Ryazan State Radio Engineering University

Institute of Master and Postgraduate Education

Department «Computer Aided Design of Computing Facilities»

Direction 09.04.01
«Information Science and Computer Engineering»

Master's degree program
«Computer aided design systems»

Master's degree program characteristics

Master's degree program «Computer aided design systems» has been developed in RSREU to train highly qualified specialists in design of technical tools, computer system and network software, automated and distributed systems for information processing and control as well as computer aided design systems and information support of products.

The program is aimed at the formation of professional knowledge and skills needed to deal with the application of mathematical and engineering problems associated with the research, design and technological master's work in the creation, implementation and operation of modern software applications, computer networks, information systems and technologies.

The program is based on wide spread cooperation of RSREU with leading institutions in the field of education and science of the Russian Federation: Institute for Design Problems in Microelectronics of the Russian Academy of Sciences (IDPM RAS), Institute of Control Sciences of the Russian Academy of Sciences (ICS RAS), Bauman Moscow State Technical University, Higher School of Economics (HSE), Tomsk Polytechnic University as well as with industrial enterprises of Moscow, Ryazan and other regions of the Russian Federation.

Academic subjects of the Master's degree program
• Modern philosophy and methodology of science.
• Foreign language for specific purposes.
• Internet-technologies.
• Computing systems.
• Technologies of software development.
• Education science of the higher school.
• Computer technologies in science and education.
• Methods for optimization.
• Theory for experiment planning.
• Intelligent systems and soft computing.
• Automated systems of process engineering.
• Methods for analysis and synthesis of design decisions.
• Program-methodical CAD complexes.
• Object analysis and object-oriented programming.
• CALS-technologies in CAD.
• Software project management.
• CAD geographical sub-systems.
• Operating system Linux and free software.
• System software.

Career options
Graduates have opportunities to work in information technology companies (or in IT departments of other companies) where they can participate in software development projects and play a variety of roles such as system analysts, architects and designers, programmers, test engineers, technical writers, team managers and project leaders. Graduates of the master's degree program can continue studies at Doctoral study level and can start working in the university and scientific research organizations.

Academic staff of the Master's degree program

7 doctors of sciences, 20 candidates of sciences, leading specialists of high-tech enterprises. Department «Computer Aided Design of Computing Facilities» works closely with other departments and research centres of the University.

Professional competences of the Master's degree program

research activities:
• knowledge of research methods and skills of their execution;
• knowledge of methods for optimization and skills of their execution under decision of profession challenges;
• skills of available methods and algorithms to recognize and process data;
• application of promising research techniques and meeting professional challenges based on knowledge of global trends of computer science and information technology development.

project activities:
• ability to design distributed information systems, their components and their interaction protocols;
• ability to design parallel data-processing systems and high-performance systems and their components;
• ability to create technical tasks and participate in the elaboration of hardware and software computing facilities;
• ability to choose methods and develop algorithms to solve administrative problems and automation object design.

engineering and manufacturing activities:
• ability for software realization of distributed information systems;
• ability for software realization of parallel data-processing systems and high-performance systems;
• ability for organization of industrial testing of designed software;
• ability for software development to design three-dimensional images.

Educational, scientific and experimental base

Computer laboratories of the department are equipped with modern computing technologies, projection and multimedia equipment. Lectures, laboratory operations and practical trainings are held there. Students also prepare course projects and graduate qualification thesis in computer laboratories.

Training laboratory «Computer aided design»

All personal computers of the department are connected to the local computer network with a dedicated file server and diversified print service.

Local computer network of the department is a part of the integrated computer network of the University and supports all provided services.

Training held in
«Computer aided design» laboratories

Students are provided with high-speed unlimited Internet access on any personal computer of the department both in class and during free time for self-training. Wi-Fi Internet access is available all over the department to connect to local services from students' and professors' mobile devices.

Training laboratory
«Design and engineering of electronic systems»

Both licensed software and software developed by staff and students of the department are used under the educational process of the department.

There are all methodological literatures required to hold lessons in computer labs.

Training laboratory
«Network and cloud technologies»

Issues related to the educational process in computer classes and laboratories are solved by qualified engineering staff of the department, an engineer on duty is always there. Computer laboratories are located on the 1st floor of the main building (department «Computer Aided Design of Computing Facilities»).

