

Chiroptera-Inspired Robotic CEphaloid: a Novel Tool for Experiments in Synthetic Biology

Period:

May 1, 2002 - April 30, 2005

Partners:

Universiteit Antwerpen

Universität Erlangen-Nürnberg

Katholieke Universiteit Leuven

Bath University

University of Edinburgh

Universität Tübingen

Project Goals

- to reproduce, at a functional level, the echolocation system of bats, i.e. to construct a bionic bat head
- to use this bionic bat head to gain more insight into neural encoding of sensory data in an active sensing context



Challenges: Bionic bat head

- transducers & efficient drivers for emission/reception of ultrasonic sound waves
- neuromimetic hardware to realise realtime signal processing
- beamforming shapes to model the bat's mouth/nose & pinnae
- ‘micro’-mechanical system for pinna/emitter movement & shape control

Challenges: Realistic Biosonar Tasks

- classifying natural landmarks based on spike coding of the relevant echo features
- make use of head configuration and body movement to facilitate extraction of echo features
- navigation in natural environments



Expected achievements

- advanced bionic bat head supporting:
 - Large bandwidth signals
 - Real-time spectral analysis of echo signal
 - Active sensing
- improved understanding of biosonar:
 - Acoustical signal processing
 - Neural coding of echo features
 - Neural signal processing



Future FET actions

What is Space, that a Man May Know It,
and a Man, that He May Know Space?

(paraphrasing Warren S. McCulloch)

- perception of space
- representation of space
- interaction with space