FP6-016039

CILIA

Customized Intelligent Life-Inspired Arrays

Integrated Project

Information Society Technolgies
Future & Emerging Technologies
Proactive Initiative BIO-I3

DELIVERABLE: D2.3.1 – Executive Summary

COMPUTATIONAL MODELLING OF STIMULUS TO AFFERENT CODING

CRICKET, FISH, BAT

Actual submission date:	February 28, 2008	
Start day of project:	September 1st, 2005	**Duration:** 48 months

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EXECUTIVE SUMMARY

This deliverable documents the computational modelling work (WP2.3) on the bat and the cricket target localisation system. The work on population encoding in the bat's cochlea attempts to show that the information in the spectrogram of the received echo is still present in the spike encoded representation as delivered by the auditory nerve to the auditory brain centres. The results so far indicate that realistic spike encoding models, including stochastic and adaptive behaviour, can be inverted. However, the number of auditory nerve cells required for this inversion is still too high to be realistic. The work on neuronal modelling of bat target localisation shows, more specifically, that the Head Related Transfer Function (HRTF) induced cues, both monaural and binaural ones, are not removed by the spike encoding and can be used by biologically plausible networks to extract target location information. Finally, a computational model of an air flow sensor based on an array of hair sensors is proposed. This simplified model is then used to analyse air flow estimation performance of both MEMS array sensors and cricket cerci. In collaboration with SDU, the model for the cricket as presented here is currently expanded to include mechanical (viscous or substrate) coupling between hairs and spike coding of the sensor readouts.