Lecture in the laboratory «Design and construction of electronic systems»

Lectures in various subjects taught at the department are held in the lecture hall allowed seating two study groups. Lecture hall is equipped with multimedia and projection equipment in combination with smart board.
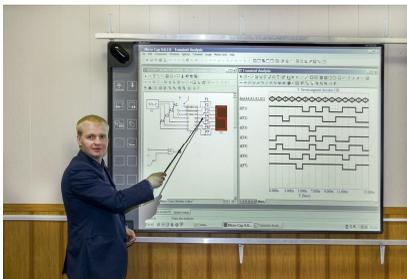
Holding lecture classes

Lecture hall of the department

Laboratory operations and practical trainings in various subjects are held in the electronic laboratory of the department for one study group. Laboratory operations are held on industrial samples and models made by the department «Computer Aided Design of Computing Facilities» using modern computing and measuring engineering.
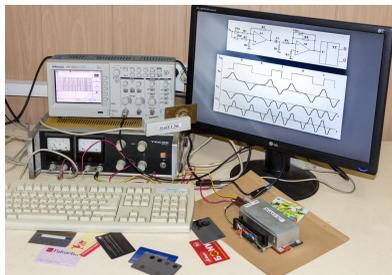
Model of a pilot unit for laboratory operations

Laboratory provides necessary information and methodological literature. Supply of academic process is ensured by qualified staff – engineers of the department.

Training laboratory «Electronics»
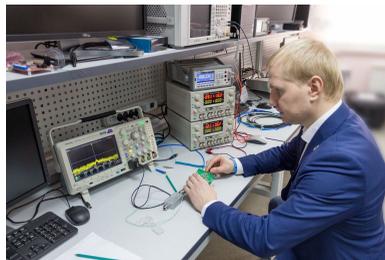
Carrying out of the research work

Students during the training pass through various types of practices. Educational practice is conducted in the laboratories of the department, research, production and undergraduate practices in the business incubator of the university and at the leading high-tech enterprises.

Basic software

Education and science laboratories of the department are provided by the following software products:

• AutoCAD – Computer-aided design and drafting software application;

• T-FlexCAD – Parametric CAD software application for 3D solid modeling and 2D design and drafting;

• SolidWorks – Solid modeling computer-aided design and computer-aided engineering computer program;

• COMPASS – 3D – Family of computer-aided design systems with the possibility of registration of project and design documentation;

• Micro-Cap – SPICE compatible analog/digital circuit simulator with an integrated schematic editor;
• MathCAD – Computer software for the verification, validation, documentation and re-use of engineering calculations;
• LabVIEW National Instruments – System-design platform and development environment for a visual programming language;
• MatLab Classroom, Simulink Classroom – Multi-paradigm numerical computing environment and programming language;
• Delphi Academic Edition – programming language and software development kit (SDK) for desktop, mobile, web, and console applications;
• Deductor Academic – Platform for visualization and analysis of data to make complete analytical solutions;
• Microsoft Visual Studio – Development environment multiplatform;
• Microsoft SQL Server 2014 – Database management system;
• IDE Qt Creator 5.5.

Main scientific directions of the department

• Computer-aided design of high-performance systems and computer networks;
• Application of the GERT-network theory for simulation of telecommunications;
• Planning of bandwidth of network lines when aircrafts are tested;
• Design of mathematical and software support of adaptive routing in software defined networks;
• Development of methods and technologies for data flow balancing in software defined networks under quality service assurance;
• Design of methods and technologies for dynamic management of data flow in distributed center networks of data processing;
• Design of computer and telecommunication systems;
• Design of multithreaded programs for multi-core systems;
• Design of algorithms and programs for data processing systems by means of graphic accelerators on the platform CUDA;
• Design of software for digital data processing systems;
• Design of methods and algorithms for smart analysis of data in social and economic systems;
• Design of mathematical and software support of intelligence decision making systems;
• Design of decision making support systems.

Scientific activities of the Department «Computer Aided Design of Computing Facilities»

Every year the Department «Computer Aided Ddesign of Computing Facilities» is the organizer of All-Russian scientific engineering student young scientist and specialist Conference «New Information Technology in Scientific Researches (NIT)».

The conference is supported by the Ministry of Education and Science of the Russian Federation, Government of the Ryazan region, Russian Foundation of Basic Researches, Ryazan state radio engineering university.

Every year Interuniversity collection of scientific works of the Department «Computer Aided Design of Computing Facilities» «Information Technologies» is published. Papers devoted to the use of information technologies in enterprises, industries, science and education are published in the collection.

