Prof. Dr. Bernhard Kainz

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Areas of expertise

human-in-the-loop computing, machine learning, medical image analysis, GPU accelerated algorithms

Employment history

Professor, Dept. AIBE, Friedrich-Alexander-University Erlangen-Nürnberg, Germany	since 09/2021
Assoc. Prof.++ (UK Reader), Dept. Computing, Imperial College London, UK	since 09/2021
Assoc. Prof. (UK Senior Lecturer), Dept. Computing, Imperial College London, UK	09/2019 – 08/2021
Ass. Prof. (UK Lecturer), Dept. Computing, Imperial College London, UK	10/2015 – 08/2019
Honorary Lecturer, ISBE, King's College London, UK	since 10/2015
Senior Research Fellow, ISBE, King's College London, UK	05/2015 – 10/2015
Marie-Curie Fellow, Department of Computing, Imperial College London, UK	03/2013 – 04/2015
Post-doctoral researcher, ICG, Graz University of Technology, Austria	05/2011 – 02/2013
Research Associate, ICG, Graz University of Technology, Austria	01/2008 – 04/2011
Research Associate, Dept. Urology, Medical University of Innsbruck, Austria	06/2007 – 12/2007
part-time Research Engineer, Test-lab for High-Voltage Engineering, Graz, Austria	06/2006 – 02/2013
part-time Research Engineer, Siemens Healthcare, Graz Austria	2004 – 2007

Education

Ph.D. Graz University of Technology	10/2007 – 05/2011
Dissertation: "Ray-Based Image Generation For Advanced Medical Applications" (Advisor: Prof. Dieter Schmalstieg) (summa cum laude). Viva date: 05/25/2011	
M.Sc. Graz University of Technology (summa cum laude)	10/2005 – 10/2007
Specialization in Biomedical Engineering and Computer Vision/Graphics	
B.Sc. Graz University of Technology	10/2001 – 06/2005
Course: Telematics (Computer Science plus Electrical Engineering)	

Academic achievement summary

- 44 peer reviewed articles in scientific journals
- 72 peer reviewed full papers at leading international conferences
- 17 peer reviewed abstracts international conferences
- 28 popular science contributions
- 3 patents
- 17 grants, $>$ €1.5M (as PI), $>$ €23.2M (total)
- 24 awards, prizes, and honours
- 3 books edited
- full list: https://scholar.google.com/citations?user=Igxq-YEAAAAJ&hl=en&oi=ao
- supervised 10 PhD students and 100+ UG project students

Awards and Prizes

- **2021** Best Paper Award MICCAI MLCN (with Ma et al.)
- **2021** Best Demonstration runner-up MICCAI ASMUS (with ThinkSono Ltd.)
- **2021** IEEE TMI Distinguished Reviewer Award
- **2020** Winner of the MICCAI Medical Out-of-Distribution Analysis Challenge (with Tan et al.)
- **2019** Imperial President's award (team award for BioMedIA with D. Rueckert, B. Glocker, W. Bai)
- **2018** S.M. Perren research award (for Verbruggen et al. 2018, J Biomechanics)
- **2017** Winning team of the Multimodal Brain Tumor Segmentation Challenge (BraTS'17) (Kamnitsas et al.).
- **2017** IEEE PacivicVIS'17 best paper honourable mention award.
- **2017–now** Various student project prices, Google poster competitions, Corporate Partnership Awards.
- **2016** Insight-Award for the most aesthetic Visualization 2016: "Smoky hurricane" led by R. Khlebnikov.
- **2015** Short-listed for the Nurturing Research Talents Marie Skłodowska-Curie actions prize.
- **2014** Best paper honorable mention award EuroGraphics 2014.
- **2013** Short-listed for the OCG Heinz Zemanek Price.
- **2013** *Best poster* honorable mention for IEEE SciVis 2013.
- **2012** VCBM Karl-Heinz-Höhne 3rd award for "Crepuscular Rays for Tumor Accessibility Planning".
- **2012** Short-listed for the GI-dissertation price.
- **2011** *"Forum Technology and Society"* research/dissertation prize, Graz University of Technology.
- **2011** *Ing. F. Schmiedl research prize*, Research price for the best dissertation
- **2011** *Best paper award*, International Symposium on Non-Photorealistic Animation and Rendering.
- **2008** *ACM Honorable Mention*, CGEMS SIGGRAPH Educational Committee.
- **2007** *Award for excellent performance as a student*, Graz University of Technology.

