

the challenge:

Bring NJIT to national leadership in wireless telecommunications and networking by 2008.

the progress:

NJIT's programs in wireless telecommunications, signal processing and networking continue to expand their base of research funding in collaboration with public and private partners including NASA, the U.S. Army, Samsung and IDT.



networking

Computer-Assisted Community

Envisioning a future in which wearable computers help students locate their friends on campus and even facilitate introductions to new acquaintances with similar interests, a team of researchers are working to make NJIT a national prototype SmartCampus. Constantine Manikopoulos, (above, right) associate professor of electrical and computer engineering, and Quentin Jones, (above, left) assistant professor of information systems, are leading a team of faculty drawn from electrical engineering, information systems, computer science, human-computer interaction, humanities and architecture. The project is supported by funding from the National Science Foundation and Hewlett-Packard.

The team will develop a mobile, wireless NJIT campus community system along with the software and protocols to support a wide range of location-based computing services. NJIT will serve as a dispersed laboratory for the study of online communities in terms of community building; co-ordination of mobile teams; user privacy; and security. SmartCampus will aid the analysis and

understanding of the underlying technical and social issues and their interactions, taking into account rising privacy concerns while creating the infrastructure for a heterogeneous mobile wireless community.

Researchers will address the security and privacy concerns that such a network raises. Building upon Manikopoulos' expertise in intrusion detection and network defense, the team will develop ConexGuard, a novel SmartCampus security-on-demand framework designed for the network's heterogeneous environment, and create privacy-sensitive applications that make use of contextual factors — the properties of people and places and the relationships between them — that are unique to people to people to places, or P3 systems such as SmartCampus.

The project will also enrich the curriculum — the team foresees the development of masters programs in human-computer interaction and information assurance and new courses in such areas as wireless security and wearable computing.



IMPROVING THE CAPABILITY OF WiMAX

Yehezkel Bar-Ness, distinguished professor and Foundation chair, and executive director of the Center for Communications and Signal Processing, is leading a collaborative project with Samsung (Korea) to improve the capability of WiMAX – Worldwide Interoperability for Microwave Access – a certification mark for products that pass conformity and interoperability tests for the IEEE 802.16 standards. The WiMAX protocol, a way of networking computing devices together, is similar to Wi-Fi, (wireless fidelity), but faster and longer-range.

WiMAX is revolutionizing the broadband wireless world, enabling the formation of a global mass-market wireless industry. Industry revenue from this new approach is currently \$1.14 billion and is expected to reach \$2.4 billion by the year 2007. Bar-Ness' team is using multiple-in, multiple out Orthogonal Frequency Division Multiplexing (MIMO-OFDM) technology to improve the capability of this industry standard. The project builds on the center's expertise in multi-carrier technologies. One patent is in the process of being submitted jointly between Samsung and NJIT.



In Other Projects

NJIT is partnering with Iowa State University (ISU) to develop the Center for Information Protection (CIP), an NSF-supported **COOPERATIVE RESEARCH CENTER IN INFORMATION ASSURANCE**. Constantine Manikopoulos, associate professor of electrical and computer engineering, will head the NJIT component, which will focus on research in intrusion detection, network security, privacy, and attack-tolerant systems. The center is designed to improve the the security of the nation's cyber infrastructure. The CIP will partner with industries that provide security solutions as well as industries that use these solutions in the creation of an overall security perimeter designed to protect data and information assets critical to their industry.

ROBERTO ROJAS-CESSA, assistant professor of electrical and computer engineering, is leading a team of researchers who are developing a new service model concept, called service vector, as a solution for providing quality of service support for a large variety of traffic classes – Internet, video, audio, business and data services – that challenge the next-generation information networks. The study has NSF funding.



ALEX HAIMOVICH, professor of electrical engineering, is developing a new type of network using multiple antennas that could accommodate both a high-speed information link and a sensor network for security or medical

monitoring within the same frequency space. With NSF funding, his research team is seeking to develop solutions that can support a wide variety of applications simultaneously within a home or business. The team's goal is a new type of network characterized by multiple antennas and multiple appliances (MAMA).

Revolutionizing the mindset in wireless networking is the goal of research by **SIRIN TEKINAY**, associate professor of electrical and computer engineering. Her team works to devise techniques for adapting the network architecture to user demand, using mobile ad hoc networking, in which there are no dedicated base stations and all nodes interact as peers for packet forwarding. The goal is to facilitate service so that networking is transparent. She is studying the use of Cellular Ad Hoc Augmented Network (CAHAN) architecture to enhance the performance of mobile cellular networks, comparing the total transmitted energy consumption and the system capacity of the CAHAN with those of pure mobile cellular networks.