The department staff are actively involved in review and publication of scientific papers in scientific and technical journal «Vestnik of RSREU » listed in the leading peer-reviewed journals issued in the Russian Federation where main scientific results of the PhD theses in electronics, measuring equipment, radio engineering and communications, management, computer engineering and informatics should be published.

website of the journal: http://vestnik.rsreu.ru

**Center of Innovative Networking and Cloud Technologies (CINCT)**
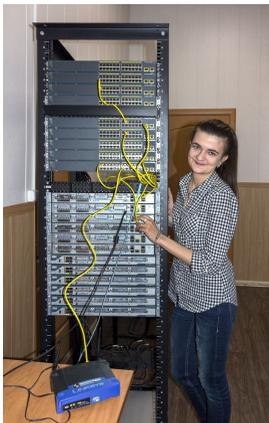
Center of Innovative Networking and Cloud Technologies effectively operates at the Department «Computer Aided Design of Computing Facilities». The CINCT main directions are:

• Creating of competitive software and hardware in the field of information, network and cloud technologies;

• Carrying out of basic and applied scientific researches in the development and use of innovative networking and cloud technologies in different spheres of activity;

• Target preparation and further training of research staff members, professors and other employees of educational institutions in the area of creation and use of innovative networking and cloud technologies in different spheres of activity.

The department staff are the official members of the international community IEEE Software Defined Networks and represent RSREU in the Consortium of the leading Russian engineering universities «SDN – technologies in research and education environment». The main tasks of the Consortium are:

1. Learning and distribution of experience of the best global research centers in the field of computer networks in research and education environment of the Russian Federation. Establishing, supporting and development of international science and technology links with leading global research centers in the field of cloud technologies;

2. Promoting use of innovative networking technologies in research and education environment of the Russian Federation;

3. Design of education programs to prepare highly qualified specialists, improve qualification and retrain staff in the field of network technologies including subcritical systems;

4. Promoting the systems of Russian scientific conferences and youth scientific schools in the fields of networking technologies and applications.

Main results of scientific research
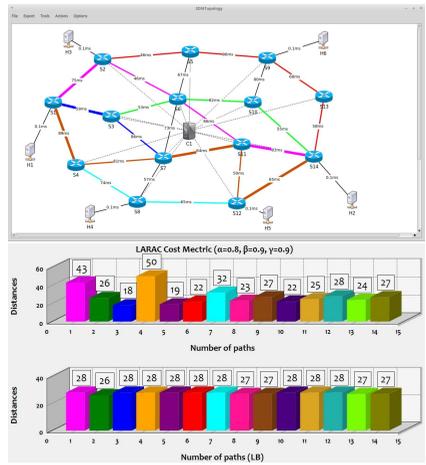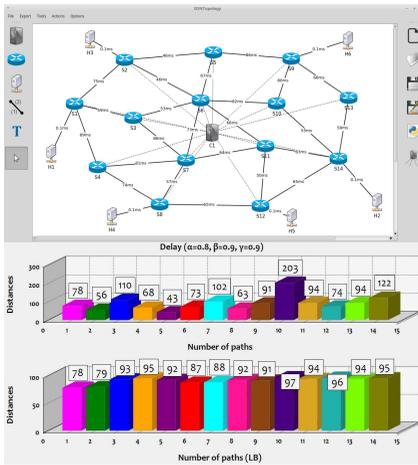
Visual design environment of data flow load balancing process
in software defined networks providing service quality assurance
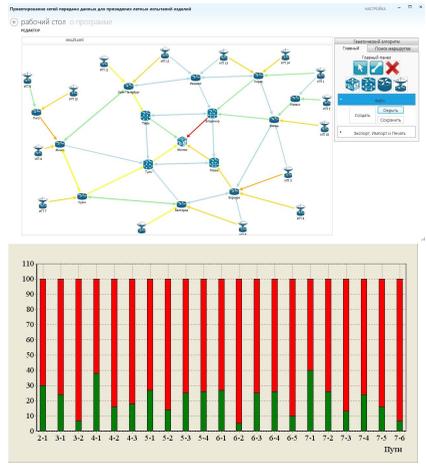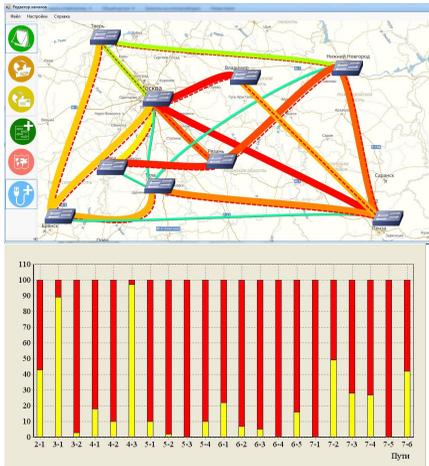
Measured load balancing system of launch-site data acquisition and measurements complex

Achievements and awards of the Department «Computer Aided Design of Computing Facilities»

Additional information on the Master's program and Department «Computer Aided Design of Computing Facilities» is available on the website http://sapr.rsreu.ru