===== **INFORMATION** =====

"RUSYCON"—Portal of Scientific Information

D. A. Tomchin and A. L. Fradkov

Institute of Problems of Mechanical Engineering, Russian Academy of Sciences, St. Petersburg, Russia
Received August 15, 2002

Abstract—The capabilities and methods of using Internet by the experts in automation and control system were described. The results of developing RUSYCON, a site of scientific information (Russian Archive on Systems and Control, www.rusycon.ru) that supports researchers working with the Internet resources were presented.

1. INTRODUCTION

New information technologies including Internet find ever increasing application in science and engineering. The Internet technologies play special role in automation and control not only as training facilities or a repository of the distributed corporate databases, but also as means of realizing the problems of modeling and control [1, 2].

Nevertheless, many experts still do not use the modern Internet technologies in their everyday work even to collect information. The difficulties of mastering the methods of search and acquisition of information in Internet are due primarily to dispersion of information over the network and high degree of "noise pollution" by irrelevant information. That is why the so-called portals—guides to the network resources in the form of sites containing, in addition to the subject information, structured references to the resources that might be useful in the given knowledge domain—hold much favor among the beginners.

Virtual Control Engineering Library [3], Control Theory and Engineering Links [4], NETLIB [5] and some others can be cited as the most popular resources in the area of the theory of systems and control. However, until recently a Russian-language resource guide was lacking. The information portal RUSYCON (Russian Archive on Systems and Control, www.rusycon.ru) containing over two thousand references to both English-language and Russian-language resources was opened in 1999 and continues to operate with success. It is visited monthly by thirteen to nineteen hundred users. This paper aims at giving the readership an insight into the structure, information capabilities, and methods of using the RUSYCON portal, as well as other Internet resources that may be useful to the experts in automation and control systems.

2. USE OF INFORMATION SITES IN SCIENCE AND ENGINEERING

The following are the elements of the technologies of Internet-based research:

• keyword-based search of the network resources and publications on the given subject in the information-retrieval systems and on the sites of libraries, journals, and publishers;

• search and establishment of contacts with experts and institutions carrying out research on the corresponding subject-matter;

• search of the possibilities of research financing on the sites of appropriate institutions and foundations;

• browsing of the sites of conferences, seminars, exhibitions, and journals with the aim of selecting a suitable way of testing and publishing the results.

We note that both presentation of the material for publication and correspondence with the Editorial Boards and conference organizers is currently done in the electronic form, that is, also by means of Internet. Besides seeking partners and means of publication of the results, the engineering activity needs search and acquisition of the instrumentation, hardware, software, materials, and components required for development.

At each of the above stages, Internet exerts a significant influence on the technologies. Owing to the difficulty of finding the desired information in Internet, the network information resources— sites, portals, databases, archives—play an important part. They serve as professional Internet guides, media of fast publication, and popular electronic libraries.

3. EXISTING INFORMATION SITES ON SYSTEMS AND CONTROL

The information sites can be classified as follows [6–8]:

• special-purpose sites devoted to a narrow topic;

• general-purpose sites reviewing different subjects;

• megaportals such as Yahoo, Yandex, Rambler, and others that contain multiple references to various sites and are intended to make sojourn in the network more comfortable. They offer search systems, news, stock exchange reports, weather forecasts, that is, any information required daily. Some megaportals provide additional services such as e-mail, time-planning, maintaining the databases of addresses and dates, as well as other free applications.

Internet currently has many sites of scientific information that can be helpful to the control-system experts of which the following deserve special mentioning:

Control Virtual Engineering Library [3] contains references to the major conferences[1] (19); teams working in the area of the control theory (260), professional communities (30), journals (34), information services (18), commercial organizations (78), others (9); 448 references altogether.

Control Theory and Engineering Links [4] is a division of the portal of scientific information "Theorem.Net" maintained by the Tennessee State University, USA. The list of resources comprises on-line books (5), abstracts and contents of books (30), teams (209), software (5), information services (28), organizations (21), journals (28), conference lists (9); 335 references altogether.

Netlib Network Database [5] contains mathematical software, papers and a calendar of conferences on the theory of systems, computations, and related mathematical fields (282 references).

