



The mission of the **Distributed Systems and Networking Virtual Laboratory (DSNET)** is to perform outstanding research in the fields of Computer Networks, Distributed Systems, Distributed Embedded Systems, and their theoretical basis, to provide high quality university level courses, to facilitate joint research efforts between academia and industry, and to engage in multidisciplinary research efforts with other academic units and regional institutions.

The laboratory and its members have successfully participated in research efforts in different fields of electronic and computer engineering, such as: design and development of communication firmware and peripheral drivers for microcontroller systems; design and development of communication protocols for embedded systems; design and analysis of multi-tier models for realization of distributed monitoring and control systems; electronic tools for signal and data processing from medical instruments; design and analysis of wireless protocols; simulation and modelling of distributed systems' communication and mobile wireless networks.

## Participation in the FP7 Funding Initiatives

The Laboratory is strongly interested to participate in proposals for Integrated Projects and STREPs, in the following objectives:

- Internet of Things and Enterprise environments (ICT-2009.1.3) – adaptation of multi-tier business models and open middleware for design and development of Internet of things; network-enabling of embedded devices and design of protocol converters; adaptation of Web services architecture for the domain of Internet of things and integration of enterprise networks and factory floor.
- Engineering of Network Monitoring and Control Systems (ICT-2009.3.5) – development of Internet-ready communication protocols, modelling and simulation of traffic flow and packet delays for networks of embedded devices;
- Personal health systems (ICT-2009.5.1) (in the area of Cardiovascular diseases) – We are interested in development of Web-based PHS for monitoring of high risk patients with cardiovascular diseases.

We have a well established collaboration with the following institutions and partners from Bulgaria and Europe:

- Prof. DSc. Todor Stoilov, Institute of Computer and Communication Systems – Bulgarian Academy of Science.
- Dr. Evtim Peytchev – Intelligent Simulation and Modelling Group, School of Computing & Informatics, Nottingham Trent University.
- Dr. Volker Zerbe – System and Control Theory Department, TU Ilmenau.
- Assoc. Prof. Ivo Iliev – Laboratory of Biomedical Engineering, TU Sofia.
- Prof. Stefan Ovcharov – Laboratory of Semiconductor circuit engineering, TU Sofia.
- Olimex Ltd. – An SME for developing and manufacturing of microcontrollers, development boards and kits.

## Distributed Systems & Networking, Virtual Laboratory

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## List of completed and ongoing projects in which DSNET is involved

### Web Services and Data Integration in Distributed Automation and Information Systems in Internet Environment

(Ongoing - final year) This project is funded by the National Science Fund of Bulgaria. Key goal of the project is the analysis of the latest technologies in web services and their integration and adaptation in distributed automation, based on controllers with embedded TCP/IP stack and Web server. For this purpose, a model of information flow and representation in distributed automation systems will be developed, employing the standards of e-business, working on HTTP/TCP. Modules and libraries for integration of Web services in distributed embedded systems will be developed and exposed.

### Analysis of attacks and methods for securing Web services in global networks

(Ongoing - final year) This project is funded by the National Science Fund of Bulgaria. The main goals of the project are analysis of the current state of attacks and security mechanisms for protection of Web services, modeling and implementation of proxy services and modules based on existing standards and technologies, and realization of an experimental test-bed distributed information system for monitoring the access to integrated web services.



### HOCFIT (Home Control on Fingertips)

This project is part of the IEEE Sixth Annual Computer Society International Design Competition (CSIDC'05). The main goal of the project was to propose an open and easily extendable system for home automation.

### Internet-based distributed embedded system for monitoring of parameters in real-time

This project is funded by Technical University of Sofia, branch Plovdiv. The main goal is to design and develop an experimental system for remote monitoring and control of temperature and humidity in controlled microclimate environment. The experimental system is based on multi-tier client-server architecture.

### Web-based experimental network of microcontrollers for examination of information flows in distributed embedded systems

This project is funded by Technical University of Sofia. The main goal is to design and develop an experimental network for test-bed analysis of traffic and information flows in distributed embedded systems with networking capabilities. Standard communication protocols are used for the interaction e.g. Ethernet, UDP, SNMP.

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