

# PROCEEDINGS

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of the Union of Scientists - Ruse

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Book 5  
**Mathematics, Informatics and  
Physics**

Volume 8, 2011



RUSE

**The Ruse Branch of the Union of Scientists in Bulgaria** was founded in 1956. Its first Chairman was Prof. Stoyan Petrov. He was followed by Prof. Trifon Georgiev, Prof. Kolyo Vasilev, Prof. Georgi Popov, Prof. Mityo Kanev, Assoc. Prof. Boris Borisov, Prof. Emil Marinov. The individual members number nearly 300 recognized scientists from Ruse, organized in 13 scientific sections. There are several collective members too – organizations and companies from Ruse, known for their success in the field of science and higher education, or their applied research activities. The activities of the Union of Scientists – Ruse are numerous: scientific, educational and other humanitarian events directly related to hot issues in the development of Ruse region, including its infrastructure, environment, history and future development; commitment to the development of the scientific organizations in Ruse, the professional development and growth of the scientists and the protection of their individual rights.

The Union of Scientists – Ruse (US – Ruse) organizes publishing of scientific and popular informative literature, and since 1998 – the "Proceedings of the Union of Scientists- Ruse".

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**BOOK 5**

**"MATHEMATICS,  
INFORMATICS AND  
PHYSICS"**

**VOLUME 8**

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## HUMAN COMPUTER INTERACTION IN COMPUTER SCIENCE EDUCATION

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**Abstract:** *Including Human computer interface as a subject in modern education for Computer Science and related students is of very important. This could be clearly seen from the proposed subjects, curricula and other specialized courses offered at universities in Europe and USA. How is this reflected in the training of students in computer science in Bulgaria? A brief analysis of this issue and related problems, the authors try to give in this article.*

**Keywords:** *Human-Computer Interaction, Human-Computer Interface, Education*

### INTRODUCTION

Human-computer interaction is the study, planning and design of the interaction between people (users) and computers. It is often regarded as the intersection of computer science, behavioural sciences, design and several other fields of study. There is currently no agreed upon definition of the range of topics which form the area of human-computer interaction. There are some working definitions, that at least permit to get down to the practical work of deciding what is to be taught and one of them is:

Human-computer interaction is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them [2].

Research in Human-Computer Interaction has been spectacularly successful, and has fundamentally changed computing [1]. Through the past three decades, HCI has progressively integrated its scientific concerns with the engineering goal of improving the usability of computer systems and applications, thus establishing a body of technical knowledge and methodology.

One of the most important fields of Human-Computer Interaction for us is Human-Computer Interface (HCI) and its design.

### EDUCATIONAL PURPOSES IN HCI

The objectives, pursued by HCI training, are to teach principles and techniques for design and development both usable and secure systems, but also functional. Emphasis is particularly the project construction and test methods for prototypes' development and evaluation and the psychological aspects of CHMI, too.

Long-term goal of HCI is to develop systems which minimize the barrier between the human model understanding of what is need to get from the computer and the real computer "perception" of the user task. This objective is the basis for building the subject's training.

People, dealing with HCI, are interested in developing new design methodologies, experimenting with new hardware devices, prototyping new software systems, explaining new paradigms of interaction and development of new models and theories of interaction.

To produce easy to use computer system, HCI professionals should:

- Understand the factors (physiological, ergonomic, organizational and social), which determine how people handle and make efficient use of computer technology;

- Apply this understanding in tools and techniques development, that help the designer to provide computer system, suitable for users, so that:
- Achieve efficient, effective and safe interaction with individual and group HCI

### HCI IN COMPUTER SCIENCE EDUCATION

Human-computer interaction (HCI) has long been a focal area for innovative, multidisciplinary computing research and development. Ten years after the new millennium began, it is time to ask where this increasingly important field is going. Are the new forthcoming specialists in computer science ready for developing the HCI? Could they improve and appreciate the new interesting and stimulating ideas on the future of our interactions with computers?

#### *How it is done worldwide?*

In 1985, the ACM SIGCHI workshop on curricula in HCI (Mantei, 1985) proposed the development of courses in HCI [2]. Since then, numerous individual courses have been developed and instituted in many parts of the world [5]. The main proposed for the curricula courses are shown on Table 1.

