerical methods in heat and fluid flow |
| **Greg Walker**  
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