Hello, my name is Nicolau Leal Werneck, and I am from Universidade de SÃ£o Paulo, USP, in Brazil. I work at the Computer Engineering department, and I'm at the fifth year of my doctorate. My thesis is titled Camera orientation estimation in anthropic environments based on edgels.

Anthropic environments are any regular office room or hallway that has lines in three orthogonal directions, creating a natural reference frame. I developed a method to estimate the orientation of a camera in such an environment from a single picture of it. The orientation is a three-dimensional rotation between this natural reference frame, and the camera frame. This can be used to guide a mobile robot, for example. It can also be part of a larger vision system to build solid models of environments.

Traditional orientation estimation techniques rely on extracting lines from the images, and finding their vanishing points. One problem with this approach is that extracting lines is a complicated procedure, and it tell us more than we would like to know. And if we could find out the orientation first, this could actually help in the line extraction. To estimate orientation without extracting lines we can use edgels, which are points sampled over the image lines. Edgels also work with distorted images, while lines don't.

Edgel based orientation estimation works by minimizing the prediction error of the edgels directions as a function of the camera orientation. My method does this, and it also uses a new edgel extraction procedure based on a grid mask, that can control the number of extracted edgels creating a precision/speed compromise. It also uses quaternions to represent the orientation, and that requires a very cool constrained optimization algorithm to keep the solution inside the four-dimensional 3-sphere, which is awesome.