Department of Information Sciences

The Department of Information Sciences funds researches on the generation, acquisition, storage, transmission, processing and utilization of information. Based on the trends of disciplinary development and social progress in recent years, the following priorities are set for funding: nano electronics and bioelectronics, radio wave transmission and new types of antenna, advanced information processing, future communication theory and system, space information system, key issues in theoretical computer science, computer software, computer system configuration and storage system, key technologies in computer application, computer network and distributed computer system, bionic sensing and advanced sensors, modeling, analysis and control of complex systems, basic theory and application of intelligent science, advanced robot technology and application, basic research on semiconductor integrated chip system, quantum information technology, key scientific issues in optical information display and processing, advanced laser technology, and biomedical optics. Particular attention will be given to basic researches that meet social demands and have far-reaching importance in promoting national economic and disciplinary development. The encouraged research fields listed by the divisions of the Department in the *Guide to Programs* are only for reference and guidance to application in 2007, and are subject to modification every year in the future.

Scientific and technical issues in information science are increasingly interdisciplinary in nature. Therefore, the Department pays great attention to proposals of interdisciplinary researches between information science and mathematics, physics, materials, life science, chemistry and so on. The Department encourages applicants to submit cross-disciplinary research proposals and proposals for cooperation among scientists with different background and knowledge. The Department will give preferential funding to proposals which have a good background of international cooperation to encourage Chinese scientists to conduct international cooperative research with scientists abroad in frontier areas of information science.

NSFC and the Ministry of Railways signed an agreement on joint funding. This joint fund is open to all scientists in China, with the aim to attract scientists in universities and research institutes to participate in basic research pretending to scientific and technological issues in railway development. The Division III of Information Science will be responsible for the acceptance of proposals. For details on submitting proposals and areas of funding, please refer to relevant pages in the Joint Fund section in the Guide. NSFC has also signed the agreement with Microsoft Research Institute Asia to jointly fund research projects, which covers both Key Program and General Program projects, including network techniques, man-machine interface techniques, image and graphics techniques, etc. All divisions of the Department will accept proposals for the joint fund.

In 2006, the Department increased its budget to the Fund for Less Developed Regions

and Young Scientists Fund in project evaluation. The Department paid continued attention to innovative projects. The Department gave projects completed, which are rated "A" or "C", priority or de-priority consideration in their new applications for funding. The experts in the evaluation panel made strict checks on the projects that were not properly completed, and made suggestions of de-priority to the related institutions that implemented and managed poorly or failed to submit reports in time. In recent years, there remain some problems in the evaluation at project completion, e.g., acknowledgement to NSFC's support in articles published in academic journals did not follow the standard format or even did not appear at all. These problems must be brought to the attention of applicants and management sectors of related institutions undertaking research projects funded by NSFC.

Funding for General Program in Recent Years

Unit: 100,000 yuan

Scientific division		FY 2005			FY 2006		
		Projects granted	Funds	Funding Rate (%)++	Projects granted	Funds	Funding Rate (%)
Division Ⅰ	Electronics and communication system Signal and new type of information processing	270+35*	6,447	20.93	298+32*	7,735	18.21
Division Ⅱ	Computer science Network and information security	232+38*	5,545	19.05	268+34*	6,985	16.58
Division III	Control theory and control engineering System science and system engineering Intelligent system	190+26*	4,570	21.43	207+24*	5,384	18.57
Division IV	Semiconductor and information Devices Information optics and photo-electronic devices Laser technique and technical optics	211+25*	5,204	20.63	213+26	6,131	17.47
Total		903+124*	21,766	20.43	986+116*	26,235	17.65
Average funding*		21.19 (23.28**)			23.81 (25.69**)		

Notes: * Projects of Fund for Small Exploratory Study.

** Average funding without projects of the Small Fund for Exploratory Studies.

++Funding rate including projects of the Small Fund for Exploratory Studies.

