The ActComm project on Transportable Agents and Wireless Networks. 1997 AFSOR MURI Award

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The goal of the ActComm project is to develop technologies that will maximize the usability of complex, global computer and communications networks, focusing especially on wireless networks, for modern command-and-control applications. The main technical innovation is the concept of an active communications system. An active communications system consists of dynamic elements - Active software, active information, active hybrid networks and active resource allocation. These active elements are introduced to make future military wireless computer and communications networks more robust, more powerful and more flexible under a wide variety of operating environments. Active elements will be coordinated by a novel architecture that uses advanced agents to manage network, computer and information assets delivering high confidence communications and computing.

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ActComm Project Technical Progress Summary: Overview

The ActComm Project is a Department of Defense Multidisciplinary University Research Initiative effort administered by the Air Force Office of Scientific Research. ActComm’s goals are to research and develop technologies that will make volatile networks, especially wireless networks, more robust using mobile agent software systems. The five-year project began in the summer of 1997.

A complete description of our planning, execution, analysis and presentation of the experiment can be found at

http://actcomm.dartmouth.edu/demo2/

and

http://actcomm.dartmouth.edu/~rgray/present/muri2001review.ppt

The project website is at http://actcomm.dartmouth.edu/ with additional information about the project’s main agent system, D’Agents, at http://agent.cs.dartmouth.edu/.

According to the project's original schedule, year 4 of the effort was to be devoted to research integration and evaluation in testbed experiments, leading to a culminating experiment in the 5th year. In addition to the basic research activities which are documented below, project personnel have been working this year to integrate a variety of systems developed during the first 3 plus years, including advanced information retrieval techniques, resource allocation and control, network sensing and prediction, ad hoc wireless routing and the underlying mobile agent technology. A preview of this culminating experiment will be presented at the December 13, 2001 technical program review meeting to be held in Arlington, VA.

Project personnel by institution are:

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PUBLICATIONS

http://agent.cs.dartmouth.edu/papers/#gray:motivation

http://agent.cs.dartmouth.edu/papers/#gray:scalability

http://agent.cs.dartmouth.edu/papers/#gray:scalability-tr

http://agent.cs.dartmouth.edu/papers/#gray:spe

http://agent.cs.dartmouth.edu/papers/#kotz:jmodel

http://agent.cs.dartmouth.edu/papers/#kotz:model-tr2


J. Bredin and D. Kotz and D. Rus. The Role of Information in Computational-Resource Allocation, for the TASK Electronic Commerce REF. Invited paper at the DARPA TASK PI meeting, May, 2001
http://agent.cs.dartmouth.edu/papers/#bredin:info

http://agent.cs.dartmouth.edu/papers/#bredin:jgame


URL: http://black.csl.uiuc.edu/~tbasar/aams.pdf


O.C. Imer, T. Basar, and R. Srikant. A distributed globally convergent algorithm for fair, queue-length-
URL: http://black.csl.uiuc.edu/~tbasar/cdc01-imer.pdf

URL: http://black.csl.uiuc.edu/~tbasar/cdc01-alpcan.pdf

URL: http://black.csl.uiuc.edu/~tbasar/cdc01-rajiv.pdf


L.A. Shay. Determination of an Appropriate Order for the Autoregressive Model for the WiNE Sensor Baseline, working paper.


STUDENTS SUPPORTED FY 2001

Dartmouth

Graduate Students: J. Bredin, G. Nofsinger, Q. Li, R. Xie

Undergraduate Students: D. Walsh, W. Pierce, C. Masone, M. Corr, N. Dubrovsky, D. Zlateva, A. Fiske, R. Neelakantan

University of Illinois

R.A. Rozovsky, R. Maheswaran, T. Alpcan

Harvard

D. Vlah, D. Cheng, P.-H Hsiao

Rensselaer Polytechnic Institute

Graduate Students: L.A. Shay, B. Sikdar

PRESENTATIONS By ActCom Participants in FY 2001

International Neural Network Society Board of Governors meeting, Como, Italy, July 2000.

DARPA ISAT Final Briefing, Woods Hole MA, August 2000.

AFOSR Strategic Planning Meeting, La Jolla, CA, August 2000.