Table 1 Course Emphases on the Content of HCI [2]

CONTENT AREAS (course length assumed to be 14 weeks with 42 contact hours total)	CS1: UI Design & Devel.	CS2: Phen & Thy of HCI	PSY1: Psych of HCI	MIS1: Human Aspects of IS
<b>N The Nature of HCI</b>				
N1 (Meta-)Models of HCI	2	2	2	1
<b>U Use and Context of Computers</b>				
U1 Human Social Organization and Work	2	4	4	4
U2 Application Areas	1	1	1	4
U3 Human-Machine Fit and Adaptation	2	2	4	3
<b>H Human Characteristics</b>				
H1 Human Information Processing	1	9	4	1
H2 Language, Communication and Interaction	1	5	2	2
H3 Ergonomics	1	2	1	1
<b>C Computer System and Interface Architecture</b>				
C1 Input and Output Devices	2	0	3	2
C2 Dialogue Techniques	3	0	4	3
C3 Dialogue Genre	1	0	1	1
C4 Computer Graphics	1	0	1	1
C5 Dialogue Architecture	1	0	1	0
<b>D Development Process</b>				
D1 Design Approaches	4	2	4	4
D2 Implementation Techniques	5	2	2	4
D3 Evaluation Techniques	5	6	4	3
D4 Example Systems and Case Studies	3	2	2	4
<b>P Project Presentations and Examinations</b>	7	5	2	4

Table 1 relates the content of HCI and the emphases of each topic for each of four proposed courses. All proposed in the curricula courses could be broadly characterized as either technology oriented (CS1: User Interface Design and Development and CS2: Phenomena and Theories of Human-Computer Interaction) or human oriented (PSY1: Psychology of Human-Computer Interaction and MIS1: Human Aspects of Information Systems). Also they are moving from a general professional/practical orientation (CS1 and MIS1) to one that is more specialized and research oriented (CS2 and PSY1). Also the courses should be specified, depending on the type of students – hardware or software oriented; bachelor, master or PhD etc.

Main courses and their interaction are shown on figure 1.

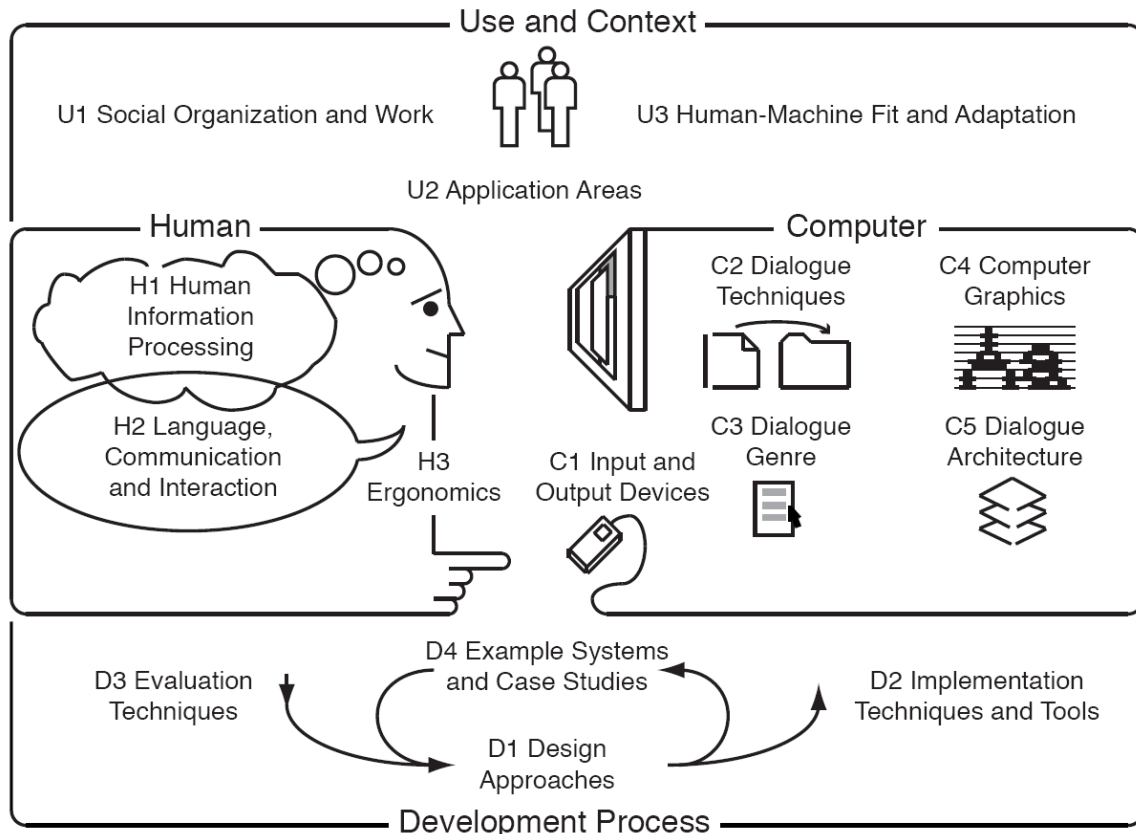


Fig. 1 Human-Computer Interaction

**How it is done in Bulgaria?**

In our country, the education in Computer science is already well developed. But it is not the same for including HCI in the computer science curricula in different universities.