Additionally, many useful references can be found on the sites of greater organizations such as Institute of Electrical and Electronic Engineers (IEEE), [9], International Federation of Automatic Control (IFAC) [10]), Society of Industrial and Applied Mathematics (SIAM) [11], and so on, as well as on the sites of universities and journals and in the catalogs of the search such as Yahoo and Altavista, and on the personal sites of some researchers (see, for example, the sites of E. Sontag [12] and V.V. Tsvetkov [13]).

However, the majority of existing information resources are inadequate for the Russian researchers and engineers because they virtually have no references to the Russian resources. Among few Russian-language sites one can mention the RSCI.ru information system containing a database of the Russian thesis advisers and beginning researchers, Internet exhibition "Novations," references to grant organizations and foundations, conferences, electronic libraries, journals, scientific societies, and also the "INFOMAG" service [14] offering information bulletins, contents and abstracts of scientific journals, electronic journals and newspapers, and so on. Therefore, the Russian resources of scientific information encompass either technical sciences as a whole (RSCI.ru and Infomag systems, Nature.ru scientific network, catalogs of data retrieval systems Yandex, Rambler, List.ru, Aport, and others) or narrower areas such as the sites "Nondestructive Testing in

---

[1] Here and below the data pertain to February 1, 2003.

Russia" [15], "Fuzzy Logic, Fuzzy Systems and Soft Calculations" [16], "Industrial Automation in Russia" [17] and so on.

4. RUSYCON—RUSSIAN ARCHIVE ON SYSTEMS AND CONTROL

In order to satisfy the need for guides on the Russian-language Internet resources on automation and control systems, the laboratory of "Control of Complex Systems" of the Institute of Problems of Mechanical Engineering, Russian Academy of Sciences backed by the Saint-Petersburg group of the Russian National Committee on Automatic Control developed and opened in 1999 the Russian archive on systems and control (RUSYCON) (http://www.rusycon.ru). Historically, RUSYCON is a continuation of the laboratory site "Control of Complex Systems" [18] that appeared in 1997 and gradually was extended and complemented by the appropriate data and references.

The site contains diverse information and references to the Internet resources that can be useful for researchers, instructors, engineers, and students engaged in the area of automation, theory of systems, and control theory, as well as in the related areas of mathematics, mechanics, and informatics. The main task of the RUSYCON archive is to render assistance to the experts in knowledge domains such as theory of systems and control theory in seeking partners and using the WEB-resources in their professional work. The information is in Russian and English.

We describe below the structure of the RUSYCON archive [19]. Each its page contains a drop-down menu in its upper side. Therefore, the user can pass from any page of the site to any other page without loading the intermediate pages, that is, by one mouse click. The menu acts also as a site map. New pages in Russian and English are supported. The archive regularly (once or twice in a month) is updated by the information obtained by looking though various information and corporate sites or by direct search in Internet. Correctness of the existing references is checked every two or three months. The main menu enabling one to classify conveniently diverse useful information was written in JavaScript. Its structure, as well as that of other site divisions was chosen from analysis of the current informational and semantic structure of the knowledge domain and its "virtual image," the existing Internet resources. The techniques of using Internet by the experts and the experience gained in site maintenance also were taken into account.

"Experts" division presents information about the Russian and foreign specialists, teams, and vacant positions in the area of the theory of system and the control theory. It includes the following subdivisions: Full Members of the Russian Academy of Sciences, Corresponding Members of the Russian Academy of Sciences, Experts in Moscow, Experts in Saint-Petersburg, Experts in Other Regions, Russian Teams, Foreign Experts and Teams, and Vacant Positions. The initial list of experts was based on the information about the members of the Russian Academy of Sciences taken from the site of its Presidium and the lists of participants of some international conferences on systems and control theory held in this country in 1997–2000. In total, the archive contains information about approximately six hundred Russian experts and references to the largest foreign databases of experts. Its pages invite the experts to provide personal information to be stored in the database. It was first expected that this method would become the basic method of updating the database as it is the case with the international databases that are actively filled by the young researchers who understand the importance of positioning themselves among the active part of experts for their promotion. Unfortunately, in RUSYCON this channel still works inadequately. The IEEE author database containing the registration data of about ten thousand participants of the IEEE control system conferences such as American Control Conference, Conference of Decision and Control that were accumulated over several years is recommendable for seeking contact information about the experts, both foreign and Russian.

