

## Message from the Chair

On behalf of the organizing committee, it is my pleasure to welcome you to our second annual IEEE Wireless Hive Networks Conference (WHNC). The 2008 expanded program highlights the growing interest in wireless hive networks. We benefited again this year from our close collaboration with National Instruments in co-locating IEEE WHNC with NIWeek 2008. In addition, we appreciate the financial support of the IEEE-USA and the IEEE Central Texas Section.

In architecture research, hive networks exist under the names of “Pixie dust,” “Smart dust,” “Sensor networks,” and “Ad Hock networks.” Researchers assumed that the devices for those networks would evolve based on ever-shrinking silicon electronics, creating intelligent wireless dust-particle-size devices. However, the reality of antenna size, power output, and physical distances dictate that the fully integrated hive devices are between the size of a postage stamp and a cell phone. Creating a low-cost device at this size is not reachable by silicon wafer technologies alone. In combination with the new technologies of printed electronics, however, the target can be met.

Printed electronics include circuits made of conductive polymer, carbon nanotubes, and/or crystalline silicon, and printed on Mylar, stainless steel or sapphire substrates. The key advantage of printed electronics over the silicon wafer is that printed electronics applies to the non-shrinkable elements of the device, including the display, antenna, battery, analog power circuits, sensors (mic), actuators (speaker) touch screen, or keyboard, etc., as well as to the shrinkable parts (low power analog, memory, and logic). Consider a cell phone: in the future all the elements of the cell phone may be produced as one (folded) Mylar sheet, thus significantly enhancing reliability and reducing costs (nothing to assemble or solder).

Conductive polymers (organic semiconductors) is a Nobel Prize technology presently reaching the market through OLED displays by Sony and other manufacturers. The focus of printed electronics falls into two distinct categories: *Matrix devices* and *Hive devices*. Matrix development focuses on single replicated elementary devices, used for lighting panels, OLED displays and solar cells, all ranging in size from a few to a few thousand square inches. In contrast, Hive devices contain a complex set of elements including sensors, actuators, power circuits, antenna, logic, memory and operating system. Our conference aim is to bridge the gap between the “top down” views of Hive networks architecture (that are, for example, concerned with message hopping protocols) and the “bottom up” views of the materials and processes to produce this low cost, very large size (by silicon chip standards) high-reliability Hive devices.

Our Thursday, keynote speaker, Jon Adams, Director of Wireless Strategy at Freescale and former Vice-Chairman of the Zigbee Alliance, will discuss the evolution of hive network device technologies. Dr. Walt Trybula, Director of the Nanomaterials Application Center, will address the opportunities and challenges of ubiquitous wireless networks. Our Thursday lunch panelists will share their perspectives on wireless applications in the health industry – from research to applications to regulation. Accepted conference papers will be presented, reflecting current research on Hive networks.

I want to thank our organizing committee, especially Vice-Chair Kristi Hummel who virtually willed the conference into being, Treasurer Frances Freeman who stepped-in as a late replacement, and Publications Chair Saurabh Sureka, also a recent substitute. The program committee chaired by Steve Crowl did a superb job of managing the paper submission and review process as well as organizing our speakers.

Enjoy the conference.

Hanan Potash, Ph.D. IEEE Senior Member,

2008 WHNC Chair