

Studies in Computational Intelligence, Volume 235

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Reiner Onken and Axel Schulte

System-Ergonomic Design of Cognitive Automation

Dual-Mode Cognitive Design of Vehicle Guidance
and Control Work Systems

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We can only see a short distance ahead,
but we can see plenty there that needs to be done.
(Alan Turing)

Acknowledgements

This book came about when there was the latest transition in office for the chair of Flight Dynamics and Flight Guidance at our Universität der Bundeswehr München (Munich University of German Armed Forces). The two of us were personally involved in that transition, i.e. one of us came in office and the other retired. It was the younger one who eventually stimulated the project to write this book on a research and development topic by which our institute became known worldwide.

Since about two decades the institute has been putting feet on new grounds regarding the introduction of knowledge-based systems and cognitive automation into the work process of guidance and control of air and road vehicles for the sake of performance enhancement and safety. A great number of publications accumulated and groundbreaking experiments were conducted during that time, including complex simulator and field trials.

There are always good reasons why such success comes about. The one to be mentioned in the first place are the resources of our university, thereby offering best provisions for successful research. The basic financial support as to the laboratory equipment and experimental facilities has been outstanding throughout. Additional funding mainly was granted by the German Departments of Defence (BMVg) and Research and Technology (BMFT), by the European Union, as well as by companies like Dornier Luftfahrt, EADS (former DASA), Daimler-Benz, MAN, and Opel. This made it possible that a rather small group of people could come to some amazing achievements.

In addition, the organisational setup of the faculty lends itself to initiate fruitful co-operations. This cannot be appreciated highly enough. For a long period of time the institute was run together with the colleague Prof. Dr. Ernst-Dieter Dickmanns who was holding the chair of Control Engineering. During that time, benefit was mutually gained from common participations in research projects like for instance the notably funded Prometheus project Pro-Driver and the CAMA (Crew Assistant Military Aircraft) project. Now, as part of a recent reorganisation a new promising formation, the Institute of Flight Systems, is established together with the colleague Prof. Dr. Peter Stütz who now holds the chair of Aeronautical Engineering.

The content of our book is substantially based on the work being outlined in the doctoral dissertations which were completed during the last two decades, resulting from enthusiastic engagement in a fascinating research field. Without them, there would be hardly anything to write on an authentic basis. All started with the dissertation of Heinz-Leo Dudek on the ASPIO cockpit assistant system. This achievement was a kind of foundation stone for the following work. He also was

significantly involved in the CASSY project as actively participating representative of the company Dornier Luftfahrt GmbH. The following dissertations which we like to mention here are those of Matthias Kopf (the first dissertation on the automotive application, resulting in the driver assistant system DAISY), Thomas Wittig, Thomas Prévôt, Axel Schulte, Marc Gerlach, Johann Peter Feraric, Wilhelm Ruckdeschel, Michael Strohal, Frank Schreiner, Stephan Grashey, Peter Stütz, Frank Ole Flemisch, Anton Walsdorf, Udo von Garrel, Henrik Putzer, Andreas Frey, Hans-Jörg Otto, and lately Claudia Meitinger, the first researcher of the new generation after the aforementioned transition. At this point, also the work of André Lenz should be especially appreciated. Diana Donath and Michael Kriegel shall be named as further representatives for the new generation, not enumerating those, at present more than ten members of the research staff, who were only involved for a relatively short period of time or have not yet finished up their research work. Through all the years Dr. Werner Fohrer supported the research team as enthusiastic expert of classical flight mechanics.

Undoubtedly, the experimental work would not have been possible without the technical staff helping to build up and maintaining the laboratory and computing equipment as well as the simulators as larger experimental facilities of the institute. The work of these staff people was always highly appreciated, even if we are not citing them here by name. One other name should be mentioned, though. That is our secretary Madeleine Gabler. She can be considered as the living form of the good spirit of the institute during all the years. She was also involved in the editing work for shaping up the formal layout of our book.

Having continuously been active in scientific discourse with the international research community, we received innumerable valuable suggestions of many colleagues for our work when discussing the results of our research. This was also the case in the context of preparing our book. Representative for all of them, we would like to mention by name the German colleagues Prof. Dr. H. Bubb, Prof. Dr. B. Döring, Prof. Dr. B. Färber, Prof. Dr. K.-P. Gärtner, Prof. Dr. P. Hecker, Prof. K.-F. Kraiss, Prof. Dr. U. Krogmann, Prof. Dr. H.-P. Krüger, Dr. E. Rödiger, Prof. Dr. C. Schlick, Prof. Dr. F. Thielecke, Prof. Dr. K.-P. Timpe, Prof. Dr. U. Völckers, and Prof. Dr. H. Winter, and from abroad Prof. R. Amalberti, G. Champigneux, Prof. Dr. M. Cummings, Dr. M. Draper, Prof. Dr. P. Fabiani, Dr. R. Frampton, Prof. K. Funk, Prof. Dr. E. Hollnagel, S. Howitt, C.A. Miller, E. Palmer, Dr. J.T. Platts, J. Ramage, J. Reising, R.M. Taylor, Prof. C.D. Wickens, Dr. S. Wood, Prof. D.D. Woods. Certainly, there are many more who have contributed to our work in one or the other way. We apologize, if we might accidentally have missed someone who might also deserve mention. Nevertheless, we hope that it will be forgiven and accepted at this point that we hereby thank all of them across the board.

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Video demonstration of CASSY (DVD)