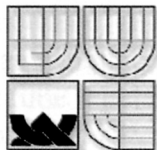


BRNO UNIVERSITY OF TECHNOLOGY



Department of Radio Electronics (DREL)
Brno University of Technology



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Vienna University of Technology



Institute of Communications and Radio-Frequency Engineering (INTHFT)
Vienna University of Technology

RESEARCH AND MODELING OF ADVANCED METHODS IN RECENT WIRELESS COMMUNICATION SYSTEMS

Final Report

AKTION project no. 54p18

1 July 2009 – 30 June 2010

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1 Project overview and changes

Originally, the project was focused on research, assessment and comparison of different methods, means and standards for distribution of digital television and signals in baseband as well as in radio frequency band, as it was announced in the project proposal in spring 2009. The project was focused mainly on short time regular exchange visits of two young researcher Dr. Tomas Kratochvil (at DREL in Brno) and Dr. Michael Ries (at INTHTF in Vienna) to discuss the state of the art, literature survey and related research, towards to modelling of the advanced methods for image/video quality evaluation in the source coding and transmission of the compressed image/video material.

At the very beginning of the project there was a change in the responsible person at INTHTF from Dr. Michael Ries to Prof. Markus Rupp (ex-supervisor of the Dr. Michael Ries). This change was announced to AKTION offices in Prague and Vienna officially in December 2009 and this change was approved by the authorities. After the change of contact person at INTHTF the project has extended topics to recent wireless communications systems and the idea of short time regular exchanges was changed into two big regular meetings of academics and researchers from DREL and INTHTF. These meeting were focused on research and education activities and they were scheduled to February 2010 at INTHTF in Vienna and April 2010 at DREL in Brno.

During these two meetings a group of approx. 50 academics and researchers discussed common topics and research interests to establish connection and foster further personal meetings of interested colleagues between DREL and INTHTF. Draft programmes of the meetings within the project and established cooperation in research, education and dissemination are presented in the next parts of this final report.

2 Meetings of the DREL and INTHTF

There were two big meetings called “Research Track” and “Educational Track” with the aim of finding partners for active cooperation and mutual exchange of the information between people at institutes of INTHTF and DREL and with strictly voluntary attendance. The names, dates, contents and places of the meetings were:

1) **Research Track**, 15 – 16 February 2010 at Vienna University of Technology, INTHTF

The first track was focused on cooperation in the research activities with the audience of approx. 40 persons (both academics and researchers). During the plenary meeting there were given overall presentations of research activities at INTHTF and DREL. The short talks were introductions of individual researchers to their posters. The poster session was displayed during whole the meeting in individual sessions – Audio and Video, RF Design and Satellites, Wireless Communications, DSP and Optical Systems. In total the poster session contained 35 individual posters. During the poster session there were established individual discussions in common research groups and there were also organized individual visits at laboratories (in total seven laboratories) of the INTHTF.

The next day the presentation of the future research projects from DREL and INTHTF were given with the focus on possible real cooperation in the research and research support (cooperation of individual research groups, how to join European projects and FP7 calls, regular conventions and scientific conferences). Also the meeting in April and DREL focusing on education was prepared.

2) **Educational Track**, 22 – 23 April 2010 at Brno University of Technology, DREL

The second track was focused on cooperation in the educational activities with the audience of again approx. 40 persons (both academics and researchers). During the plenary meeting there were given overall presentations on bachelor, master and doctoral degree education and detailed study programmes at INTHT and DREL were discussed. There was also organized a poster session on education and reciprocal visits at research and educational laboratories (in total 11 laboratories) of the DREL.

The next day there were also organized two plenary meetings. The first was focused on possible cooperation in education of master and doctoral degree students at INTHT and DREL (including panel discussion). The second was focused on the details of possible and real cooperation in research projects and research support as a continuation of the topics from the Vienna meeting in February.

