

Around every six weeks researcher John van Opstal, from Radboud University in Holland, visits Lisbon to work with a team at ISR | Lisboa. A Professor of Biophysics and Director of the Donders Centre for Neuroscience, van Opstal has become a very active collaborator of ISR.

It all began when J. van Opstal was looking for an exchange of expertise needed for a project proposal and came into contact with the work of Alexandre Bernardino at VisLab. As it turned out a team of ISR researchers started performing services regarding his new ERC funded project **ORIENT – Goal-Directed Eye-Head Coordination in Dynamic Multisensory Environment**. This exchange of services was so successful that soon after that van Opstal decided to prepare an amendment to the Grant Agreement, in order to change the status of the Lisbon group to co-beneficiaries and thus expand the partnership.

Officially starting January 1<sup>st</sup> 2017, ORIENT is a project focusing on Neuroscience, with a goal to better understand how the brain coordinates movements in the eyes and head, in order for humans to orient themselves in the world and in relation to any object that might be around. John Van Opstal has a background in Physics, in which he developed different models and he has also worked with human patients. Now his goal is to understand the full scheme of action, from perceiving an environment to orienting the eyes: what is called the action-perception cycle. It just so happens that the models that can be created for a robot to take such actions are a great test for the solidity of that knowledge.

*“This is a critical test for our concepts and models. We are applying our results to a novel autonomous humanoid eye-head robot that is equipped with foveal vision, realistic auditory inputs, three-dimensional nested motor systems, rapid sensorimotor feedback and learning algorithms.”*

At VisLab there's a background of working in visual processing and even of making moving robotic eyes. This new project allows for the basic control principles from Neuroscience to give rise to synthetic eye movements, with the goal of creating an eye and head systems that really approximate the human ones. Since April 2018 several students are working to improve and extend

on this prototype: Carlos Alleluia, who works on the 3D kinematics and on mechanical improvements, Mariana Martins, who focuses on visual-image processing and stabilization of the systems positioning) and PhD student Akhil John.

Among other goals, the team is currently focused on building a model of a human eye, with all of the essentials, which is not without challenges. *“As each eye has six muscles that can rotate it, just being able to replicate the movement can be quite difficult. A muscle is not just a simple string or rope, it's much more complex than that.”*

The ORIENT project is outlined to end by December 2021. Until then it's certain that many challenges will surface and scientific goals will be reached.



ORIENT team at ISR, September 12, Lisbon, Portugal

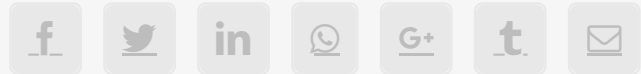
**Project website:** <http://www.mbfys.ru.nl/~johnvo/OrientWeb/orient.html>

**Lisbon sub-project:** [http://www.mbfys.ru.nl/~johnvo/OrientWeb/orient\\_1.html#Sub3](http://www.mbfys.ru.nl/~johnvo/OrientWeb/orient_1.html#Sub3)

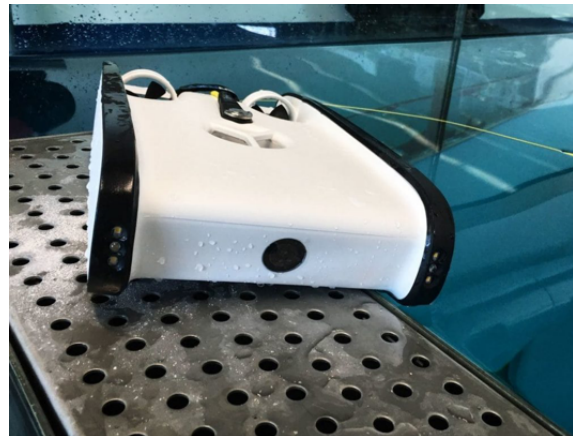
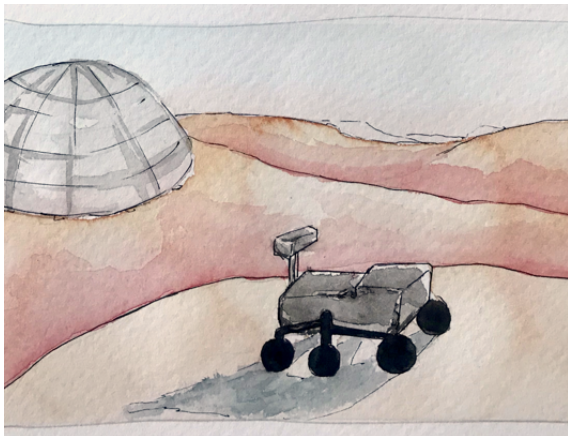
**Prof. A.J. van Opstal's page:** <https://www.ru.nl/english/people/opstal-a-van/>

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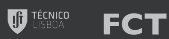


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