

# Callisto (ANR-09-CORD-003): Calibration in stereo vision with statistical methods

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## Objectives

High precision in early steps of stereo vision pipeline:

- ▶ Internal calibration.
- ▶ Match points extraction.
- ▶ External calibration.
- ▶ Stereo rectification of pairs of images.
- ▶ Dense matching in pairs of images.
- ▶ Merging of 3D point clouds issued from different pairs.
- ▶ Vectorization of point cloud to a mesh.
- ▶ Mesh refinements, processing, etc.

## Techniques

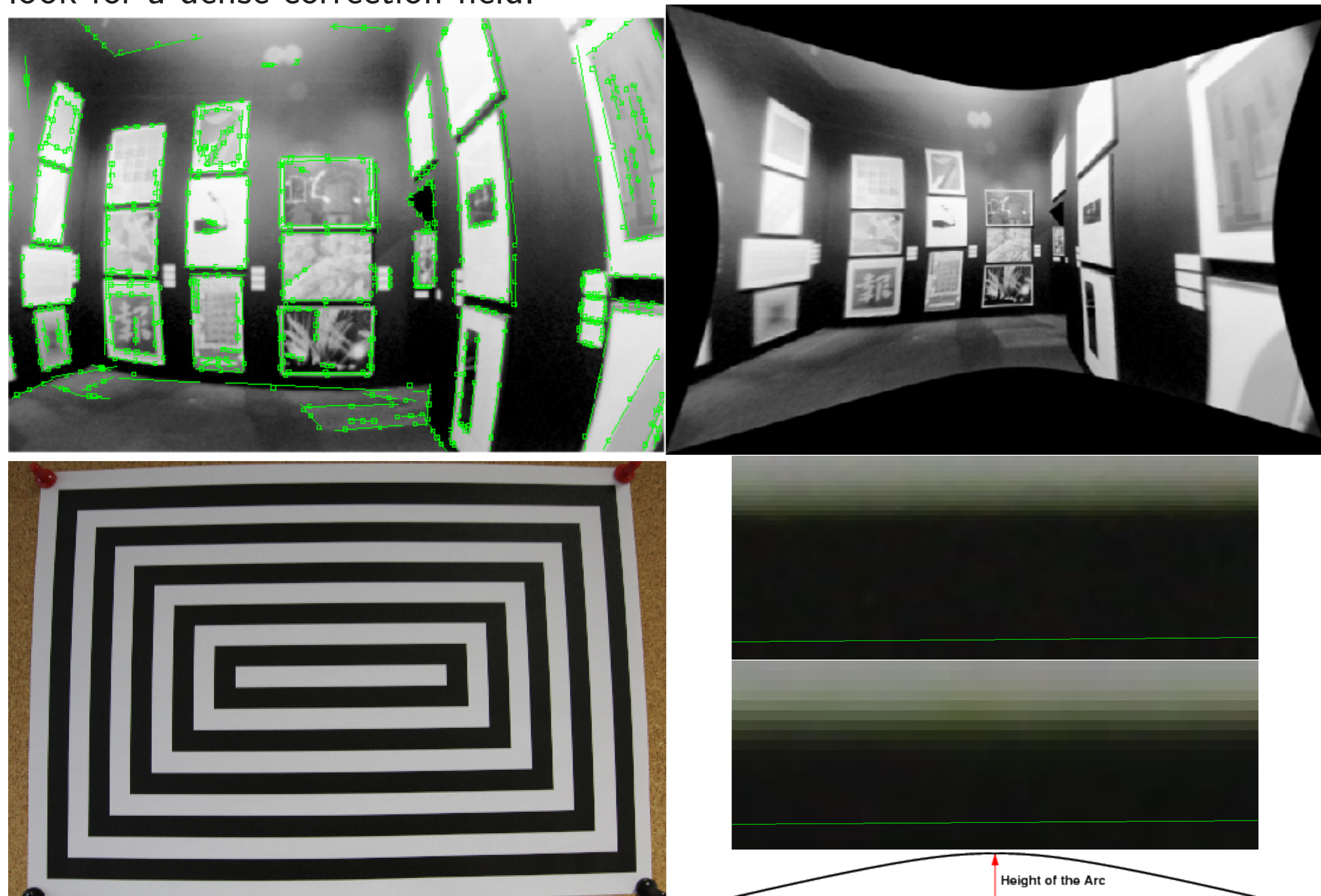
- ▶ SIFT and MSER interest points in images
- ▶ Global optimization in external calibration
- ▶ Statistical methods.
- ▶ *a contrario* methodology.
- ▶ Control of type I errors (false positives).
- ▶ Sparse recovery.
- ▶ Randomized estimator (RANSAC).
- ▶ False Discovery Rates methods

## Selection of model: Epipolar geometry or homography?



## Correction of lens distortion

Will be done separately from internal calibration. Goal: achieve at least 1/10th pixel precision: parametric models will probably be inadequate, so we will have to look for a dense correction field.



