

## HOW TO MOTIVATE STUDENTS FOR SPECIAL ACTIVITIES

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**Abstract** — *The paper summarizes good experiences with motivating students for special activities, students' research projects (donated by the Grant Agency of Czech Ministry of Education, Culture and Youth and by the Grant Agency of the Faculty of Mechanical Engineering, VSB-TU Ostrava), students competitions (organized by our Department for the last seven years), student exchange programs, etc. All these activities are helpful for increasing the number of engineering students and helps for their study process and professional goals. The paper shows concrete programs and results acquired at the Department of Control Systems and Instrumentation.*

*Index Terms* — *activity, project, competition, conference.*

### OBJECTIVES

The actual economical situation in the Czech Republic is not so good. This situation influences possibilities of faculties of engineering very negatively. Many potential students decide to study management, law, philosophy or other study programs, which are not as expensive and demanding. The situation at the beginning of the 90' looked critical, many of traditional Czech factories was in trouble, many of them closed their development departments, many of them were reengineered (divided to more smaller parts) and privatized.

Sponsorship and collaboration with universities was at the zero point at that time. Fortunately, the economical situation is improving; more international companies opened their business in the Czech Republic and opened collaboration with faculties of engineering again. Situation is now better, but not ideal. It is not easy to reopen the closed development departments and find new workers. Collaboration with small factories is very problematic because of their low incomes.

This paper deals with the activities of the Department of Control Systems and Instrumentation, Technical University of Ostrava, to motivate students in study programs from the area of control systems.

### STUDY PROJECTS

One way to motivate students is focusing on traditional study projects (short-term project, usual one-semester projects) in the modern and interesting areas, like wireless communication, GPS systems, smart sensors, adaptive controllers etc. The main problem is that students do not have effective knowledge from this area and the main goal

of this project is to learn more about solving a problem. It is almost impossible to connect these projects to solve some concrete problems for industrial partners. Another problem is the price of the newest hardware and software. In this case we have good experience in collaboration with some hardware and software producers, who give or loan us their equipment for our laboratories.

### GRANT PROJECTS

Much better (and complicated) are the long-term projects, solved during a longer time by a student team controlled by the teacher. There is a very good possibility to learn more about teamwork, team management and collaboration. A few of these projects are developed at our Department. Many of them are oriented on creating and updating information systems, provided by our Department, like:

- Information system for conference organization support – registration of participants, papers, accommodation, excursions etc.
- Information system for course contents, connected to available electronic sources, electronic textbooks etc.

A student team has developed these systems for last three years chaired by the author of this paper. The course contents system is focused on helping students to find up-to-date information about their courses and available data sources. This information system has been developed by a student team according to the student's needs, which is well seen in its searching system, which helps students to find courses by name, number, teacher, study program and also by the contents, prerequisites or examination questions. Information system operation is shown in Figure 1.

Other projects are focused on helping non-profit organizations with their activities, like:

- Measurement system for children's competitions.
- This project is very interesting for our students because they can show their professional skills developing and operating this special measurement system in the well-known, popular children's competition with a nineteen years long tradition. Especially when some of them participated in this competition in the past. Two pictures from this competition are shown in Figures 2 and 3.

The Grant Agency of the Czech Ministry for Education, Youth and Sports gives support to these students' projects, to increase the activity of students, especially at universities of technology. Our Department has had good achievements because of activity, and we have usually two students' grant projects every year.