Interdisciplinary research between information and mathematics

In 2007, the Department of Information Sciences and the Department of Mathematical and Physical Sciences will continue to fund interdisciplinary researches that require combined efforts from information science and mathematics. The approval rate and funding will not be lower than the same types of projects in General Program. The areas to be included are mathematical methods in modern computer science, mathematical methods in information security, information system and advanced control theory. Interdisciplinary researches in the following areas (but not limited to) are encouraged:

1. Theory and algorithm of integer representation of real numbers
To design the theory and algorithms of integer representation of real numbers, and to realize by computer and give complexity analysis of the algorithm.

2. Theory and methods of formalized representation of software systems
To describe and represent, by using formalization theory and methods, practical software system, not only applicable to real time application software systems, but also applicable to interactive, discrete event software systems.

3. Theory and method of designing security software systems
To verify both theoretically and practically the advantages of the theory, algorithm and system structures of typical software system (system software or application software) analysis, design and development for improving the safety performance of software systems.

4. Theoretical studies on new software system structure
To study, by addressing the contemporary needs of software application, the structure, theory and methods of the system structure of novel software and to give appropriate scientific characteristics in combination with practical software system.

5. Theoretical studies on the validation of software systems
To establish the theory and methods on the validation of software system development so as to ensure the validity of the developed software.

6. Theory and methods of formalized representation of practical engineering projects

Division I of Information Science

The Division mainly funds basic and applied basic research in electronic science and technology, information theory and information system as well as related interdisciplinary areas.

The Division will encourage innovative research on basic issues in the application,

particularly through the combination of theoretical research and application to promote the development of electronic science and technology. Research focus will be on circuit and system, radio wave transmission theory, electromagnetic field transient performance, electromagnetic scattering and inverse scattering, high precision and high efficiency electromagnetic computation method, electromagnetic compatibility and protection, microwave millimeter wave device and integrated circuit, new style vacuum device, plasma electron device, superpower microwave technique and application, new style antenna theory and technology, new types of electronic materials and devices, new types of sensors, microwave photonics, tera hertz electronic techniques, nanometer-electronics, molecular electronics, biomedical electronics, biological information detection and recognition technology, and the extraction and processing of information in the diagnosis of traditional Chinese medicine. The Division encourages innovative researches in frontier areas such as nanometer electron device, electromagnetic property and application of new type media, tera hertz technology, interaction of electronic wave and matter, electromagnetic biological effect mechanism and so on.

Centering on the theoretical and technical researches in the acquisition, transmission, process, storage, exchange and application of information in the areas of information theory and information system, the Division will keep on its funding to encoding technique, sensing technique system, communication theory and system, new communication network, communication software and protocol, sensing and imaging system, weak signal detecting and processing, self-adaptive signal processing, multidimensional signal processing, network information processing, image processing and the integration of multiple sensor information, and other research directions. Applicants are encouraged to explore new methods of signal analysis and processing, new theory and methods of image interpretation and analysis, and theory and methods in advanced information processing, such as biological information processing at molecular, cell and system levels. In order to adapt to the trend of digitalization, networking and intelligent information system, and unification of information system, research and explorations in frontier areas will be strengthened as follows: next generation mobile communication, mobile wireless Internet, network communication theory and system, new type network access technology, multimedia communication, space information processing, next generation network and new types of information system, etc.

In 2006, the Division received 1,903 proposals for General Program and funded 355 (including 36 projects for exploratory studies), including 22 projects for the Joint Funds of Civil Aviation Research and 3 projects for the Joint Fund with Microsoft Research Institute Asia. Among the projects funded in 2006, 227 were Free Application projects, 96 Young Scientists Fund projects and 7 projects of the Fund for Less Developed Regions. The approval rate of Free Application projects was 17.6%, that of Young Scientists Fund 19.2%, and that of the Joint Funds of Civil Aviation Research 24.2%. Some projects funded were related to interdisciplinary research such as information and mathematics, and information and health related subjects.

In 2007, the Division will continue to implement the policy of giving preferential support to Young Scientists Fund and Fund for Less Developed Regions, encourage researches in the areas of network and information security, detection and imaging technologies, bio-information processing and space information processing, and network information processing, support innovative and cross-disciplinary research without common view from reviewers, continue to offer small amount of funds for exploratory studies, and give preferential funding to projects which scored outstanding achievements in previous research.

