

Curriculum Vitae

Personal Information

Name Fabio Tosi
Date of Birth *October 3rd, 1992*
Address Viale del Risorgimento 2, 40136, Bologna
Email fabio.tosi5@unibo.it / fabio.tosi92@gmail.com
Website <https://vision.disi.unibo.it/~ftosi/>
Code [GitHub](#)
Citations [Google Scholar](#)
ResearchGate https://www.researchgate.net/profile/Fabio_Tosi



Research Area and Expertises

Machine Learning, Deep Learning, Computer Vision and 3D sensing, Image Processing

Education

- 2020 **Visiting Ph.D.** student at the Max Planck Institute for Intelligent System and University of Tübingen - Autonomous Vision Group (*Tübingen, Germany*)
Topic: "Active Multi-view Stereo"
Supervisor: Prof. Andreas Geiger
- 2017 – 2020 **Ph.D.** in Computer Science and Engineering (*Bologna, Italy*)
PhD Thesis: "Deep-learning for 3D reconstruction" approved after examination by Dr. Sean Ryan Fanello and Prof. Seungryong Kim
Supervisor: Prof. Stefano Mattoccia
- 2014 – 2017 **Master Degree – 110/110 cum Laude** in Computer Science and Engineering (*Bologna, Italy*)
Thesis: "Confidence measures and depth map refinement algorithms"
Advisors: Prof. Stefano Mattoccia, Dr. Matteo Poggi
- 2011 – 2014 **Bachelor Degree – 109/110** in Computer Science and Engineering (*Bologna, Italy*)
Thesis: "Refinement techniques for depth data generated by a stereo vision system"
Supervisor: Prof. Stefano Mattoccia

Work Experience

- 02/2021 – now **Research Fellow** at the "Department of Computer Science and Engineering (DISI)" (*Bologna, Italy*)
Research project funded by **Huawei Technologies Co. Ltd.**
Advisors: Prof. Luigi Di Stefano, Prof. Stefano Mattoccia, Dr. Matteo Poggi, Dr. Samuele Salti
- 04/2017 – 11/2017 **Research Fellow** at the "Building and Construction Interdepartmental Center for Industrial Research" (*Bologna, Italy*)
Topic: "Image-Based Methods for Streamflow Observations"
Advisors: Prof. Elena Toth, Prof. Stefano Mattoccia
- 2013 – 2014 **Internship** at the University of Bologna (*Bologna, Italy*)
Topic: "Stereo Vision: Algorithms and Applications"
Supervisor: Prof. Stefano Mattoccia

Teaching Experience

- 2019 **2nd Level Master course**, "*Depth sensing technologies for autonomous vehicles*", Master in Sustainable and Integrated Mobility In Urban Regions, University of Bologna, Imola (Bologna)

2019 – 2020 **Teaching assistant**, “Computer architectures T - Computer Science and Engineering”, at the University of Bologna (*Bologna, Italy*) with Prof.Stefano Mattocchia

2017 – 2018 **Teaching assistant**, “Logic Design T - Computer Science and Engineering”, at the University of Bologna (*Bologna, Italy*) with Prof.Stefano Mattocchia and Prof.Alfredo D’Elia

Acknowledgements

Outstanding Reviewer - European Conference on Computer Vision (ECCV 2020)

Skills & Background Knowledge

Other languages English, *B2 certificate*
Programming languages C, C++, C#, Java, Python, Lua, Scala, Prolog, VHDL, LaTeX
CV and ML frameworks OpenCV, Tensorflow, PyTorch

Live Demonstrations & Tutorial

- Tutorial**
- *"Facing depth estimation in-the-wild with deep networks"*, ECCV 2020 (SEC, Glasgow)
 - *"Learning and understanding single image depth estimation in the wild"*, CVPR 2020 (Seattle, Washington, US)
 - *"Learning - based depth estimation from stereo and monocular images: successes, limitations and future challenges"*, CVPR 2019 (Long Beach, California, US)
 - *"Learning - based depth estimation from stereo and monocular images: successes, limitations and future challenges"*, 3DV 2018 (Verona, Italy)

- Live Demo**
- *"Real-Time self-adaptive deep stereo"*, CVPR 2019 (Long Beach, California, US)
 - *"Real-Time monocular depth estimation without GPU"*, CVPR 2019 (Long Beach, California, US)
 - *"Energy - Efficient Monocular Depth Estimation on ARM - based Embedded Platforms"*, U-boot at DATE 2019 (Firenze, Italy)
 - *"Towards real-time monocular and unsupervised depth estimation on CPU"*, 3DV 2018 (Verona, Italy)
 - *"Towards real-time learning of monocular depth estimation enabling multiple view synthesis on CPU"*, ECCV 2018 (Munich, Germany)