Modeling and monitoring change on the Web, Lorentz Institute, Leiden University, Netherlands, Sept., 2000.

Agent-based systems engineering, DARPA TASK Meeting, Charleston SC, October 2000.

AFOSR MURI Review, Harvard University, November 2000.


Modeling Web changes, CNRI, Pisa Italy March 2001.


DARPA CoABS PI meeting, February 2001

DARPA TASK PI meeting, May 2001

Mitsubishi Electric Research Lab, May 2001

DARPA CoABS PI meeting, July 2001

40th IEEE Conference Decision and Control, Orlando, FL Dec. 4-7, 2001

Internet Performance and Control of Networked Systems, Boston, MA, November 5-8, 2001


ITCom 2001, Denver, August 20-24, 2001

Stochastic Theory and Control Workshop, Lawrence, Kansas, October 18-20, 2001


IMA 2001 Summer Program: "Hot Topics" Workshop: Wireless Networks, August 8-10, 2001

2001 SIAM Annual Meeting, San Diego, California, July 9-13, 2001

Symposium on Complex Systems Modeling and Optimization in the Information Age To Celebrate 45 Years of Outstanding Contribution of Prof. Yu-Chi "Larry" Ho, Harvard University, June 23-24, 2001

NSF/ONR Workshop on Cross-Layer Design in Adaptive Ad Hoc Networks: From Signal Processing to Global Networking, Cornell University, May 31-June 1, 2001,

Seminar at Univ. of California, Santa Barbara
FUNDAMENTAL SCALING LAWS FOR WIRELESS NETWORKS: HOW MUCH TRAFFIC CAN THEY CARRY?

The United Technologies Sponsored Seminar Series in Manufacturing and Systems, Boston University, September 21, 2001

Seminar at Harvard University, September 19, 2001, SCALING LAWS FOR WIRELESS NETWORKS: HOW MUCH TRAFFIC CAN THEY CARRY?

Seminar at MIT: LIDS Colloquium, September 18, 2001, Ad hoc wireless networks: Analysis, protocols, architecture, and convergence
Seminar at Univ of Pennsylvania, September 17, 2001, Ad Hoc Wireless networks: Analysis, protocols, architecture, and convergence

The ACM Symposium on Mobile Ad Hoc Networking & Computing (MobiHoc 2001)

11th International Workshop on Network and Operating Systems Support for Digital Audio and Video (NOSSDAV 2001)

IEEE INFOCOM'01 (The Conference on Computer Communications)

IEEE GLOBECOM '00 Workshop on Service Portability and Virtual Customer Environments

Santa Fe Institute

National University of Singapore

Academia Sinica, Taiwan

Nortel Networks

Microsoft Corporation

Consultative and Advisory Functions

Board of Visitors, Program Review of 6.1 ARL-ARO Mathematics Division, U.S. Army Research Office Research Triangle Park, NC

U.S. Army Research Office, Computing and Information Sciences Division, Panel Member, Triennial Research Strategy Planning Workshop, Charleston, SC Jan 3-5, 2001

Kansas Technology Enterprise Corporation, April 12, 2001. Review of Telecommunications and Information Sciences Laboratory at the University of Kansas

Greater Boston Biodefense Collaborative Advisory, January 24, 2001. Review of Biodefense Initiatives

Consultant to Nortel Networks, Trebia Networks, InfiniSwitch Corporation, ITServ, Nimble MicroSyster etc.

DOD and Other Transitions FY 01

New CECOM project based on ActComm results (bio-medical sensing; eventual transition to LandWarri

Ongoing CoABS project (a DARPA research program on control of agent-based systems)
Ongoing TASK project (a DARPA research program on taskable agents)

New NASA project dealing with long-duration space flight (bio-medical sensing)

K.S. Vastola started Premonitia, Inc. in Acton, MA to develop technology for internet network management based in part on work under the MURI project

In July 2001, Major Shay transitioned to the faculty of the Department of Electrical Engineering and Computer Science at the United States Military Academy at West Point. She will continue to do research in fault sensing in wireless networks and wireless network security for the Information Technology and Operations Center at West Point

Honors and Awards FY 01

Tamer Basar - Election to the National Academy of Engineering, 2000

IEEE Millennium Medal, 2000

President, IEEE Control Systems Society, 2000