Nikolaos Kyriazis

Contact Information

Computational **V**ision and **R**obotics **L**aboratory
Institute of **C**omputer **S**cience
FOundation for **R**esearch and **T**echnology - **H**ellas

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Citizenship Greek

Research Interests Computational vision, machine learning, software engineering, super-computing, computer graphics, optimization theory

Academic status Computer Science Department
University of Crete, Heraklion, Crete, Greece

PhD student	**February 2009 - June 2014**
Graduate student	**February 2006 - December 2008**
Undergraduate student	**September 2001 - February 2006**

Education

University of Crete, Heraklion, Crete, Greece

Ph.D., Computer Science Department **June 2014**

- Thesis Topic: Computational methods for observing and understanding the interaction of human and robotic systems with objects of their environment
- Supervisor: Professor Antonis Argyros
- Area of Study: Computational Vision

M.S., Computer Science Department **April 2009**

- Thesis Topic: Context Free Grammar Induction via Observation of Structured Time Processes
- Supervisor: Associate Professor Antonis Argyros
- Area of Study: Machine Learning, Computational Vision

B.A., Computer Science Department, **February 2006**

- Software Engineering and Information Systems specialization
- Minor in Information Systems

Awards

Ph.D. with Honors **14 Jun. 2014**

- Awarded Ph.D. with honors, by unanimous vote of the examination committee
- Scope: Final examination for the Ph.D.

Young Researcher Award 2012–2013 **15 Jul. 2013**

- Awarded and sponsored by the University of Crete
- Scope: Graduate students (MsC, PhD) across all departments of the 5 schools which comprise the University of Crete
- Object: To award students whose research has significantly contributed to the advancement of their research field

1st Prize in **ChaLearn Gesture Challenge 2012** **11 Nov. 2012**

- Hosted in Tsukuba, Japan in conjunction with ICPR 2012 (Gesture Recognition Workshop)
- Participation: Contestant in the Qualitative Evaluation (Demo Competition)
- Presentation: "Giving a Hand to Kinect"
- Sponsored by Microsoft, Redmond, USA

R&D Experience

Postdoctoral researcher at CVRL, ICS, FORTH **Jun. 2014 - present**

- Laboratory head: Professor P. Trahanias
- Under the supervision of Professor A. Argyros
- Research areas: Computer vision, machine learning, computer graphics, supercomputing

Full–time **internship** at Disney Research Zurich **Oct. 2013 - Dec. 2013**

- Laboratory: Capture & Effects
- Laboratory head: Dr. Thabo Beeler
- Research areas: Acquisition and representation of real world data, towards the development of algorithms that leverage this data to generate stunning visual effects

Scholarship from CVRL, ICS, FORTH **Sept. 2006 - Jun. 2014**

- Laboratory head: Professor P. Trahanias
- Under the supervision of Associate Professor A. Argyros
- Research areas: Computer vision, machine learning, computer graphics, supercomputing

Scholarship from HCI, ICS, FORTH **Sept. 2005 - Sept. 2006**

- Laboratory head: Professor C. Stephanidis
- Under the supervision of Associate Professor A. Savidis
- Research areas: Software engineering, accessible software

WEARHAP: *Wearable Haptics for Humans and Robots*
(FP7-ICT-2011-9) **Mar. 2013 - present**

- Contribution: Assistance in proposal preparation, Work on hand pose estimation based on dimensionality reduction
- Associated Lab: **C**omputational **V**ision and **R**obotics **L**aboratory, ICS, FORTH

RoboHow.cog: *Web-enabled and Experience-based Cognitive Robots that Learn Complex Everyday Manipulation Tasks* **Feb. 2012 - present**
(FP7-288533)

- Contribution: Assistance in proposal preparation, Observation of human demonstrations, extraction and symbolic representation of information
- Associated Lab: **C**omputational **V**ision and **R**obotics **L**aboratory, ICS, FORTH

GRASP:*Emergence of Cognitive Grasping through Introspection, Emulation and Surprise (IST-FP7-IP-215821)* **Sept. 2007 - Feb. 2012**

