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Biovision project-team

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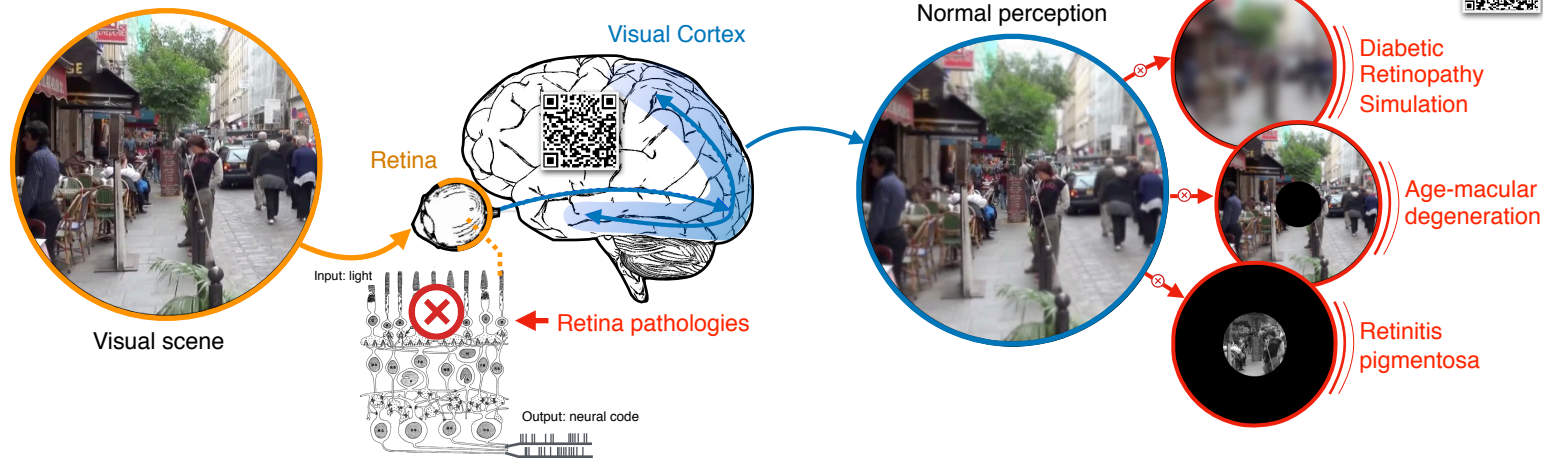
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The visual system



Research Axis 1 ————— Coord.: Bruno Cessac



Modelling and understanding the early visual system in normal and pathological conditions

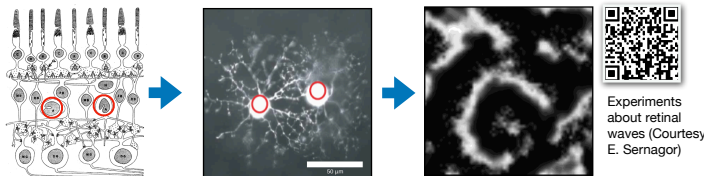
Main goals:

- Model and simulate normal and degenerated retinas
- Understanding how retina encodes motion (detection, anticipation)
- Contribute new therapeutic strategies

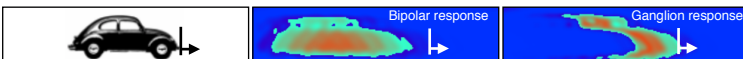
Methodologies: Biophysical modelling, dynamical systems theory, statistical physics, mean field, neural fields, computer simulations, ...

Biophysical modelling of the visual system

- Retina during development, retinal waves (Dora Karvouniari PhD)



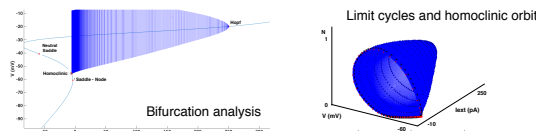
- Motion anticipation in the retina and beyond (Selma Souihel PhD)



- Impact of retinal cells silencing on vision (Jenny Kartsaki PhD)

Mathematical analysis

$$\frac{\partial G_A}{\partial t} = g_A D_M \left[(\nabla G_S, \nabla G_A) D_H^2 \left(\frac{\nabla G_S}{\nabla G_A} \right) + \frac{\partial H}{\partial G_S} \Delta G_S + \frac{\partial H}{\partial G_A} \Delta G_A \right] + S(G_S, G_A).$$



Research Axis 2 ————— Coord.: Pierre Kornprobst



Unveiling fundamental mechanisms of low vision perception to leverage cross reality

Main goals:

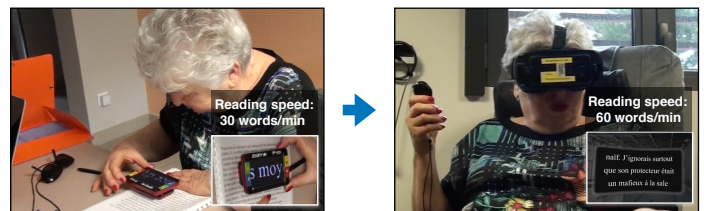
- Study low vision pathologies at behavioral level
- Design vision aid systems targeting main low vision needs
- Design patient specific low vision simulators

Methodologies: Computer vision, virtual and augmented reality, partial differential equations, dynamical systems, neural fields, ...

Modelling oculomotor strategies

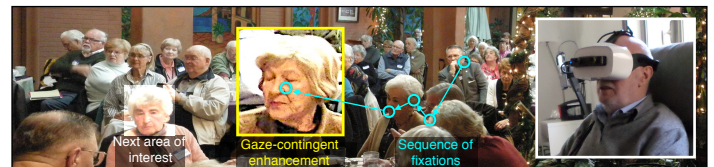


Reading aid system using virtual reality (Marco Benzi and Iliann Caugant)



Vision aid systems using augmented reality

- Face recognition and enhancement (Josselin Gautier)



Main partners

Physicians

- CHU Pasteur 2, Service d'ophtalmologie, Nice
- Institut de la Vision, Paris

Neuroscientists

- Institut des Neurosciences de la Timone, Marseille
- Laboratoire de Psychologie Cognitive, Marseille
- University of Valparaiso, Chile
- University of Newcastle, UK

Theoreticians, modelers, computer scientists

- Institut de Physique de Nice
- Laboratoire J.A. Dieudonné, Nice
- CIMFAV, AC3E Valparaiso, Chile
- University of Genoa, Italy