Patents

- *Method for determining the confidence of a disparity map through a self-adaptive learning of a neural network, and sensor system thereof.*, pending - M. Poggi, F. Aleotti, **Fabio Tosi**, S. Mattocchia
- *Depth determination method based on images, self-adaptive neural networks, and relative system (Real-Time Self Adaptive Deep Stereo)*, pending - Alessio Tonioni, **Fabio Tosi**, Matteo Poggi, Stefano Mattocchia, Luigi Di Stefano
- *Depth determination method based on images, and relative system (Guided Stereo Matching)*, pending - Matteo Poggi, Davide Pallotti, **Fabio Tosi**, Stefano Mattocchia - a research project funded by University of Bologna, PoC UNIBO 2nd edition

List of Publications

Citation Indices Citations: 671; *h-Index*: 13; *i10-Index*: 16
Source: scholar.google.com
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- Conference** - **F. Tosi**, Y. Liao, C. Schmitt, A. Geiger, "SMD-Nets: Stereo Mixture Density Networks", at the IEEE Conference on Computer Vision and Pattern Recognition (CVPR 2021)
- F. Aleotti, **F. Tosi**, L. Zhang, M. Poggi, S. Mattocchia, "Reversing the cycle: self-supervised deep stereo through enhanced monocular distillation", at International Conference on Pattern Recognition (ECCV 2020)
 - M. Poggi, F. Aleotti, **F. Tosi**, G. Zaccaroni, S. Mattocchia, "Self-adapting confidence estimation for stereo", at International Conference on Pattern Recognition (ECCV 2020)
 - **F. Tosi**, F. Aleotti, P. Zama Ramirez, M. Poggi, S. Salti, L. Di Stefano, S. Mattocchia, "*Distilled Semantics for Comprehensive Scene Understanding from Videos*", at the IEEE Conference on Computer Vision and Pattern Recognition (CVPR 2020)
 - M. Poggi, F. Aleotti, **F. Tosi**, S. Mattocchia, "*On the uncertainty of self-supervised monocular depth estimation*", at the IEEE Conference on Computer Vision and Pattern Recognition (CVPR 2020)
 - M. Poggi, **F. Tosi**, F. Aleotti, S. Mattocchia, "*Leveraging a weakly adversarial paradigm for joint learning of disparity and confidence estimation*", at International Conference on Pattern Recognition (ICPR 2020)
 - V. Peluso, A. Cipolletta, A. Calimera, M. Poggi, **F. Tosi**, F. Aleotti, S. Mattocchia, "Enabling monocular depth perception at the very edge", at IEEE Conference on Computer Vision and Pattern Recognition Workshops, CVPRW 2020
 - F. Aleotti, M. Poggi, **F. Tosi**, S. Mattocchia, "*Learning end-to-end scene flow by distilling single tasks knowledge*", at The Thirty-Fourth AAAI Conference on Artificial Intelligence
 - M. Poggi, D. Pallotti, **F. Tosi** and S. Mattocchia, "*Guided Stereo Matching*", at The IEEE Conference on Computer Vision and Pattern Recognition (CVPR 2019), June 16-21, 2019, Long Beach, California, US.
 - **F. Tosi**, F. Aleotti, M. Poggi and S. Mattocchia, "*Learning monocular depth estimation infusing traditional stereo knowledge*", at The IEEE Conference on Computer Vision and Pattern Recognition (CVPR 2019), June 16-21, 2019, Long Beach, California, US.
 - A. Tonioni, **F. Tosi**, M. Poggi, S. Mattocchia and L. Di Stefano, "*Real-time self-adaptive deep stereo*", at The IEEE Conference on Computer Vision and Pattern Recognition (CVPR 2019), June 16-21, 2019, Long Beach, California, US (**ORAL**)
 - **F. Tosi**, M. Poggi, S. Mattocchia, "*Leveraging confident points for accurate depth refinement on embedded systems*", at The IEEE Embedded Vision Workshop (EVW 2019), June 16, 2019, Long Beach, California, US.
 - Valentino Peluso, Antonio Cipolletta, Andrea Calimera, Matteo Poggi, **Fabio Tosi** and Stefano Mattocchia, "*Enabling Energy-Efficient Unsupervised Monocular Depth Estimation on ARMv7-Based Platforms*", at Design, Automation and Design in Europe (DATE 2019), March 29-29, 2019, Florence, Italy.
 - M. Poggi, **F. Tosi**, S. Mattocchia, "*Learning monocular depth estimation with unsupervised trinocular assumptions*", at The 6th international conference on 3D Vision (3DV 2018), September 5-8, 2018, Verona, Italy.
 - P. Zama Ramirez, M. Poggi, **F. Tosi**, S. Mattocchia, L. Di Stefano, "*Geometry meets semantic for semi-supervised monocular depth estimation*", at 14th Asian Conference on Computer Vision (ACCV 2018), December 2-6, 2018, Perth, Australia
 - **F. Tosi**, M. Poggi, A. Benincasa, S. Mattocchia, "*Beyond local reasoning for stereo confidence estimation with deep learning*", at the 15th European Conference on Computer Vision (ECCV 2018), September 8-14, 2018, Munich, Germany.
 - M. Poggi, F. Aleotti, **F. Tosi**, S. Mattocchia, "*Towards real-time unsupervised monocular depth estimation on CPU*", at IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2018), October 1-5, 2018, Madrid, Spain.

