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Illinois Computer Science Leading $16.75 Million Information Network Center for Army

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Contact: Jennifer C. LaMontagne, jsandone@illinois.edu or 217-333-4049
Rick Kubetz, rkubetz@illinois.edu or 217-244-7716

The University of Illinois' Department of Computer Science will develop new technologies designed to support information networks in uniquely challenging environments as part of a $16.75 million research center funded by the U.S. Army Research Laboratory. The Information Network Academic Research Center (INARC) will address the research challenges inherent in complex, mobile, self-forming, and rapidly-changing networks such as those utilized on the battlefield by the Army and its soldiers.

"Modern warfare and military missions demand superior mastery of information and data of various forms. Such data and information may be massive in volume, generated from multiple sources, interconnected, and connected by logical relationships, sometimes defined by the underlying physical network or the social network above," said consortium director and Illinois computer science Professor Jiawei Han. "Most existing network modeling and analysis methods consider homogeneous, static networks. However, networks in the real world are heterogeneous, interacting and evolving. This poses great challenges in terms of effectiveness, scalability, and comprehensive analysis of such information networks, and especially so for the case of military networks."

Addressing information network challenges in this environment requires a multi-disciplinary approach that breaks new ground and builds on existing research in communication, information, and social and cognitive research.

The INARC center will bring together a team of world-class researchers in several disciplines, with Illinois as the principal member. Illinois computer science will receive $8.162 million of the total funding. Partners in the effort include UC-Santa Barbara, IBM, and CUNY as general members, and Carnegie Mellon University, University of Michigan, Northwestern University, and Palo Alto Research Center as sub-awardees.

"The University of Illinois has long been a leader in information processing, and this project takes advantage of the considerable infrastructure and faculty resources we can bring to bear," explained Ilesanmi Adesida, dean of the College of Engineering at Illinois. "This collaboration highlights the multidisciplinary nature of the challenges we face. Together, we can have a considerable impact on the future of this country's defense."

The consortium will be led by Illinois computer science professor Jiawei Han. Other Illinois faculty members contributing to the effort include computer science professors Tarek Abdelzaher and Dan Roth, and electrical and computer engineering professor Thomas Huang.

"This center brings together some of our best faculty to address issues relating to network science, along with associated issues related to massive data handling, large scale information mining, and the rapid processing needed for rapid analysis," said vice chancellor for research Ravishankar Iyer. "It provides our faculty and graduate students with a whole new series of research challenges that will push forward the field of computer science and its applications."

The center will focus on how to best support the primary task of a military Information Network: providing users with reliable and actionable intelligence across the full spectrum of Network Centric Operations (NCO), including humanitarian support, peacekeeping, force protection, and full combat operations.

This unique environment has guided the development of the Illinois INARC research agenda focused on building a foundation for scalable, hierarchical, and most importantly, dynamic and resilient information networks. The proposed research addresses critical issues of connected and interrelated entities that form sophisticated relationships and networks.

The center will focus on the most critical issues and consists of five projects: (1) Integrated Modeling and Analysis of Networks, (2) Distributed and Real-time Data-Source Integration and Information Extraction, (3) Scalable, Human-Centric Information Network Systems, (4) Knowledge Discovery in Information Networks, and (5) Designing Trusted Information Networks.

The Illinois INARC center is part of ARL's Network Science Collaborative Technology Alliance (NS CTA) Program. The Illinois INARC center will work closely with three other centers as part of a multi-million collaborative technology alliance contract. The consortium includes work on Social-Cognitive Networks (SNARC, led by Rensselaer Polytechnic Institute), Communications Networks (CNARC, led by Pennsylvania State University), and an Interdisciplinary Research Center (IRC, led by BBN Technologies).

Taken as a whole, the collaborative alliance represents "the first project looking at the social interaction, information distribution, and mobile ad-hoc network as a whole...combining three previously disparate intellectual pursuits," said Dr. Jay Gowens, ARL's CISD director.

"Illinois computer science faculty and researchers excel at finding practical, multi-disciplinary solutions to real world problems," said Michael Heath, interim head of department and Fulton Watson Copp Chair in computer science. "The opportunity to investigate the complex set of challenges associated with military and intelligence information networks is an exciting one. Even more exciting is the chance to research the problem from a variety of angles, and in collaboration with researchers across so many different areas."