



Programme of the

**Distributed Intelligent
Systems and Technologies
Workshop**


St. Petersburg, Russia
28-30 September 2011

Welcome to Workshop DIST'2011 and St. Petersburg

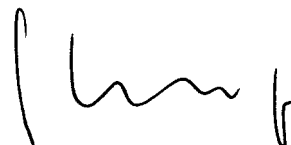
Annually St. Petersburg State Polytechnical University holds Distributed Intelligent Systems and Technologies Workshop. The first Workshop in DIST series was arranged in 2008. The organising institutions were Technical University of Munich; Bundeswehr University, Munich and St. Petersburg State Polytechnical University. 38 scientists with more than 20 presentations took part in the first DIST workshop.

Now our Workshop is also supported by Leibniz Universität Hannover, St. Petersburg Group of Russian National Committee on Automatic Control and Programme "Young Member of Scientific Innovation Competition."

We hope you will enjoy the exciting cultural and social programmes which have been arranged for you in our beautiful city of St. Petersburg.



Prof. Vyacheslav P. Shkodyrev
Workshop Co-Chair



Prof. Ludger Overmeyer
Workshop Co-Chair

In Cooperation with
Leibniz Universität Hannover
St. Petersburg State Polytechnical University

Scientific Committee

Bruno Apolloni, Italy
Bernhard Lang, Germany
Dmitry G. Arseniev, Russia
Hans-Rolf Traenkler, Germany
Ludger Overmeyer, Germany
Matti Heilio, Finland
Vyacheslav P. Shkodyrev, Russia

Local Organising Committee

Vyacheslav P. Shkodyrev
Ekaterina V. Potekhina
Vyacheslav V. Potekhin
Vladislav E. Kovalevsky
Elena N. Selivanova

Registration Information

The Registration will take place on the third floor of New Building of IIEP SPbSPU (Grazdansky Pr. 28) during the following hours:
Thursday 29 September 9:00–10:00

Opening Ceremony

(September 29, 2011 10:00–10:30)

The Opening Ceremony will take place on September 29, 2011 at 10:00 in lecture room 310 on the third floor of New Building of IIEP (Grazdansky Pr. 28).

Visit to the “Russian Industrialist”

(September 28, 2011 10:00–13:00)

The key industrial event in St. Petersburg, the XV International Forum “Russian Industrialist” will take place in St. Petersburg, “LEN-EXPO” Exhibition and Congress Center. The Forum conducted since 1997 and gathering Russian and foreign industrial specialists.

Cultural programme

A cultural programme will be supplied to attendees of the Workshop. We invite you to explore beautiful St. Petersburg, its splendid architectural treasures and the magnificent views of the Peter and Paul Fortress, St. Isaac’s Cathedral, Nevsky Boulevard, the Winter Palace and many other well known sites.

Coffee/tea

Coffee and tea will be served between morning and afternoon session.

Lunch

Lunch will be served Thursday on the first floor of IIEP.

Workshop Venue

The Distributed Intelligent Systems and Technologies Workshop being held at the Institute of International Educational Programs, St. Petersburg State Polytechnical University (Grazdansky Pr. 28) from 28 to 30 September 2011.

Phone: (812) 329 4745

Metro station: Academicheskaya.

Language

The official language of the Workshop is English.

Time Zone

The time zone in St. Petersburg is GMT + 3 hours.

Wednesday, 28 September, 2011

from 10:00	Visit to the International Forum “Russian Industrialist” The key industrial event in St. Petersburg, which will take place in St. Petersburg, “LENEXPO” Exhibition and Congress Center, conducted since 1997 and gathering Russian and foreign industrial specialists.
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Thursday, 29 September, 2011