Division II of Information Science

The Division is responsible for funding researches on basic theories, basic methods and key technologies related to computer science and technology and relevant interdisciplinary areas.

As one of the most active, fast growing and widely influencing areas in information science, the objectives of computer science and technology are to obtain high speed, large storage, highly effective, reliable, networking, intelligent and universal applicability. It is suggested that applicants conceive their research around these main features.

In 2007, the funding areas of the Division will focus on core scientific issues and key technologies in computer science and original, basic, foresighted and cross-disciplinary studies. The Division encourages researches on the theory of computer science, architecture and system software, software engineering and methods, information security, natural language interpretation, data engineering and knowledge engineering, multimedia and virtual reality, man-machine environment, mobile computation, embedded systems, pattern recognition and machine learning, bio information processing, and computation intelligence, etc. Funding priority will be given to new computing theories and algorithms, distributed system and distributed processing, hardware-software integrated system, etc.

In 2007, the Division will continue to support computer scientists in close cooperation with specialists in life science, mathematics, physics, chemistry, geo-science, mechanical engineering and management science to jointly explore new ideas, new theories and novel approaches in these interdisciplinary areas so as to promote the mutual development of computer and other sciences. The Division also encourages and supports scientists to address those basic issues which are well known internationally for their difficulty and significance, so as to upgrade the academic level and influence of China's S&T team.

In 2006, the Division received 1,828 proposals for General Program (including 7 joint projects with Microsoft Research Institute Asia), among which 1,229 were for Free Application, 548 for Young Scientists Fund and 51 for the Fund for Less Developed

Regions, with an increase of 29% from 2005. The Division approved 306 projects (among which, 176 were for Free Application, 84 for Young Scientists Fund, 8 for the Fund for Less Developed Regions, 4 for the Joint Fund with Microsoft Research Institute Asia, 34 for 1-year projects of Small Fund for Exploratory Studies with an average fund of 726,000 yuan per project), and the approval rate was 14.72% (16.58% if projects of the Small Fund for Exploratory Studies are included), and the average funding was 251,400 yuan per project.

In 2007, the Division will continue to pay special attention to applications for Young Scientists Fund. Young scholars who are under 35 years old by January 1, 2007 and have never been in charge of a project of the Young Scientists Fund are advised to apply for it.

Division III of Information Science

The Division funds research on basic theories and key technologies in automation science and technology and related interdisciplinary areas. Seven main areas will be supported including control theory and methodologies, navigation, guidance and transducer technology, system science and system engineering, pattern recognition and application, artificial intelligence and knowledge engineering, robotics, and recognition science and intelligent information processing. In recent years, nano science, life science, cognition science and complexity science have achieved rapid development. Among them, micro and nano operation and quantum system control, bio informatics, recognition process and intelligent information processing, complex system modeling, analysis and control, network system modeling and control, etc., provide not only new challenges to automation science and technology, but also new research areas in this field. High consumption, high exhaust, high pollution and low efficiency in domestic industries and the demand of green economy and recycled economy by social development all ask scientists in automation science and technology to find out scientific problems, carry out innovative research and make breakthroughs in key technologies. In a certain period of time in the future, the Division will continue to support innovative studies in the areas of basic research and key technologies in traditional areas, and also encourage research on basic research topics selected from social economical development, human health and security, as well as interdisciplinary research in these areas.

In 2006, the Division (formerly the Division of Automation Science) received 1,244 proposals for General Program projects (897 were for Free Application, 329 for Young Scientists Fund and 18 for the Fund for Less Developed Regions); 207 three-year projects (150 for Free Application, 54 for Young Scientists Fund and 3 for the Fund for Less Developed Regions) and 24 projects of the Small Fund for Exploratory Studies (12 for Free Application, 11 for Young Scientists Fund and 1 from the Fund for Less Developed Regions) were funded. The average funding for Free Application, Young Scientists Fund and Fund for Less Developed Regions were 255,000 yuan, 240,000 yuan and 240,000 yuan per project, respectively, and 80,000 yuan per project for the Small

Fund for Exploratory Studies, The approval rate for General Program projects (including the Small Fund for Exploratory Studies) is 18.57%.