- Contribution: 3D hand tracking from various visual sensing modalities
- Associated Lab: **C**omputational **V**ision and **R**obotics **L**aboratory, ICS, FORTH

VECTOR: ***V**ersatile **E**ndoscopic **C**apsule for gastrointestinal **T**um**O**r **R**ecognition and therapy (IST-FP6-IP-033970)* **Sept. 2007 - Feb. 2008**

- Collaboration: Real-time simulation of perspective and panoramic camera models for intestinal image acquisition and processing
- Associated Lab: **C**omputational **V**ision and **R**obotics **L**aboratory, ICS, FORTH

STARLIGHT:*Design and development of a commercial platform for interactive electronic books for sighted, low-vision and blind users* **Feb. 2006 - Feb. 2010**

- Collaboration: Development of the book editor application
- Associated Lab: **H**uman **C**omputer **I**nteraction Laboratory, ICS, FORTH

Teaching Experience

Computer **S**cience **D**epartment
School of Sciences and Technology
University **O**f **C**rete

Teaching assistant in CS100 **Spring 2006**, **Winter 2011**

- Course title: Programming with the C language
- Responsibilities: Recitation, programming exercises, grading

Teaching assistant in CS472 **Spring 2008**, **Spring 2009**, **Spring 2010, Spring 2011, Spring 2012, Spring 2013**

- Course title: Computational Vision
- Responsibilities: Recitation, exercise preparation, students' project guidance

Teaching assistant in CS387 **Winter 2009**

- Course title: Introduction to Artificial Intelligence
- Responsibilities: Recitation, exercise grading

Teaching assistant in CS672 **Winter 2008**

- Course title: Advanced Topics on Computational Vision
- Responsibilities: Recitation, exercise preparation, students' project guidance

Teaching assistant in CS358 **Spring 2007, Winter 2011**

- Course title: Computer Graphics
- Responsibilities: Recitation, exercise administration, programming excercises, grading, students' project guidance

Teaching assistant in CS475 **Winter 2006**

- Course title: Autonomous Robot Navigation
- Responsibilities: Students' project definition, students' project guidance

Teaching assistant in CS471 **Winter 2013**

- Course title: Digital Image Processing
- Responsibilities: Recitation, programming exercises, grading

Participation in Scientific Events

ECCV'2010, 11th European Conference on Computer Vision

- Hosted in Hersonissos, Crete, Greece during **Sept. 5-11, 2010**
- Participation: Coordination and administration assistance, attendant

ICVSS 09, International Computer Vision Summer School

- Hosted in Sicily, Italy during **July 6-11, 2009**
- Participation: attendant
- Renumeration : 2nd best grade in the final examinations

Eurographics '2008, the 29th annual conference of the European Association for Computer Graphics

- Hosted in Heraklion, Crete during **April 14-18, 2008**
- Participation: Coordination and administration assistance, attendant

The **Onassis Foundation** science lecture series: *Robots Intelligently Interacting With People*

- Hosted in Heraklion, Crete during **July 24-28, 2006**
- Participation: Attendant

Languages

Greek : excellent (native tongue)

English : fluent (Certificate of Proficiency awarded by the University of Michigan)

French : good (D.E.L.F.)

Technical Skills

Programming aspects

- Object-oriented programming
- Functional programming
- Generic programming

Programming languages

- Compiled languages: C, C++
- Interpreted languages: Java, Python, Javascript
- Special purpose languages: MATLAB, Mathematica, CUDA
- Tools: Language theory, compiler compilers

Development environments

- Windows: Visual Studio series, Eclipse
- Unix: gcc, g++, CMake, Makefile, Eclipse, KDdevelop
- GPU: nvcc

Libraries

- Standard Template Library (STL) (C++)
- boost (C++)
- wxWidgets (C++)
- DirectX (C++)
- OpenGL (C++)
- Python (integration / embedding) (C++)
- VXL (C++)
- Java API (Java)
- OPENCV (C++, Python)
- Thrust (C++, CUDA)
- CUDPP (C++, CUDA)
- NumPy (Python)
- SciPy (Python)
- matplotlib (Python)
- scikit-learn (Python)
- ceres-solver (C++)

Applications

- Microsoft Office Suite series
- Latex
- MATLAB
- Mathematica

Mathematical Background Algebraic analysis, discrete mathematics, linear algebra, probabilistic theory, optimization theory, statistical learning theory, information theory.