As could be seen from Table 2, only a few universities have courses, which are oriented only to HCI.

Table 2 HCI courses in some Bulgarian Universities

University	Course Name	Students degree
Sofia University	Human Computer Interface Design	Bachelor Master specific course
Ruse University	Human Computer Interface	Bachelor (compulsory)
Plovdiv University	Principles in user interface construction for Web and Desktop applications	Bachelor (eligible)
Technical University – Varna	Human Computer Interface	Master
University of	Human Computer Interface Design	Bachelor (eligible)

Librarian Knowledge and Information Technology - Sofia		
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There are lots of courses, which include parts (or themes) of technical oriented aspects in HCI. But the time and themes are too small and definitely not enough for such huge subject. Normally there are almost no courses, which deal with human aspects of HCI.

### WHAT ARE THE MAIN PROBLEMS

Studying HCI in computer science education in Bulgaria, we have found some serious problems, namely:

- lack of appropriate learning systems ready for use – there are lots of systems, which some lecturers made for their own use or purposes [2, 4], but that is not a correct decision;
- lack of experience in biding education, in which the active side has to be the student;
- there are almost no literature in university libraries and all available is in English;
- a wide variety of software systems and interface types developed, which have to be well known, so the systems could be effectively used.

### WHAT SHALL WE DO?

The studying subject HCI in the Computer science courses review made, allow making following **conclusions**:

- Offered subject is actual and useful.
- Studying HCI corresponds to update level in sufficient stage, but the time and themes devoted to it in lectures are not enough.
- Preliminary students' knowledge in the field of interface models development is still very low.
- Students' language training is not good enough.

and some **recommendations**:

- Force studying of interface models development, which are in the base of design useful software systems.
- Familiarizing students in using on-line materials, so they will keep abreast of the time and follow the novelty and tendencies in software development.
- At chance to increase the time, spend in learning business models designing principles.

### REFERENCES

- [1] Brad A. Myers. "A Brief History of Human Computer Interaction Technology." *ACM interactions*. Vol. 5, no. 2, March, 1998. pp. 44-54.
- [2] Georgiewa E., M. Teodosieva, St. Smrikarova, Cv. Georgiev, Web based teching in JAVA, Proceedings of the International Conference "E-Learning and Knowledge Society", (6 – 8 September), Ghent, Belgium, pp. 2.4.1 – 2.4.9
- [3] Hewett, Baecker etc., ACM SIGCHI Curricula for Human-Computer Interaction, <http://old.sigchi.org/cdg/cdg2.html>

- [4] Krastev G., M. Teodosieva, Information System for advertisement processing, International Workshop "Computer Science and Education", Borowetz – Sofia, ISBN 954-535-401-1, 2005
- [5] <http://www.usabilitynet.org/usability/university.htm>

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## ОБУЧЕНИЕТО ПО ЧОВЕКО-МАШИНЕН ИНТЕРФЕЙС В ОБЛАСТТА НА КОМПЮТЪРНИТЕ НАУКИ В БЪЛГАРИЯ

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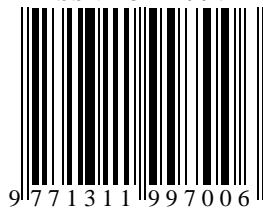
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**Резюме:** Включването на човеко-машинния интерфейс като дисциплина в съвременното образование на студентите от специалност Компютърни науки и свързаните с тях е доста важно. Това може ясно да се види от предложените учебни дисциплини, учебни програми и различни специализирани курсове, предлагани в университетите в Европа и САЩ. Как е отразено това в обучението на студентите в областта на компютърните науки в България? Кратък анализ на състоянието на този въпрос и свързаните с него проблеми, авторите се опитват да дадат в настоящата статия.

**Ключови думи:** Човеко-машинно взаимодействие, Човеко-машинен интерфейс, Обучение



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