

Dickmanns ED 2004: **Dynamic Vision Based Intelligence**

Abstract: Contrary to the usual approach to AI, a concept of intelligence of autonomous mobile systems has been realized in which closed loop perception and action cycles of relatively high frequency with spatio-temporal models (4-D approach) form the core of the lower level in a multiple-scale, layered architecture. On the lower layers, systems dynamics methods with differential models and methods prevail, like initially studied in cybernetics, and of higher layers using AI-type, more quasi-static methods. However, the link between these two worlds has been carefully developed for combining the positive aspects of both and for avoiding the pitfalls encountered previously. Objects and subjects (defined as objects with the additional capability of sensing and control application based on these results), are grouped according to generic classes and form the core of this approach by designing specialist processes for visual detection and efficient tracking of members of the classes. Temporal embedding of action and motion processes provides the background for high-performance autonomous systems. As first applications, vertebrate-type vision for several tasks in vehicle guidance in naturally perturbed environments has been realized on a distributed PC-system. Experimental results with the test vehicle **VaMoRs** and a commercial-off-the-shelf (COTS) computer system realization are discussed: A mission on a network of minor roads with sections of off-road driving has been demonstrated.