10:00-12:00	Morning Session Chairpersons: Björn Niemann, Germany, Vyacheslav Shkodyrev, Russia
10:00-10:20	Opening Vyacheslav Shkodyrev, Russia
10:20-10:40	AN APPROACH OF AN AUTOMATED GUIDED VEHICLE CONTROL SYSTEM WITH ROAD WAY INHERENT TRANSPONDERS Björn Niemann, Ludger Overmeyer, Germany
10:40-11:00	AGENT BASED MODELING FOR BUSINESS SOLUTIONS Elena Serova, Russia
11:00-11:20	RECEDING HORIZON KALMAN FILTER WITH DIFFERENT SENSOR SAMPLE RATES Il Young Song, Moongu Jeon, South Korea
11:20-11:40	HETEROGENEOUS ILL-STRUCTURED KNOWLEDGE HARMONIZATION BY ONTOLOGY DESIGN Ekaterina Bolotnikova, Tatiana Gavrilova, Russia
11:40-12:00	THE USE OF DYNAMIC TREE STRUCTURES FOR SOLVING THE MOBILE ROBOT LOCALIZATION AND MAPPING PROBLEM Nadezhda Babakina, Maxim Kolesnikov, Russia
12:00-12:30	Coffee break
12:30-14:10	Afternoon Session Chairpersons: Moongu Jeon, South Korea, Vyacheslav Potekhin, Russia
12:30-12:50	A REINFORCEMENT LEARNING METHOD FOR DISPATCHING STRATEGIES IN INTRALOGISTICS Mišel Radosavac, Gerd Heiserich, Ludger Overmeyer, Germany
12:50-13:10	SITUATION-SPECIFIC CONTROL IN PREVENTION OF EMERGENCY SITUATIONS IN CONTINUOUS (CHEMICAL) MANUFACTURING Vladislav Kovalevsky, Pavel Valov, Vyacheslav Shkodyrev, Vyacheslav Potekhin Russia
13:10-13:30	VISUAL SLAM WITH TIME-OF-FLIGHT CAMERA Stanislav Serebryakov, Lev Stankevich, Russia
13:30-13:50	CONTROL SYSTEM FOR ADAPTIVE SURFACE: RESEARCH AND DEVELOPMENT Dmitry Vorobiev, Petr Caruntu, Vyacheslav Potekhin, Russia
13:50-14:10	INTELLIGENT SYSTEM FOR STANDOFF DETECTION OF "SUICIDE BOMBERS" IN MASS TRANSIT ENVIRONMENT Stanislav Vorobyev, Vyacheslav Shkodyrev, Russia
14:30-15:30	Lunch

Thursday, 29 September, 2011

10:00-12:00

Morning Session

Chairpersons: Björn Niemann, Germany, Vyacheslav Shkodyrev, Russia

AN APPROACH OF AN AUTOMATED GUIDED VEHICLE CONTROL SYSTEM WITH ROAD WAY INHERENT TRANSPONDERS

Björn Niemann, Ludger Overmeyer

A combination of identification technologies and automated guided vehicle systems offers significant advantages in terms of storage, modification and adaptation of travel and navigation data for larger or flexible transportation systems. The storage of information may take place on the track. The possibility to abandon virtual maps reduces data traffic and necessary transport data for transport operation. Overall the technical effort for vehicle navigation is reduced. The presented approach allows the operation of vehicles as decentralized modules with manageable complexity.

AGENT BASED MODELING FOR BUSINESS SOLUTIONS

Elena Serova

This paper considers the role of multi-agent approach for carry out modern management tasks. When solving business problems, simulation modeling tools should ensure mutual understanding at all organizational levels and bridge the gap between strategic vision and its implementation. One of the solutions is multi-agent systems (MAS) that have been developing rapidly in the last decade. Modern business simulation modeling tools use special software, programming languages and systems to develop models demonstrating structure of business processes, relations between people and areas for optimization in the organizational structure as a whole.

RECEDING HORIZON KALMAN FILTER WITH DIFFERENT SENSOR SAMPLE RATES

Il Young Song, Moongu Jeon

A receding horizon asynchronous data fusion algorithm is investigated for an arbitrary number of sensors with different sensor sampling rates. This algorithm is developed based on the Kalman filter combined with multisensor pseudo measurements under parameter uncertainties. The proposed asynchronous fusion estimator not only is optimal in linear minimum mean square error, but also can archive the best real-time running performance. Additionally, it is robust against dynamic model uncertainties. Superior performance of the designed asynchronous fusion estimator is demonstrated through numerical example when the system modeling uncertainty appears.