"Institutions" division presents information about Russian and foreign organizations, enterprises, and foundations and consists of the following subdivisions:

—Russian organizations and foundations;

—Foreign organizations and foundations;

—Russian research institutes and technical higher educational institutes;

—Russian enterprises.

Altogether, the archive refers to about five hundred organizations. The list of Russian organizations and foundations refers not only to the federal and All-Russian organizations and foundations, but also to their regional counterparts. The list of foreign organizations and foundations refers to the largest international organizations and to scientific organization of individual countries that actively cooperate with Russia and offer grants to Russian researchers: INTAS (an international association for promoting cooperation with scientists from the new independent countries of the former Soviet Union) [20], the Royal Society of Great Britain [21], and others. The list of "Russian Research and Technical Higher Educational Institute" refers to research institutes specializing in the theory of systems and control and related areas of mathematics, mechanics, informatics, and applied physics. An exhaustive list of the Russian technical higher educational institutes, having servers (including some inofficial servers that are often very informative and useful in work) is presented. The list of Russian enterprises includes those involved in the development and supply of equipment and software for automation and control systems.

"Conferences and Exhibitions" division consists of the following subdivisions:

—Conferences in Russia;

—Conferences abroad;

—Exhibitions.

The foreign conferences on the system and control theory are usually sponsored by one or more international societies whose sites have calendars of planned events for several future years. The conference sites are opened one or two years before the event and provide all useful information for the actual and would-be participants. The conferences held in this country usually are sponsored by institutes or universities, and appropriate information can be found on their sites. Unfortunately, information about Russian conferences often comes to nothing more than information letters appearing, if at all, on sites with substantial delays. The archive refers to the lists of conferences of the greatest international organizations in this knowledge domain such as IEEE [9], IFAC [10], SIAM [11], and others. There are also references to some larger international conferences. Information about the Russian conferences is regularly updated from the sites of institutes and universities. Usually the archive contains information about 50 to 70 future conferences and seminars on the theory of systems and automatic control and related areas. References to the sites of conferences that took place and often contain reports about their work and other useful information are kept. The "Exhibitions" subdivision refers to the greatest international and Russian-language databases on exhibitions, as well as on the sites of the Russian exhibition companies and societies.

"Publications" division consists the following subdivisions: Russian (including electronic) journals—48 references; foreign (including electronic) journals—38 references; newspapers—4 references; new Russian books (78); foreign publications of the Russian authors (77 references); publishers (41 references); libraries (8 references); and on-line shops (9 references).

Altogether, the division refers to over three hundred publications. We note that some libraries and bookstores have vast catalogs that are accessible to any user and indispensable for seeking and specifying information about the book data-lines.

"Other Useful Sites" division contains diverse information and consists of the following subdivisions:

—Databases on Systems and Control;

—Information Sites on Science and Technology;

—Bookshelf;

—Educational Materials;

—On-line Experiments;

—Nonlinear Dynamics and Chaos.

The division contains about eighty references altogether. The "Databases on Systems and Control" comprises references to other sites having multiple references in this or narrower knowledge domains. The "Information Sites on Science and Technology" subdivision contains references to broad scientific and engineering sites having references to the resources from many areas of science and technology. The "Bookshelf" presents the references to the most interesting (from the point of view of the site designers) books and papers that have free access in Internet. The "Educational Materials" subdivision is a collection of references to the materials on systems, automation, control, synergetics, as well as on the sites rendering assistance in mastering the most popular scientific mathematical packages. The "On-line Experiments" subdivision has references to the sites containing interactive experiments and virtual laboratory works in the area of control theory. No additional software is usually required for the on-line experiments. The majority of the presented sites has more than one experiment each and some theoretical material, which allows one to classify them with virtual laboratories.

" 'Rusycon' electronic journal" offers the possibility of electronic express publication of the works on the theory of systems and control theory. Both the publications and access to them are free of charge. The journal publishes materials in Russian or English with abstracts in both languages. According to the traditions of electronic archives (see, for example, the largest archive of scientific publications of the Los-Alamos National Laboratory, USA http://www.arXiv.org) reviewing of the presented materials is replaced by their reading by the editors, which accelerates publication of the materials, including the discussion ones.

