

# CURRICULUM VITAE

## PERSONAL INFORMATION

|               |  |
|---------------|--|
| Name          | TOLGA BIRDAL, Ph.D.  |
| Address       | 210 Cowper Street<br>94301 Palo Alto, CA, USA  |
| Telephone     | +1-650 4415125   |
| E-Mail        | tbirdal@stanford.edu<br>tbirdal@gmail.com  |
| Nationality   | Turkish  |
| Date of birth | 17.12.1983   |
| Webpage       | <a href="http://tbirdal.me">http://tbirdal.me</a><br><a href="https://linkedin.com/in/tbirdal">https://linkedin.com/in/tbirdal</a><br><a href="http://campar.in.tum.de/Main/TolgaBirdal">http://campar.in.tum.de/Main/TolgaBirdal</a><br><a href="https://profiles.stanford.edu/tolga-birdal">https://profiles.stanford.edu/tolga-birdal</a> |
| Interests     | 3D Computer Vision, Machine Learning, Machine Vision, Pattern Recognition, High Performance Computing  |



## EDUCATION

- |                           |   |
|---------------------------|---|
| ▷ Period                  | 2019 - Present  |
| ○ Acquired qualifications | <b>Postdoctoral Research Fellow</b>                             |
| ○ Institute               | Stanford University   |
| ○ Supervisor              | Prof. Leonidas Guibas / Geometric Computing Group               |
| ▷ Period                  | 2014–2018   |
| ○ Acquired qualifications | <b>Dr. Rer. Nat. (Ph.D.)</b>                                    |
| ○ Institute               | Technical University of Munich                                  |
| ○ Principal subjects      | Informatics   |
| ○ Thesis subject          | Geometric Methods for 3D Reconstruction from Large Point Clouds |
| ▷ Period                  | 2008–2011   |
| ○ Acquired qualifications | <b>Master of Science</b>  |
| ○ Institute               | Technical University of Munich                                  |
| ○ Principal subjects      | Computational Science and Engineering                           |
| ○ Thesis subject          | 3D Deformable Surface Recovery Using RGBD Cameras               |
| ▷ Period                  | 2004–2008   |
| ○ Acquired qualifications | <b>Bachelor of Science</b>                                      |
| ○ Institute               | Sabanci University  |
| ○ Principal subjects      | Electronics Engineering   |
| ▷ Period                  | 1999–2004   |
| ○ Graduate school         | Robert College  |
| ○ Principal subjects      | Science   |

## PROFESSION

- ▷ Period
- Employer

- Position
- Projects

2014–2018

### **Siemens Corporate Technology**

Otto Hahn Ring 6, 81739, Muenchen, Deutschland

Research Scientist

I have started to contribute in Siemens' machine vision research as a byproduct of my Doctoral studies on large scale 3d reconstruction, where the presence of clutter and occlusion is inevitable. We expect our research to impact Autonomous Systems and Quality Assurance.

- ▷ Period
- Employer

- Position
- Supervisor
- Projects

2014–2014

### **Google Summer of Code**

Mountain View, CA, USA

Student

Dr. Vincent Rabaud

Implementation of surface matching algorithms into OpenCV

- ▷ Period
- Employer

- Position
- Projects

2010–2014

### **Gravi Information Technologies**

Istanbul, Turkey

CEO & Co-Founder

Gravi is a research oriented machine vision company in Turkey, developing industry oriented vision libraries. I was responsible in the management and the direction of the research on 3D machine vision.

- ▷ Period
- Employer

- Position
- Projects

2008–2011

### **BeFunky Inc.**

San Francisco, CA, USA

Chief Engineer & Co-Founder

I have co-founded BeFunky, an online digital art engine, which utilizes state of the art computer vision algorithms. Besides being the co-founder I have developed the entire system and most of the basis for the algorithms running on BeFunky ([www.befunky.com](http://www.befunky.com))

- ▷ Period
- Employer

- Position
- Supervisor
- Projects

2009–2010

### **Mitsubishi Electric Research Labs**

Cambridge, MA, USA

Intern

Prof. Fatih Porikli

At MERL, I worked on simulating human breathing in 4D. This included the implementation of Random Walks for image segmentation, 3D CT processing on CUDA, and real-time Bilateral Filtering.

- ▷ Period
- Employer

- Position
- Supervisor
- Project

2007

### **Carnegie Mellon University**

Pittsburgh, PA, USA

Intern

Prof. Martial Hebert & Dr. Yan. Ke

Shape Matching Algorithm using Spatial Segmentation Data

- ▷ Period
- Employer
- Position
- Supervisor
- Projects

## AWARDS

### ▷ Personal awards

2005–2007

#### **Vistek Isra Vision**

Teknokent, Gebze, Turkey

Application Developer

Prof. Aytul Ercil

Development of industrial computer vision systems on OCR/OCV, Bar-code Reading, Robot Control, Object Classification based on Halcon.

