



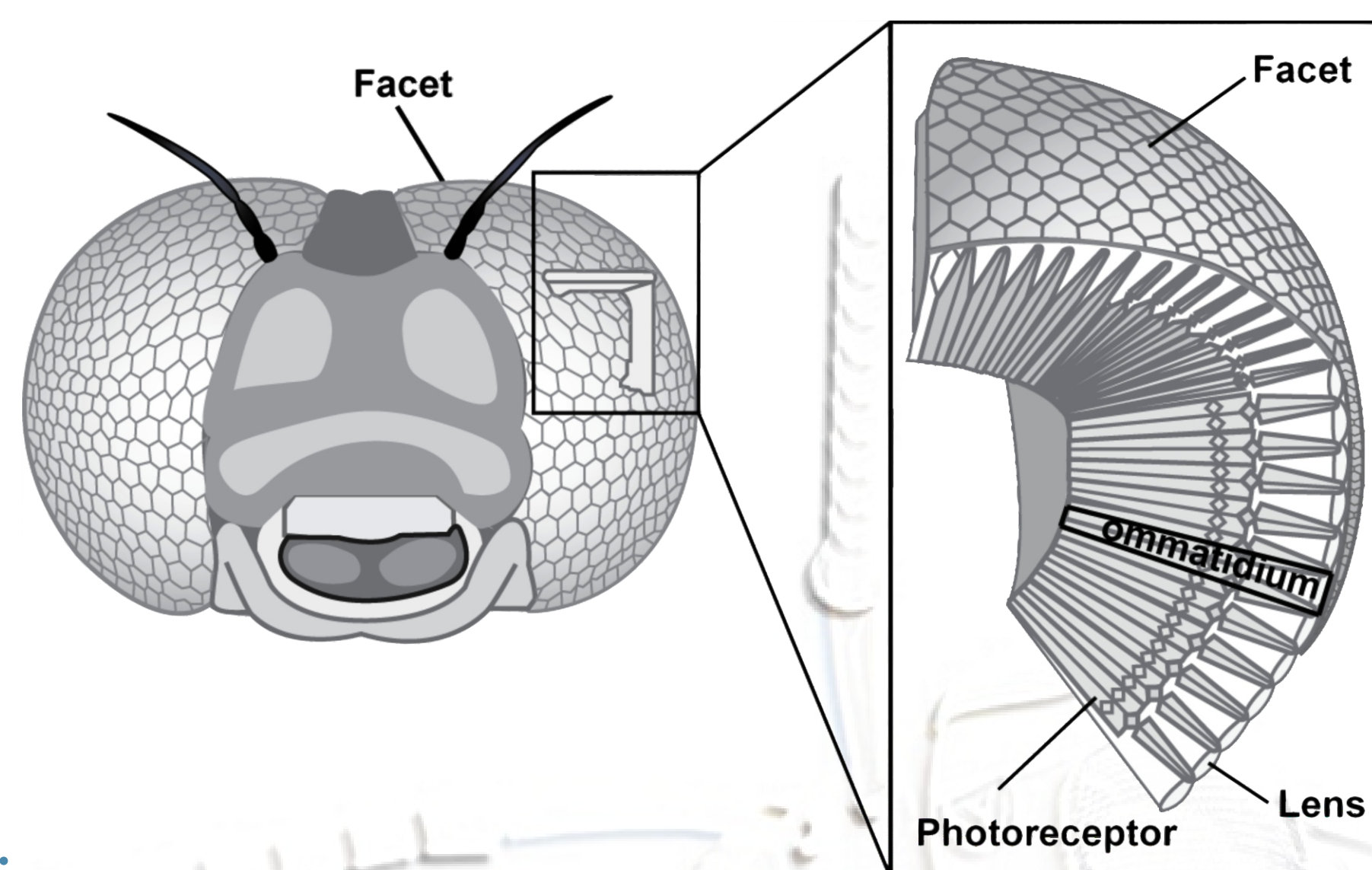
## Curved, flexible and programmable artificial compound eyes

### Bio-inspiration

Compound eyes are the main vision organs of many invertebrates. They consist of a curved array of microlenses each conveying light to one or more photoreceptors.