5. CONCLUSIONS

The potentialities of using Internet by experts on the theory of systems and control were described together with RUSYCON, the site of scientific information which facilitates use of the Internet resources. In terms of structural branching and number references to the informational resources, the RUSYCON archive is superior to its foreign counterparts and can be regarded as an information portal [22].

Unfortunately, activity of the Russian experts in using the professional Internet resources is currently moderate. In contrast to their foreign colleagues, the Russian experts are not in a hurry to inform about themselves and their research teams, seminars, conferences, and so on. At the same time, Internet, if correctly used, offers wide possibilities of scientific promotion, improvement of the level of events, and enhancement of the prestige of scientific collectives.

It is expected that this publication will be of interest to the experts, instructors, and students and will help them to estimate the advantages of active cooperation with the RUSYCON archive. In turn, this archive and other sites of scientific information could improve efficiency of Internet in professional activity.

REFERENCES

1. Fradkov, A.L. and Nikiforov, V.O., Internet Technologies of Scientific Work, *Tr. 2 nauch.-tekhn. konf. molodykh uchenykh po navigatsii i upravleniyu dvizheniem* (Proc. Second Conf. of Young Researchers on Navigation and Motion Control), St. Petersburg, 2000. See also electronic journal RUSYCON, 24.10.2000, (www.rusycon.ru/journal).

2. Virtual Control Lab, Bochum University (http://www.esr.ruhr-uni-bochum.de/VCLab/).

3. Virtual Control Engineering Library
   (http://www-control.eng.cam.ac.uk/extras/Virtual_Library/Control_VL.html).

4. Control Theory and Engineering Links (http://www.theorem.net/control.html).

5. NETLIB (http://www.netlib.org/).

6. Kirsanov, D., *Veb-dizain* (Web Design), St. Petersburg: Simvol-Plyus, 1999.

7. Nielsen, J., *Designing Web Usability*, Indianapolis: New Rider Publishing, 2000. Translated under the title *Veb-dizain*, St. Petersburg: Simvol-Plyus, 2001.

8. Krug, S., *Veb-dizain ili "ne zastavlyaite menya dumat'!"* (WEB Design or "Donna Make Me Think!"), St. Petersburg: Simvol-Plyus, 2001.

9. Institute of Electrical and Electronic Engineers (http://www.ieee.org).

10. International Federation of Automatic Control (http://158.42.53.29:8080/index.htm).

11. SIAM (Society of Industrial and Applied Mathematics) (http://www.siam.org).

12. Site of Sontag, E., (http://www.math.rutgers.edu/∼sontag/).

13. Site "Avtomatika i robotekhnika" (Automation and Robot Engineering)
    (http://home.polarcom.ru/vvtsv/).

14. "INFOMAG" service (http://www.infomag.ru).

15. "Nondestructive Testing in Russia" server (http://www.ndt.ru).

16. "Fuzzy Logic, Fuzzy Systems and Soft Calculations" server
    (http://fuzzy.newmail.ru).

17. "Industrial Automation in Russia" information portal
    (http://www.industrialauto.ru/).

18. Laboratory of "Control of Complex Systems" of the Institute of Problems of Mechanical Engineering, Russian Academy of Sciences
    (www.ipme.ru/ipme/labs/ccs/).

19. Tomchin, D.A. and Fradkov, A.L., Design of a Modern Problem-oriented Site of Scientific Information as Exemplified by a Network Archive on Systems and Control, in *"Tekhnologii informatsionnogo obshchestva—Internet i sovremennoe obshchestvo." Materialy vseros. ob"edinennoi konf.* (Proc. All-Russian United Conf. "Technologies of the Informational Society—Internet and the Modern Society), St. Petersburg, November 20–23, 2001, pp. 66–68.

20. INTAS (http://www.ib.be/intas/).

21. The Royal Society—The UK National Academy of Science (http://www.royalsoc.ac.uk/).

22. Shatalova, N., New Runet Projects, *Poisk*, 2002, no. 15(673), pp. 7.

This paper was recommended for publication by V.I. Venets, a member of the Editorial Board