2016, **EMVA Young Professional Award**. Given to young professionals and novel works with great industrial impact  
 2014, **Ernst von Siemens Scholarship**, Siemens AG. Given to talented PhD candidates in industry, showing high academic potential  
 2004, **Merit Scholarship**, Sabanci University for success in University Entrance Exam

2004, Ranked 81<sup>st</sup> in Istanbul and ~ 600<sup>th</sup> in Turkey in University Entrance Exam, among ~ 1.7M applicants

2004, Received Robert College **Sait Halman Computer Honor Prize** (Given to one who has great achievements in Computer Science)

### ▷ Publication awards

**Best Paper Finalist** at Conference on Computer Vision and Pattern Recognition (CVPR) 2019

**Best Student Paper Award** at International Conference on Computer Vision (ICCV) 2017 Workshop on Multiview Relationships in 3D Data (MVR3D)

**Alper Atalay Best Paper Award** at SIU 2013 Ranked 3<sup>rd</sup>

### ▷ Entrepreneurial Awards

2011, **Hottest iPhone App** in Photo & Video Category on Apple iTunes Store

2009, Motorola Worldwide Mobile Widget Competition - **Winner**

2009, GTS Tech Start-up Competition - **Finalist**, Presenter

2007, TechCrunch40 Tech Start-up Competition - **Finalist**

### ▷ Awards in other competitions

2008, Ranked 1<sup>st</sup> with robot ROBO112 in Projistor Robot Competition at Dogus University

2008, Ranked 2<sup>nd</sup> with robot ROBO112 in ITURO Robot Competition at Istanbul Technical University

2000, Ranked 10<sup>th</sup> in Izmir Aegean Chess Tournament

## LANGUAGES

NATIVE LANGUAGE  
 OTHER LANGUAGES

Turkish

English (Proficient), German (Intermediate)

## PUBLICATIONS

### ► International Conferences

- Tolga Birdal**, Michael Arbel, Umut Simsekli & Leonidas Guibas: *Synchronizing Probability Measures on Rotations via Optimal Transport*, CVPR 2020
- Zan Gojcic, Caifa Zhou, Jan D Wegner, Leonidas J Guibas & **Tolga Birdal**: *Learning multiview 3D point cloud registration*, CVPR 2020
- Yongheng Zhao\*, **Tolga Birdal**\*, Jan Eric Lenssen, Emanuele Menegatti, Leonidas Guibas & Federico Tombari: *Quaternion Equivariant Capsule Networks for 3D Point Clouds*, ECCV 2020 **[oral]**
- Mai Bui, **Tolga Birdal**, Haowen Deng, Shadi Albarqouni, Leonidas Guibas, Nassir Navab & Slobodan Ilic: *Multimodal 6D Camera Relocalization via Bingham Mixture Models*, ECCV 2020
- Mikaela Uy, Jingwei Huang, Minhyuk Sung, **Tolga Birdal** & Leonidas Guibas: *Deformation-Aware 3D Model Embedding and Retrieval*, ECCV 2020
- Christiane Sommer, Yumin Sun, Leonidas Guibas, Daniel Cremers & **Tolga Birdal**: *From Planes to Corners: Multi-Purpose Primitive Detection in Unorganized 3D Point Clouds*, RA-Letters 2020
- Fabian Manhardt, Diego Arroyo, Christian Rupprecht, Benjamin Busam, **Tolga Birdal**, Nassir Navab, Federico Tombari: *Explaining the Ambiguity of Object Detection and 6D Pose from Visual Data*, ICCV 2019
- Tolga Birdal** & Umut Simsekli: *Probabilistic Permutation Synchronization using the Riemannian Structure of the Birkhoff Polytope*, CVPR 2019 **[oral]**
- Haowen Deng, **Tolga Birdal** & Slobodan Ilic: *3D Local Features for Direct Pairwise Registration*, CVPR 2019
- Yongheng Zhao\*, **Tolga Birdal**\*, Haowen Deng & Federico Tombari: *3D Point-Capsule Networks*, CVPR 2019
- Tolga Birdal**, Umut Simsekli, Onur Eken & Slobodan Ilic: *Bayesian Pose Graph Optimization via Bingham Distributions and Tempered Geodesic MCMC*, NeurIPS 2018
- Tolga Birdal**, Benjamin Busam, Nassir Navab, Slobodan Ilic & Peter Sturm: *Generic Primitive Detection in Point Clouds Using Novel Minimal Quadric Fits*, T-PAMI, 2019
- Haowen Deng, **Tolga Birdal** & Slobodan Ilic: *PPF-FoldNet: Unsupervised Learning of Rotation Invariant 3D Local Descriptors*, ECCV 2018
- Adrian Haarbach, **Tolga Birdal** & Slobodan Ilic: *Survey of Higher Order Rigid Body Motion Interpolation Methods for Keyframe Animation and Continuous-Time Trajectory Estimation*, 3DV 2018 **[spotlight]**
- Tolga Birdal**, Benjamin Busam, Nassir Navab, Slobodan Ilic & Peter Sturm: *A Minimalist Approach to Type-Agnostic Detection of Quadrics in Point Clouds*, CVPR 2018
- Haowen Deng, **Tolga Birdal** & Slobodan Ilic: *PPFNet: Global Context Aware Local Features for Robust 3D Point Matching* CVPR 2018 **[spotlight]**
- Tolga Birdal** & Slobodan Ilic: *CAD Priors for Accurate and Flexible 3D Reconstruction*, ICCV 2017
- Benjamin Busam, **Tolga Birdal** & Nassir Navab: *Camera Pose Filtering with Local Regression Geodesics on the Riemannian Manifold of Dual Quaternions*, ICCVW 2017
- Tolga Birdal** & Slobodan Ilic: *A Point Sampling Algorithm for 3D Matching of Irregular Geometries*, IROS 2017