Publications

- A. Makris, N. Kyriazis, and A. Argyros. Hierarchical particle filtering for 3d hand tracking. In *Computer Vision and Pattern Recognition Workshops (CVPRW), 2015 IEEE Conference on*, June 2015.

- P. Panteleris, N. Kyriazis, and A.A. Argyros. 3d tracking of human hands in interaction with unknown objects. In *British Machine Vision Conference (BMVC 2015)*, 2015. To appear.
- A. Qammaz, N. Kyriazis, and A.A. Argyros. Boosting the performance of model-based 3d tracking by employing low level motion cues. In *British Machine Vision Conference (BMVC 2015)*, 2015. To appear.
- N. Kyriazis and A. Argyros. Scalable 3d tracking of multiple interacting objects. In *CVPR*, 2014.
- P. Douvatzis, I. Oikonomidis, N. Kyriazis, and A. Argyros. Dimensionality reduction for efficient single frame hand pose estimation. In *International Conference on Vision Systems, (ICVS)*, July 2013.
- N. Kyriazis and A. Argyros. Physically plausible 3d scene tracking: The single actor hypothesis. In *CVPR*, 2013. Oral presentation, acceptance rate: 3.2%.
- M. Patel, C. H. Ek, N. Kyriazis, A. Argyros, J. Valls Miro, and D. Kragic. Language for learning complex human-object interactions. In *ICRA*, 2013.
- D. Song, N. Kyriazis, I. Oikonomidis, C. Papazov, A. Argyros, D. Burschka, and D. Kragic. Predicting human intention in visual observations of hand/object interactions. In *ICRA*, 2013.
- I. Oikonomidis, N. Kyriazis, and A. Argyros. Tracking the articulated motion of two strongly interacting hands. In *CVPR*. IEEE, June 2012.
- N. Kyriazis, I. Oikonomidis, and A. Argyros. A gpu-powered computational framework for efficient 3d model-based vision. In *COGSYS*, 2012. Refereed based on poster.
- I. Oikonomidis, N. Kyriazis, and A. Argyros. Efficient model based tracking of the articulated motion of hands. In *COGSYS*, 2012. Refereed based on poster.
- N. Kyriazis, I. Oikonomidis, and A. Argyros. Binding vision to physics based simulation: The case study of a bouncing ball. In *BMVC*. BMVA, 2011.
- I. Oikonomidis, N. Kyriazis, and A. Argyros. Efficient model-based 3d tracking of hand articulations using kinect. In *BMVC*. BMVA, 2011.
- I. Oikonomidis, N. Kyriazis, and A. Argyros. Full dof tracking of a hand interacting with an object by modeling occlusions and physical constraints. In *ICCV*. IEEE, 2011. Oral presentation, acceptance rate: 3.6%.
- I. Oikonomidis, N. Kyriazis, and A. Argyros. Markerless and efficient 26-dof hand pose recovery. In *ACCV*, pages 744–757. Springer, 2010.
- K. Tzevanidis, X. Zabulis, T. Sarmis, P. Koutlemanis, N. Kyriazis, and A. Argyros. From multiple views to textured 3d meshes: a gpu-powered approach. In *ECCV Workshop on Computer Vision on GPUs (CVGPU)*, pages 5–11, 2010.

Dissertations

- N. Kyriazis. *A computational framework for observing and understanding the interaction of humans with objects of their environment.* PhD thesis, University of Crete, 2014.
- N. Kyriazis. Induction of Context Free Grammars from Observations of Structured Time Processes. Master's thesis, University of Crete, 2008.

Technical reports

- N. Kyriazis, I. Oikonomidis, and A. Argyros. A gpu-powered computational framework for efficient 3d model-based vision. Technical Report TR420, ICS-FORTH, July 2011.