Since 2006, the Division started to receive applications for the Joint Fund for Railway. In 2006, the Division received 82 applications and funded 13 projects, with an average rate of 15.85% and an average funding of 246,200 yuan per project. Applicants are advised to note information on this and submit applications according to relevant requirements specified in the *Guide to Programs*.

In 2007, such research areas will be encouraged as unified control and management of energy saving, low consumption and pollution reducing production process, network system and network information processing and control, complex system modeling, analysis and optimal control, information control processing and control in biology and life sciences, new methods of information acquisition and new transducer technology, integration of information from multiple sources, new theory and methods of pattern recognition, new theory and methods of artificial intelligence, advanced robotic system and key technologies, and cognitive process and intelligent information processing.

Division IV of Information Science

The Division mainly funds researches in the areas of semiconductor science and information devices, optics and photo-electronics. In recent years, along with the development of physics, chemistry, materials science and information science, semiconductor science and information devices, optics and photo-electronics have witnessed tremendous growth and in-depth intercrossing with other disciplines and the formation of many newly emerged interdisciplinary areas.

In 2006, the Division received 1,368 proposals for General Program projects (including 977 proposals for Free Application, 373 for Young Scientists Fund and 18 for the Fund for Less Developed Regions), which was 19.7% more than 2005. After evaluation, the Division funded 213 three-year projects (including 153 for Free Application, 56 for Young Scientists Fund and 4 for the Fund for Less Developed Regions), and 26 for the Small Fund for Exploratory Studies. The approval rate including the Small Fund for Exploratory Studies was 17.47%, and the average funding per project for three-year projects and Small Fund for Exploratory Studies project was 278,000 yuan and 80,000 yuan, respectively.

Referring to the number of applications in 2006, some major areas like micro electronics, optical information transmission, and technical optics had large increase, semiconductor and other devices, semiconductor physics, infrared technology, nonlinear optics had apparent small number of applications, optical information processing had small increase, nonlinear optics was the same as last year, and optics and photo electronic materials had small decrease. In regard to the contents of applications, IC design, high-speed optical

communication network and relevant devices, solid laser device, quantum optics were still the hot spots of research, and photon crystal, various laser devices, various optical membrane and biomedical optics enjoyed rapid increase.

The Division pays attention to the close integration of basic research and applied research, encourages researches in areas of new disciplinary, interdisciplinary, across-disciplinary, interdepartmental and international cooperative research, as well as qualified young scientists to apply for Young Scientists Fund, and gives preferential support to innovative and excellent projects that have application prospects. According to the research and development trend and overall layout of the information sciences, as well as the suggestions from experts, the Division will give priorities in the areas of nano device and technology, wide gap semiconductor materials and devices, tera hertz devices, quantum regulation, semiconductor integrated circuit system (SoC), optical information processing and display technology, and advanced photon technology, etc., in the Eleventh Five-Year Plan period. In 2007, the Division will also encourage researches in the following fields: nanometer scale MOS devices and technological issues, radio frequency and digital analogy mixed integrated circuit design, on-chip system and on-chip network chip design, micro-nano optical and electro-mechanical device and technology, transducer technology, low dimensional quantum structure materials, physics and devices, wide gap semiconductor materials and devices, self-spin electronics and self-spin photo electronic materials and devices, organic (polymer) and organic/inorganic composite materials and devices, ultra violet technology, tera hertz technology, quantum optics and quantum communication, high speed optical communication, optical exchange, optical interconnection, optical transmission network element technology and devices, high density information storage, new technologies and devices of optical transmission, optical display, optical detection and sensing, high speed real time optical information and image acquisition and processing, new laser device and optical information functional materials and devices, laser physics and new types of laser technologies, photo electric transfer and interaction, microwave photonics, micro-nano photon devices, advanced optical manufacture and checking technology, super spectrum imaging method and technology, study of new phenomena and new technology in ultra fast optics, information devices, and optics and photonic problems in health and biomedical sciences.