HETEROGENEOUS ILL-STRUCTURED KNOWLEDGE HARMONIZATION BY ONTOLOGY DESIGN

Tatiana Gavrilova, Ekaterina Bolotnikova

The paper presents one approach aimed at harmonization of teaching ontologies based on the principles of ontological engineering. The research framework is targeted on development of methodology and technology that will scaffold the process of heterogeneous knowledge structuring. The structuring procedure is the kernel of ontology development. Ontologies that describe the main concepts of the domains are used both for teaching and assessment techniques. Special stress is put on visual design as a powerful learning and teaching mind tool. The examples are taken from the courses delivered in St. Petersburg State University at Graduate School of Management and St. Petersburg State Polytechnic University.

THE USE OF DYNAMIC TREE STRUCTURES FOR SOLVING THE MOBILE ROBOT LOCALIZATION AND MAPPING PROBLEM

Nadezhda Babakina, Maxim Kolesnikov

In this paper the problem of environment geometric model making is considered. This problem is main part of global issue for mobile robots task-oriented moving in random non-stationary environments. We propose an approach to making of tree-type dynamic structures for environment description, based on two or more input video channels. Such structures allow to uniquely describe the position of the robot and surrounding objects in the relative coordinate system. Mobile robot position changes lead to the realize of tree structures dynamic properties and allow to modify local detailing level.

Thursday, 29 September, 2011

12:30-14:30	Afternoon Session Chairpersons: Moongu Jeon, South Korea, Vyacheslav V. Potekhin, Russia
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A REINFORCEMENT LEARNING METHOD FOR DISPATCHING STRATEGIES IN INTRALOGISTICS

Mišel Radosavac, Gerd Heiserich, Ludger Overmeyer
Due to changing requirements in production and logistics, future material flow systems have to provide solutions with increased flexibility and adaptivity. In this contribution a reinforcement learning method for dispatching strategies in intralogistics is presented. This method is implemented in a simulation model for a cross-docking distribution center and evaluated in comparison with common heuristic dispatching strategies.

SITUATION-SPECIFIC CONTROL IN PREVENTION OF EMERGENCY SITUATIONS IN CONTINUOUS (CHEMICAL) MANUFACTURING

Vladislav Kovalevsky, Pavel Valov, Vyacheslav Shkodyrev, Vyacheslav Potekhin

This paper presents an approach of situation-specific control principles for multi-agent production systems via goal-directed planning and proactive coordination of coalition operations. The principle of goal-directed planning of team behavior is based on idea of constructing formal goal model of behavior of a team of agents in the environment describing their interaction with the environment and creation of coordinated operating actions of a team, leading to purposeful change of a current situation according to the generated system of criterion functions. The strategy is developed on base of applying the principle of searching for a goal by creation of a decision tree on final set of intermediate goal states and their distribution as separate sub-tasks between separate members of a team.

VISUAL SLAM WITH TIME-OF-FLIGHT CAMERA

Stanislav Serebryakov, Lev Stankevich
The article presents a visual navigation system in real time using the time-of-flight camera without a priori knowledge of the scene. A method for fusing time-of-flight and the optical camera and methods for increasing the robustness of localization, taking into account the color and spatial information is discussed.

CONTROL SYSTEM FOR ADAPTIVE SURFACE: RESEARCH AND DEVELOPMENT

Dmitry Vorobiev, Petr Caruntu
Currently, in astronomy the increasing use of radio telescopes are in the millimeter and submillimeter wavelength ranges. In the millimeter wavelength range it is needed to ensure the accuracy of the spatial shape of the radio telescope's surface. To solve the problem of controlling the shape of the surface and high retention of the specified accuracy of the spatial form of the surface is divided into separate segments. Each segment is controlled by actuators. For developing of control algorithms for adaptive surface has been created a laboratory stand. This stand allows a researcher to simulate a reflective surface in conjunction with control and measurement system.

INTELLIGENT SYSTEM FOR STANDOFF DETECTION OF "SUICIDE BOMBERS" IN MASS TRANSIT ENVIRONMENT

Stanislav Vorobyev, Vyacheslav Shkodyrev
A device for standoff detection of metallic and non-metallic objects concealed under clothing on human body is described. The device, based on active interrogation with gigahertz-range electromagnetic waves, can perform secret inspection of moving subjects. It provides both the image of concealed objects and their dielectric characteristics, which may be used to facilitate the detection of explosives.