3 **Results**

The results of the meetings can be divided into three categories: research, education and dissemination. There were found possible common interests in all these three categories:

1) **Research**

- a) Several areas of common interests have been identified - RFID, mobile communications, microwaves, antennas, signal processing, optics and light waves.
- b) Short-term stays of two young researchers from DREL will be organized at INTHT - Dr. Jan Prokopec in mobile communications and LTE measurements and Dr. Jiri Sebesta in microwaves.
- c) Short-term stays of one young researcher from INTHT will be organized at DREL as well - Dr. Michael Fischer in satellite communications.
- d) A common FP7 project focused on communication systems in emerging frequency bands has been discussed. The topic could be “MMW/FSO hybrid links for high-speed data wireless P2P transmission (to tens of Gbps, up to 2 km)”.
- e) Researcher and teachers from DREL were encouraged to use an FPGA functional library and WiMAX and LTE DL simulator tools developed at INTHT. There was also offered to help INTHT with the software development (Prof. Markus Rupp) which is already in the state of cooperation.
- f) Common activities can be partly financed by the universities themselves due to the Memorandum of Understanding established some time ago between Vienna University Technology and Brno University Technology.
- g) Possible future cooperation can also be financed from the grants of the South Moravian Centre for International Mobility, by grants of TU Vienna, Oead, ERASMUS Mundus External Cooperation and FWF support. The list of possible financial resources was distributed to all participants.

2) Education

- a) One week course on Bayesian estimation and related topics will be given by Prof. Franz Hlawatsch at DREL. Teaching can be fully financed (travel expenses, teaching fee, etc.) from the DREL.
- b) During the plenary meeting on education there have been offered possible one-week block courses from BUT that are based mainly on practical education and laboratory exercises which is difficult (but not impossible) to execute for students from Vienna: Measurement and Analysis of Mobile Networks (Dr. Jan Prokopec), Speech and Speaker Recognition (Prof. Milan Sigmund), CAD in Microwaves (Prof. Zbynek Raida), Microprocessor applications and advanced programming (Dr. Tomas Fryza).
- c) During the plenary meeting on education there have been identified possible topics from INTHFT that the doctoral students from DREL could be interested in: Adaptive filters, Multimedia over wireless, Image and video, Deterministic signal processing, Wireless cellular Standards (all Prof. Markus Rupp) and Statistical signal processing (Assoc. Prof. Franz Hlawatsch).
- d) There have been established an extension of the joint seminar "Mobile Communications" (INTHFT, no. SE 389.075) that is organized by INTHFT and Department of Telecommunication FEI STU Bratislava. In 2010, DREL will participate with organizing of approx. 1/3 of the course schedule and will guarantee "background" for the teachers and students from all three participating departments (INTHFT, Dept. of Telecommunication FEI STU Bratislava and DREL).

3) Dissemination

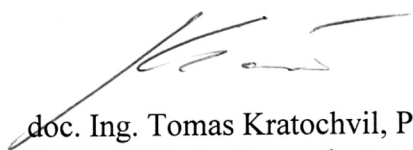
Vienna University of Technology and Brno University of Technology will support partner conferences (RFID Workshop 2010, European Wireless 2011, IWSSIP 2012, Radioelektronika 2010, Radioelektronika 2011, EuCAP 2012) and other dissemination activities that were established between academics and researchers during the meetings.

4 Operational costs

During both meetings all the guests from the visiting departments were covered with the support, refreshment, catering and corresponding accommodation as well. All the costs for the meetings were paid partly by the grant of the AKTION project no. 54p16 and mostly from the institutional budget of the DREL and INTHFT too. Drawing from the AKTION budget from DREL is attached to this report (please see Attachment). Drawing from the INTHFT has been already presented to OEAD office in Vienna.

We would like to thank very much to AKTION office at Vienna and Prague for providing us with the support, grant budget and kind help with the costs for the meetings within the AKTION project no. 54p16 "Research and modelling of advanced methods in recent wireless communication systems".

Brno and Vienna, 30 June 2010



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