## Deliverables

Milestone	Partner	Date
Website of Callisto project	Imagine	T0+1
Implementation of Martinec's calibration	(T3A) Imagine	T0+3
Short advancement report	Imagine	T0+6
Tech. report on <b>distortion correction</b>	(T2A) CMLA	T0+8
Tech. report on <b>keypoint matching</b>	(T1A) LTCI	T0+10
Long advancement report	Imagine	T0+12
Tech. report on rotation estimation	(T3B) Imagine	T0+15
Short advancement report	Imagine	T0+18
Tech. report on internal parameter estimation	(T2B) CMLA	T0+20
Tech. report: Link <i>a contrario</i> ↔ multiple hypot. test.	(T1B) Imagine	T0+20
Tech. report on MSER	(T1C) LTCI	T0+20
Long advancement report	Imagine	T0+24
Tech. report on translation estim.	(T3C) Imagine	T0+28
<b>Online demo.</b> of internal calibration	(T2C) CMLA	T0+30
Short advancement report	Imagine	T0+30
Tech. report on RANSAC	(T3D) Imagine	T0+32
<b>Calibration software</b> release in CertisLibs	Imagine	T0+36
Final report	Imagine	T0+36

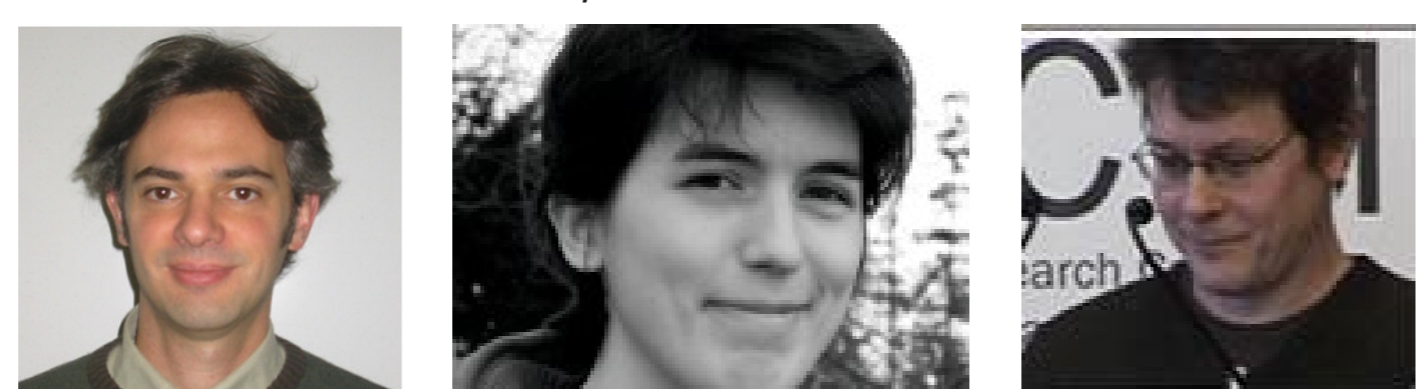
## Personnel

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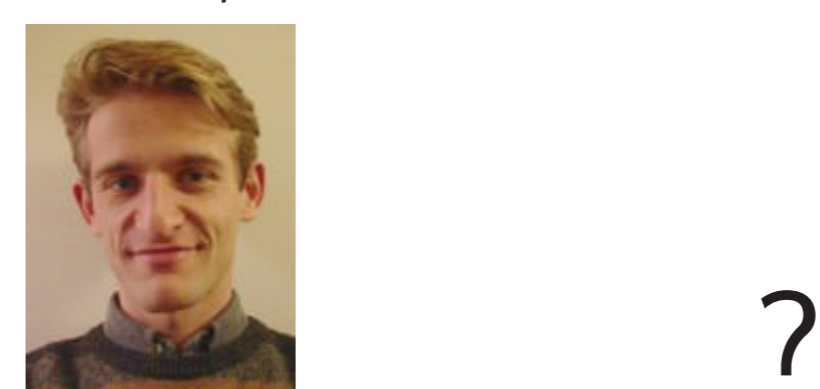
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