- Properties of compound eyes
- High temporal resolution
  - Thin package
  - No distortion
  - Wide FOV
  - High sensitivity
  - Efficient 3D motion detection
  - Multiple shapes

Apposition compound eye



Robber fly  
Author: Thomas Shahan

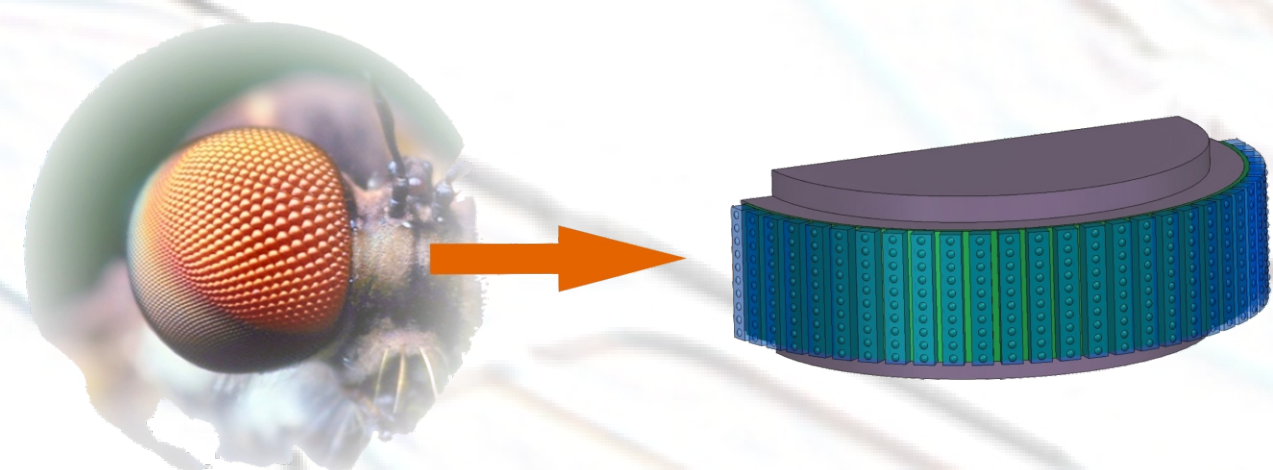


Erbenochile (trilobite)  
Author: Richard Fortey



Mantis shrimp  
© Mitsuaki Takata

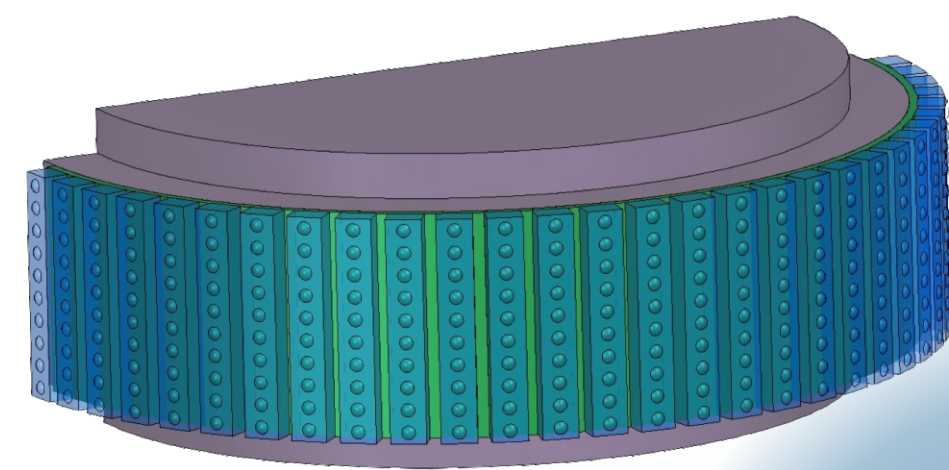
### Artificial Compound Eyes



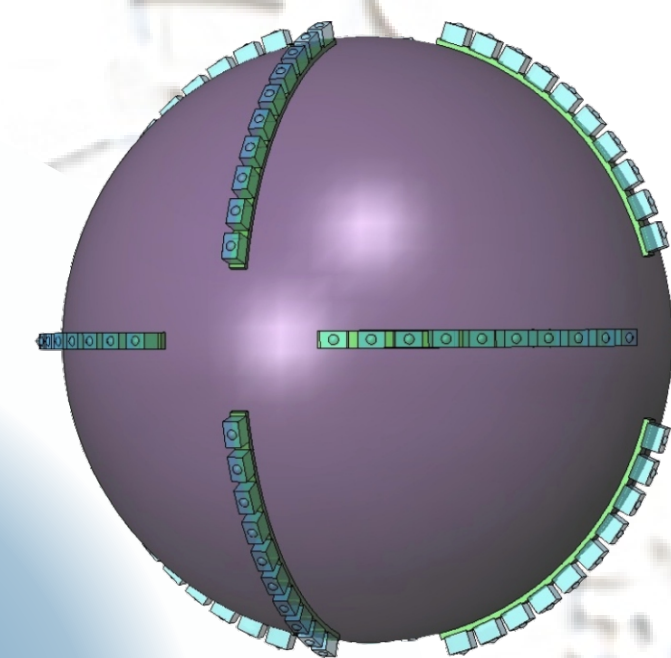
Our aim is to fabricate self-contained artificial compound eyes for sensing motion-related information and yielding:

- high frame rate of >1kHz
- fixed or adaptive field of view up to 360°
- no optical distortion, infinite depth-of-focus
- adaptive sensitivity
- mechanical adaptability
- small, thin and self-contained packaging
- programmability

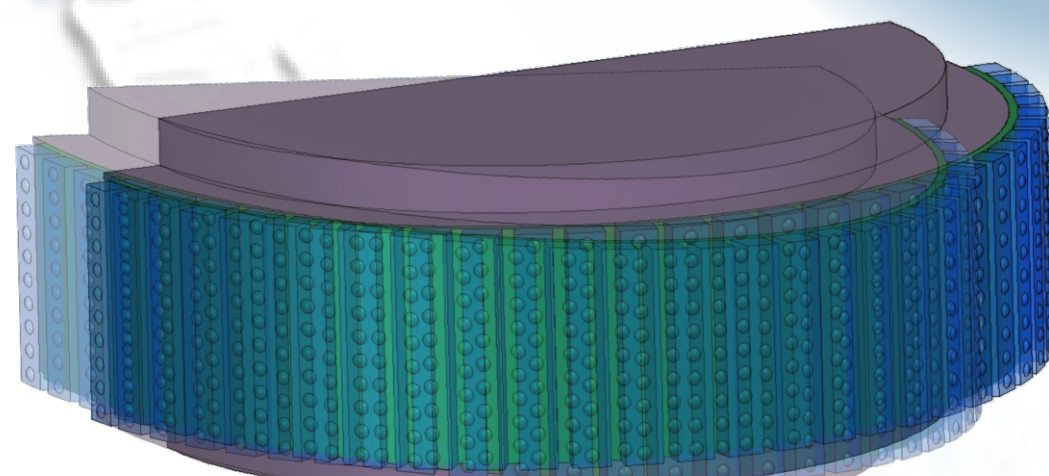
Cylindrical FOV



Omnidirectional FOV



CURVACE prototypes:  
Various geometries and functionalities



Active vision

Adaptive shape



#### Applications

- flying microrobots
- wearable sensing
- miniature collision-alert systems
- medical endoscopes
- soft robotics



### Participants

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