

## Bioinspired Vision Systems for Intelligent Robotics

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### Abstract:

As robotic systems increasingly operate in unstructured and dynamically changing environments, there is a growing demand for vision systems that are not only multifunctional but also compact, energy-efficient, and manufacturable at scale. Conventional camera architectures, largely inherited from planar and monolithic design paradigms, face fundamental limitations in meeting these requirements. In this context, bio-inspired cameras—drawing inspiration from the diverse visual ecologies of animals—offer promising alternative design principles.

This talk highlights recent advances in bio-inspired electronic eyes, with a particular emphasis on how micro- and nano-fabrication technologies enable the translation of complex biological ocular architectures into functional artificial vision systems. By leveraging advanced fabrication strategies such as micro-optical components, nanoscale photonic elements, heterogeneous material integration, and mechanically deformable electronics, animal-inspired visual functions—such as wide field-of-view imaging, foveated and multispectral vision, and adaptive light management—can be realized in compact and integrable device platforms.

Through representative examples including feline-, avian-, and stretchable eye-inspired systems, this presentation discusses how micro/nano fabrication serves as a critical bridge between visual ecology and practical robotic vision hardware. The convergence of bio-inspired design and scalable fabrication technologies opens new pathways toward next-generation robotic vision systems that are both functionally rich and manufacturable [1-6].

### References

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