- F. Aleotti, **F. Tosi**, M. Poggi, S. Mattocchia, "*Generative Adversarial Networks for unsupervised monocular depth prediction*", at 3D Reconstruction in the Wild 2018 (3DRW2018), in conjunction with (ECCV 2018), Munich, Germany, September 14, 2018.
- M. Poggi, **F. Tosi**, S. Mattocchia, "*Quantitative evaluation of confidence measures in a machine learning world*", at The IEEE International Conference on Computer Vision (ICCV 2017), October 22-29, 2017, Venezia, Italy **SPOTLIGHT**
- **F. Tosi**, M. Poggi, A. Tonioni, L. Di Stefano, S. Mattocchia, "*Learning confidence measures in the wild*", at The 28th British Machine Vision Conference (BMVC 2017), September 5-7, 2017, London, UK
- M. Poggi, **F. Tosi**, S. Mattocchia, "*Efficient confidence measures for embedded stereo*", at The 19th International Conference on Image Analysis and Processing (ICIAP 2017), September 11-15, 2017, Catania, Italy
- M. Poggi, **F. Tosi**, S. Mattocchia, "*Even More Confident predictions with deep machine-learning*", at The IEEE Embedded Vision Workshop (EVW 2017), July 21, 2017, Honolulu, Hawaii, US
- Journal** - M. Poggi, A. Tonioni, **F. Tosi**, L. Di Stefano, S. Mattocchia, "*Continual Adaptation for Deep Stereo*", at the IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)
- M. Poggi, **F. Tosi**, K. Batsos, P. Mordohai, S. Mattocchia, "On the Synergies between Machine Learning and Binocular Stereo for Depth Estimation from Images: a Survey", IEEE Transaction on Pattern Analysis and Machine Intelligence (TPAMI)
- M. Poggi, S. Kim, **F. Tosi**, S. Kim, F. Aleotti, D. Min, K. Sohn, and S. Mattocchia, "On the Confidence of Stereo Matching in a Deep-Learning Era: a Quantitative Evaluation", IEEE Transaction on Pattern Analysis and Machine Intelligence (TPAMI).
- A. Cipolletta, V. Peluso, A. Calimera, M. Poggi, **F. Tosi**, F. Aleotti, S. Mattocchia, "Energy-Quality Scalable Monocular DepthEstimation on Low-Power CPUs", IEEE IoT Journal(IoT-J).
- F. Aleotti, G. Zaccaroni, L. Bartolomei, M. Poggi, **F. Tosi**, S. Mattocchia, "*Real-time single image depth perception in the wild with handheld devices*", MDPI Sensors.
- **F. Tosi**, M. Rocca, F. Aleotti, M. Poggi, S. Mattocchia, F. Tauro, E. Toth, S. Grimaldi, "Enabling image-based streamflow monitoring at the edge", MDPI Remote Sensing, RemoteSensing
- M. Poggi, **F. Tosi**, S. Mattocchia, "Good cues to learn from scratch a confidence measure for passive depth sensors", IEEE Sensors Journal, Sensors
- F. Tauro, **F. Tosi**, S. Mattocchia, E. Toth, R. Piscopia, S. Grimaldi, "*Optical Tracking Velocimetry (OTV): leveraging optical flow and trajectory-based filtering for surface streamflow observations*", Remote Sensing , 2018, 10(12), 2010
- M. Poggi, G. Agresti, **F. Tosi**, P. Zanuttigh, S. Mattocchia, "*Confidence Estimation for ToF and Stereo Sensors and its Application to Depth Data Fusion*", at IEEE Sensors Journal
- M. Poggi, **F. Tosi**, S. Mattocchia, "*Learning a confidence measure in the disparity domain from $O(1)$ features*", Computer Vision and Image Understanding (CVIU)
- V. Peluso, A. Cipolletta, A. Calimera, M. Poggi, **F. Tosi**, F. Aleotti, S. Mattocchia, "Monocular Depth Perception on Microcontrollers", accepted on IEEE Transactions on Circuits and Systems for Video Technology (TCSVT)
- Submitted** - M. Poggi, **F. Tosi**, F. Aleotti, S. Mattocchia, "*Real-time monocular depth estimation without GPU*", at IEEE Transactions on Cybernetics

Reviewing service

- TPAMI** - IEEE Transactions on Pattern Analysis and Machine Intelligence
- CVPR** - IEEE Conference on Computer Vision and Pattern Recognition (2019,2020)
- ECCV** - European Conference on Computer Vision (2020)
- CVPR** - 3rd International Workshop on Computer Vision for UAVs (UAVision2019)

- ICCV** - IEEE International Conference on Computer Vision (2019,2021)
- ECCV** - 2nd International Workshop on Computer Vision for UAVs (UAVision2018)
- TNNLS** - IEEE Transactions on Neural Networks and Learning Systems
- IJDSN** - International Journal of Distributed Sensor Networks
- TIP** - IEEE Transactions on Image Processing
- JEI** - Journal of Electronic Imaging