Professional Activities past 5 years

Nomination for the MICCAI Society Board	2021
Area Chair/PC member 21-23nd MICCAI 2018–2020	2018 – 2020
Associate Editor IEEE Transactions on Medical Imaging	since 2019
IPC Human-Centric Machine Learning @ NeurIPS	2019
Guest Editor Computers & Graphics, Visual Computing for Biology and Medicine	2019
IPC OAGM/AAPR Medical Image Analysis 2018	2018
General Chair RAMBO Intl. Workshop at MICCAI	2016 – 2018
Senior IPC: International Joint Conference on Artificial Intelligence	2017 – 2020
Paper Chair Visual Computing for Biology and Medicine (EG VCBM)	2017

Current teaching

Computer Graphics ($\sim$60-130 students),	since 2014
Deep Learning ($\sim$180–300 students)	since 2019

Past teaching

Introduction to Computer Architecture ($\sim$160 students)	since 2018
Computer Architecture ($\sim$130 students), Matlab 101, Computing Topics, (lecture and lab), ICL	2015 – 2017
Computer Graphics at Peking University Summer School International ($\sim$40 students)	07.2016
various courses, co-delivered lectures and labs, TUG	2007 – 2013

Funded research projects	MM/YY	funder	total/employer	type	role
Ultromics AI4Health CDT	10/20 – 09/24	Ultromics&UKRI	£150k	Research	PI
iFind techn. accelerator	10/20 – 09/22	Wellcome Trust	£500k	Translation	CoI
Imperial-TUM collaboration	01/20 – 09/24	Imperial-TUM	£177k	Research	PI
AI4Health EP/S011579/1	04/19 – 10/27	UK UKRI	£15M	Training	CoI
joint venture with JKU	10/18 – 10/21	Upper Austria	£200k	Research	PI
Imaging & AI (19923)	12/18 – 11/21	Innovate UK	£10M/1.7M	Research	CoI
EP/S013687/1	04/19 – 03/22	UK EPSRC	£852k/770k	Research	PI
Intel AI DevCloud	08/18 – 08/19	Intel	$20k	Research	PI
Impact acceleration grant	07/18 – 08/19	UK EPSRC	£12k	Translation	PI
EP/N024494/1	09/16 – 08/17	UK EPSRC	£120k	Research	PI
Wellcome/EPSRC (102431)	01/16 – 09/22	Wellcome Trust	£5M/800k	Research	CoI
Nvidia HW donations	03/16 – 06/18	Nvidia	€10k	Equipment	PI
ClinicImppact (610886)	02/14 – 01/15	EU FP7	€3M/400k	Research	Co-Appl.
F.A.U.S.T. - (325661)	05/13 – 04/15	EU FP7	€230k	Fellowship	PI
Schrödinger Scholarship	resigned for $\Uparrow$	Austrian FWF	€150k	Fellowship	PI
GOSMART (600641)	04/13 – 03/16	EU FP7	€4M/600k	Research	Co-Appl.
MVP (P23329)	09/11 – 08/14	FWF	€350k	Research	CoI
FutureLab	01/08	TU-Graz	€30k	Equipment	Co-Appl.
PhD student funding	2015–2023	various	$\sim$£1M	$8\times$studentships	PI

Memberships of professional bodies

Academic Fellow at the Data Science Institute at Imperial College London	since 2017
Austrian Computer Society - OCG	since 2011
Institute of Electrical and Electronics Engineers (IEEE) - Senior Member since 2017	since 2009
Medical Image Computing and Computer Assisted Intervention (MICCAI) Society	since 2008

Selected public engagement activities/developing others

- **2021**: http://ratchet.lucidifai.com/ http://kidneycaliper.lucidifai.com/ imaging demos
- **2018**: Imperial Fringe: Intelligence Redesigned 18/01/2018
- **2017**: http://corticalexplorer.com, medical data visualisation for the public
- **2015 – 2018**: Imperial Festival, coordinated a team of 4-9; $>$15,000 audience each year; 3 days.
- **since 2013**: six outreach lectures at UK secondary schools and Silver Crest Award preparation.

