



2014학년도 2학기 뇌공학과 콜로퀴엄

Multi-sensory Perception of Ego-motion



연사: Heinrich Buelthoff 교수

소속: Max Planck Institute for Biological
Cybernetics

일시: 2014년 11월 03일(월) 17:00~18:00

장소: 우정정보통신관 601호

초록

The perception of one's own motion through the environment is based on the integration of different sensory information. Through use of our MPI CyberMotion Simulator and psychophysical methods, it is possible to systematically investigate how the brain integrates visual and vestibular sensory information into a unique percept of self-motion. Recently, we have measured the sensitivity for head-centred yaw rotations at different rotational velocities for inertial-only stimulations and for congruent visual-inertial stimuli. The results show that differential thresholds (i.e. the smallest noticeable changes in motion intensity) increase with stimulus intensity following similar power laws for all types of tested sensory input. This suggests that combining visual and inertial stimuli does not lead to improved self-motion sensitivity over the investigated range of yaw rotations. A further understanding of self-motion perception mechanisms is achieved by the development of computational models that describe this perceptual process. These models include important features of sensory dynamics, visual-vestibular integration, and the most recent experimental results on nonlinear aspects of perception. In a current study, we investigate how linear and angular cues are combined to form a percept of self-motion when traveling along a curved path. Moreover, we compare the measurements of perceived heading, angular displacement and travelled path with predictions of a visual-vestibular spatial orientation model. The results show that, although the head rotation is effectively predicted, the model does not capture the observed perceived travelled path and heading. We therefore assume that familiarity with the stimulus patterns may play an important role in shaping the percept, and should be included in the current models.

In another research project, we consider how to exploit self-motion perception models into motion cueing algorithms, which allow the reproduction of characteristic vehicle motion within the confined workspace of motion simulators. This new approach aims at reproducing the perception of motion, rather than its physical attributes. Therefore, the desired vehicle motion is transformed into its corresponding percept (i.e. the motion perception one would have in the actual vehicle), and an optimization algorithm selects simulator input commands that result in the best possible percept. The results of the first experimental validations indicate the potential of this approach and offer new insights for further research on self-motion perception

주최: 고려대학교 뇌공학과, 뇌공학연구소, BK21플러스 뇌공학글로벌인재양성사업단

후원: 고려대학교 뇌인지과학 연계전공

문의: 뇌공학과 사무실 (T. 3290-5920)