► International Conferences

**Tolga Birdal**, Ievgeniia Dobryden & Slobodan Ilic: *X-Tag: A Fiducial Tag for Flexible and Accurate Bundle Adjustment*, 3DV 2016

**Tolga Birdal**, Emrah Bala, Tolga Eren & Slobodan Ilic: *Online Inspection of 3D Parts via a Locally Overlapping Camera Network*, WACV 2016

**Tolga Birdal** & Slobodan Ilic: *Point Pair Features Based Object Detection and Pose Estimation Revisited*, 3DV 2015 **[oral]**

Umut Simsekli & **Tolga Birdal**: *A Unified Probabilistic Framework For Robust Decoding Of Linear Barcodes*, ICASSP 2015

**Tolga Birdal**, Diana Mateus & Slobodan Ilic: *Towards A Complete Framework For Deformable Surface Recovery Using RGBD Cameras*, IROS 2012

**Tolga Birdal** & Aytul Ercil: *Real-time Automated Road, Lane and Car Detection for Autonomous Driving*, DSPincars 2007

► National Conferences

**Tolga Birdal** & Slobodan Ilic: *Task Oriented 3D Sampling via Genetic Algorithms*, SIU 2018

Umut Simsekli, **Tolga Birdal**, Emre Koc & Taylan Cemgil: *A Factorization Based Recommender System for Online Services*, SIU 2013

► Patents

Tolga Birdal: *Computer-aided image processing method*, WO2018137935A1.

Tolga Birdal, Ievgeniia Dobryden & Slobodan Ilic: *Marking Device*, WO2018077535A1.

Tolga Birdal, Mehmet Ozkanoglu & Abdi Tekin Tatar: *Method and System for Generating Online Cartoon Outputs* US8629883B2.

Tolga Birdal, Emrah Bala, Emre Koc, Mehmet Ozkanoglu & Abdi Tekin Tatar: *Method and System for Providing an Image Effects Interface* US9483237B2.

## CONFERENCES

► Academic conferences

CVPR (2017, 2018, 2019), ICML 2019, NeurIPS 2018, ECCV 2018, ICCV (2017, 2019), IROS (2017, 2012), 3DV (2015, 2016), WACV 2016, SIU (2017, 2013, 2008, 2006)

► Summer schools

2013, IPAM Computer Vision Graduate Summer School, UCLA (with **NSF Scholarship**)

2012, 2015 & 2016 International Computer Vision Summer School, Sicily - Successful Completion Certificates

► Industrial conferences

2016, EMVA Business Conference - Edinburgh

2012 / 2013, World of Industry, Exhibitor - Istanbul

2008, TechCunch 50, Alumni & Exhibitor - San Francisco

2008, NVISION - San Jose

2008, ARCS - Dresden

2007, TechCunch 40, Presenter - San Francisco

2007, Hannover Industrial Fair, Exhibitor - Hannover

2007, ARIF Innovation Festival, Exhibitor - Istanbul

2007, MVTec, Siemens and Intel Training and Workshops - Munich, Nuremberg, Ankara respectively

## ABILITIES

### PROGRAMMING SKILLS

C/C++, Assembler (SSE, SSE2, SSE3, SSSE3, AVX), CUDA, Matlab, LateX, OpenCV, Halcon, C#, QT, OpenGL, Maple, Python and overall, the ability to adapt to different languages.

### HARDWARE SKILLS

Camera Systems (Basler, IDS, Sony, JAI, The Imaging Source etc), Siemens 3D Imaging Sensors, Lighting Systems (Falcon, RVSI, SmartVision), PIC, FPGA, I/O Control Modules, PLCs, Smart Cameras, Framegrabbers and other similar hardware.

### HOBBIES

One Frequent Jazz Drummer  
A Cook in the Evenings  
Occasional Chess Player  
A Former Point Guard on Basketball Fields