Novel Technologies for a Personal Air Transport System

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Abstract:
Our brain is constantly processing a vast amount of sensory and intrinsic information in order to understand and interact with the world around us. In my department at the Max Planck Institute for Biological Cybernetics in Tübingen and also in my research group in the Biological Cybernetics Lab at Korea University we aim to best model human perception and action and to test these models to predict human action for example in the context of driving and flying. To this end, we use systems and control theory, computer vision, and psychophysical techniques while conducting experiments with the most advanced state of the art motion simulators. I will briefly present our research philosophy of basic research at the Max Planck Institute before presenting a novel framework to overcome the congestion problems with current ground-based transportation.
In the myCopter project (www.mycopter.eu) we study together with other European partners the enabling technologies for traveling between homes and working places, and for flying in swarms at low altitude in urban environments. The project focuses on three research areas: human-machine interfaces and training, automation technologies, and social acceptance. Within the project, developments for automation technologies have focused on vision-based algorithms. We have integrated such algorithms in the control and navigation architecture of unmanned aerial vehicles (UAVs). Detecting suitable landing spots from monocular camera images recorded in flight has proven to reliably work off-line, but further work is required to be able to use this approach in real time. Furthermore, we have built multiple low-cost UAVs and equipped them with sensors to test collision avoidance strategies in real flight. Such algorithms are currently under development and will take inspiration from crowd simulations.
Finally, using technology assessment methodologies, we have assessed potential markets for PAVs and challenges for its integration into the current transportation system. This will lead to structured discussions on expectations and requirements of potential PAV users.

Biography:

Heinrich Bülthoff is scientific member of the Max Planck Society and director at the Max Planck Institute for Biological Cybernetics in Tübingen. He is head of the Department Human Perception, Cognition and Action in which a group of about 70 researchers investigate psychophysical and computational aspects of higher level visual processes in recognition and categorization, perception and action in virtual environments, human-robot interaction and human perception in aviation. He holds a Ph.D. degree in the natural sciences from the Eberhard-Karls-Universität in Tübingen. From 1980 to 1988 he worked as a research scientist at the Max Planck Institute for Biological Cybernetics and the Massachusetts Institute of Technology. He was Assistant, Associate and Full Professor of Cognitive Science at Brown University in Providence from 1988-1993 before becoming director at the Max Planck Institute for Biological Cybernetics. He is Honorary Professor at the Eberhard-Karls-Universität (Tübingen) and Korea University (Seoul) and Editor of several international journals. Heinrich Bülthoff is involved in many international collaborations and member of several European research networks. He has participated in many projects funded by the European Commission and is currently leading the EU project myCopter.