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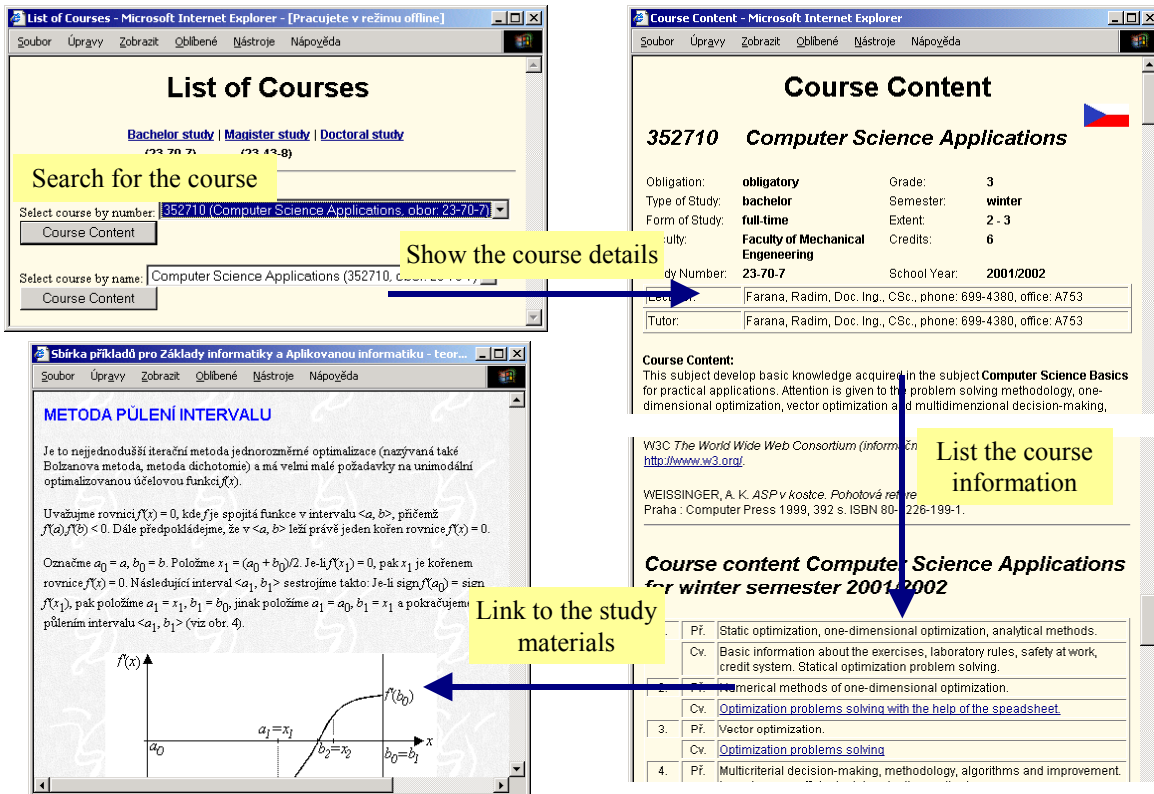


FIGURE 1  
THE COURSE CONTENT INFORMATION SYSTEM OPERATION EXAMPLE.



FIGURE 2  
STUDENTS' TEAM MEMBERS (RIGHT) WORKING ON THE MEASUREMENT SYSTEM.



FIGURE 3  
INFORMATION ABOUT THE FACULTY SPONSORSHIP.

### STUDENTS' COMPETITION

Formerly, a monster competition of students' work (SVOČ or SVUOČ as well) ended its history in the year 1989, especially because of the loss of the financial support, but for reasons of control and compulsory pedagogical presents

and other negatives given to some extent, by a previous system of control in society. Its indisputable significance for students' expertise activity development and its work presentation, especially in cooperation with industry was fortunately so obvious, that these competitions were successfully brought to life again. Firstly, it was on the Department level, then at the Faculty and University levels,

later on a state-wide level, and it is international at the present time. In the area of Mechanical Engineering including Control Systems, the credit for revival of the statewide competition called STOC- Students creative and expert activity- must be given to the team of staff from the Technical University of Brno, with its Head Ass. Prof. Pochylý, (a professor today). After a few years, however the team exhausted its strength and this led to the idea of a migratory holding of the state-wide round. In the year 1997, our Department with the cooperation of our colleagues from Faculty of Mining and Metallurgy took the lead in organizing the event. We employed our experience from a student's conference and a competition held in the year 1996, with the great help of sponsors from industry [4]. The basic statistical data about each year is shown in Figure 4. The number of works competing shows a considerable fluctuation, however, the results of 2002 are very favorable. Forty works in five sections have already almost exhausted our capacity. We consider a great success that the competitors from four foreign universities took part (from Slovakia and Poland). We are happy about keeping and developing contacts with industrial practice and firms from the area of industrial automation, which support the competition by donating prizes and by their participation in expert committees.

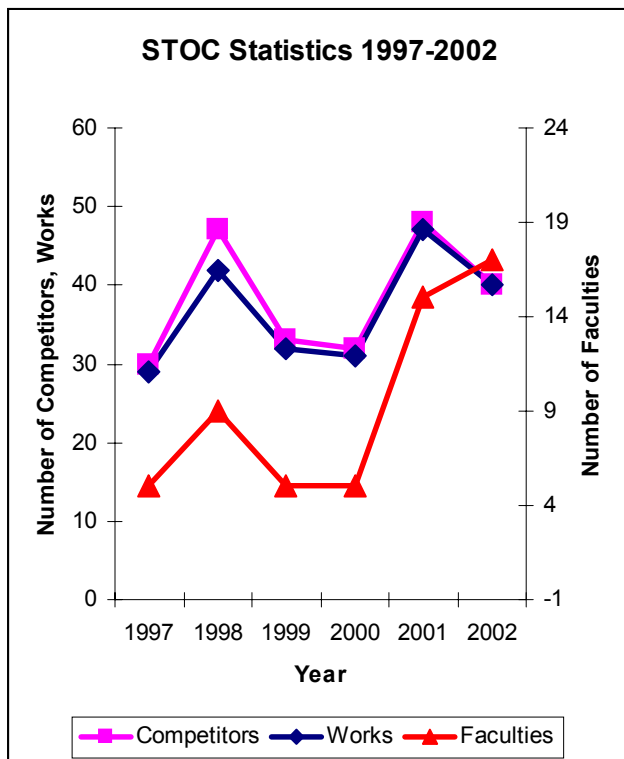


FIGURE 4  
STOC COMPETITION STATISTICS 1997-2002.

The structure of the expert sections has changed in the last few years. Previously, the very strong section of PLC

applications (in the first three years has included works also from secondary schools) was integrated with a section focused towards operators' and visualization systems, and a new section originated which is focused on applications of measurement and diagnostic systems.

The standard of the competition has been held in publishing a book of one page abstracts from the students works presented, and broad participation by students practically from all technical universities in the Czech Republic. It is more and more difficult to win a prize in this competition (granted by financial support and in some sections a valuable material prize for the Department).

### STUDENTS' CONFERENCE

The seminar of Control Systems became a tradition in meeting specialists, when the 26<sup>th</sup> year in 2001 was given the name as „Instruments and Control“ [3]. Its focus towards theoretical and applied contributions in the area of Control Systems and lately Engineering Informatics as well, became fixed. For three years the best contributions of internal doctorate students has been awarded in the framework of the Seminar, so that the Seminar is also gradually becoming a competition of internal doctorate works. The Competition, above mentioned as STOC, is understood as a students conference and an independent part of the Seminar. The number of presented contributions is shown in Figure 5. In spite of the fluctuating numbers their growing trend is obvious. Luckily, the growth of their quality is connected to it as well. A compulsory part of the contribution is a whole page extended annotation in English. These annotations then create a published book of annotation proceedings.

Full texts of contributions are available through Internet, or CD-ROM. Thanks to this orientation towards the electronic media we are able to keep the conference fees, more or less, at a symbolical level.

This year the students' conference (the Seminar) was connected with the International Carpathian Control Conference, in which one section was oriented on the engineering education area, thanks to iNEER support [1]. Detailed information included the full proceedings is available on web [2]. Orienting our Department in the area of applied Informatics is also obvious from the extended information support of all of our expert activities, namely the Seminars. A database information system has been gradually developed, which significantly helped during the organizing of world symposia (MPES 1997, ICEE 1999 and ICC 2002). A student team from our field is also participating in the development of this system, as written above.

Evidence about how difficult it is to create such an information system, is given in the description of a system work in Figure 6, which shows work with contributions – a display of a list, in detailed information, their changes and filing the contribution into a section. The system has five such parts.

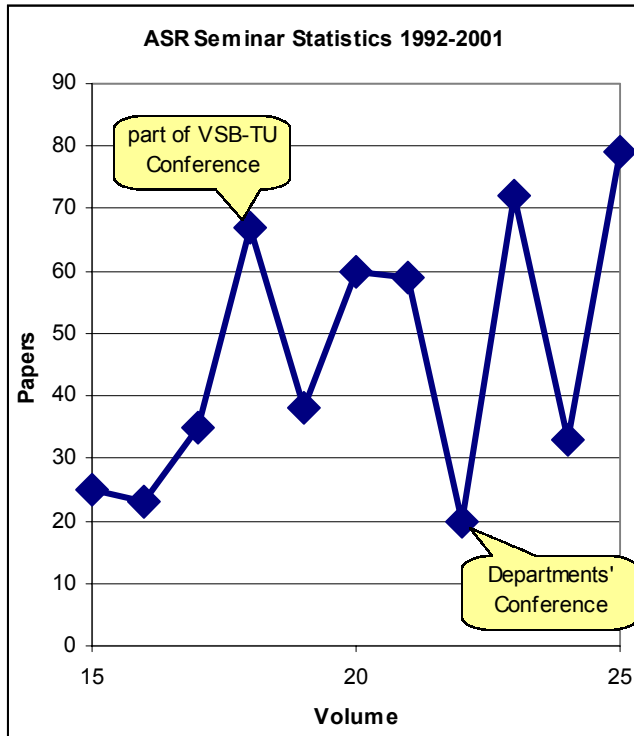


FIGURE 5  
ASR SEMINAR STATISTICS 1997-2002.

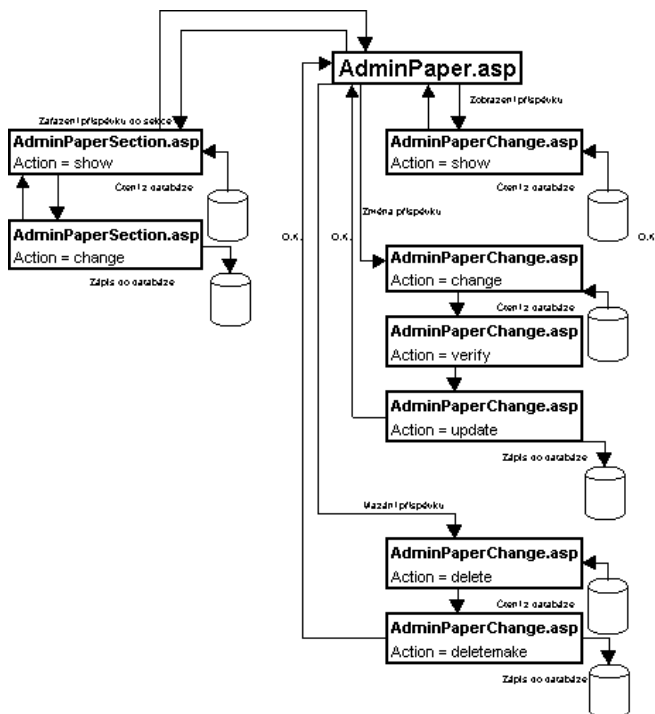


FIGURE 6  
A PART OF WEB INFORMATION SYSTEM, DEVELOPED BY STUDENTS' TEAM.

## CONCLUSIONS

At the conclusion, let us state, that in the area of expert activities focused on the technically oriented community, as well as students work presentations for doctorate and master studies, good results were reached at our Department. Very good cooperation of other Departments contribute to this focus on the industrial automation at our University and several other schools, while cooperating with firms and companies in this area.

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