Consulting and advising

- **since 2020**: Cydar Medical Ltd. (interventional technology) – Scientific Advisor
- **since 2017**: ThinkSONO Ltd./GmbH (diagnostic technology) – Algorithm design
- **2019–2020**: Ultromics Ltd. (diagnostic technology) – Scientific Advisor
- **2014 – 2017**: Exscitec (provider of STEM outreach activities) – Outreach for secondary schools

10 selected publications, Dr Bernhard Kainz

1. Grzech, D., Azampour, M.F., Qiu, H., Glocker, B., **Kainz, B.** and Folgoc, L.L., 2021. Uncertainty quantification in non-rigid image registration via stochastic gradient Markov chain Monte Carlo. arXiv preprint arXiv:2110.13289. To appear in In Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition 2022
2. **Kainz, B.**, Heinrich, M.P., Makropoulos, A., Oppenheimer, J., Mandegaran, R., Sankar, S., Deane, Ch., Mischkewitz, S., Al-Noor, F., Rawdin, A.C., Ruttloff, A., Stevenson, M.D., Klein-Weigel, P., Curry, N., Non-invasive diagnosis of deep vein thrombosis from ultrasound imaging with machine learning. **Nature NPJ Digital Medicine**. (2021) Sep 15;4(1):1-8.
3. Schmidtke, L., Vlontzos, A., Ellershaw, S., Lukens, A., Arichi, T. and **Kainz, B**., 2021. Unsupervised human pose estimation through transforming shape templates. In Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (pp. 2484-2494).
4. Budd, S, Robinson, E.C., **Kainz, B**. A survey on active learning and human-in-the-loop deep learning for medical image analysis. **Medical Image Analysis**. (2021) Apr 9:102062.
5. Meng, Q., Matthew, J., Zimmer, V.A., Gomez, A., Lloyd, D.F.A., Rueckert, D., **Kainz, B.**, Mutual Information-based Disentangled Neural Networks for Classifying Unseen Categories in Different Domains: Application to Fetal Ultrasound Imaging. **IEEE Trans Med Imag.** (2020) Nov 3;40(2):722-34.
6. Meng, Q., Sinclair, M., Zimmer, V., Hou, B., Rajchl, M., Toussaint, N., Oktay, O., Schlemper, J., Gomez ,A., Housden, J., Matthew, J., Rueckert, D., Schnabel, J., **Kainz, B**., Weakly supervised estimation of shadow confidence maps in fetal ultrasound imaging. **IEEE Trans Med Imag.** (2019) Apr 25;38(12):2755-67.
7. Schlemper, J., Oktay, O., Schaap, M., Heinrich, M., **Kainz, B.**, Glocker, B., Rueckert, D., Attention gated networks: Learning to leverage salient regions in medical images. **Medical Image Analysis**. 2019 Apr 1;53:197-207.
8. Hou, B., Khanal, B., Alansary, A., McDonagh, St., Davidson, A., Rutherford, M., Hajnal, J. V., Rueckert, D., Glocker, B., and **Kainz, B.**, 3-D Reconstruction in Canonical Co-ordinate Space from Arbitrarily Oriented 2D Images, **IEEE Trans Med Imag** 37, (2018), 1737-1750
9. Alansary, A., Rajchl, M., McDonagh, S. G., Murgasova, M., Damodaram, M., Lloyd, D. F. A., Davidson, A., Rutherford, M., Hajnal, J. V., Rueckert, D., and **Kainz, B.**, PVR: Patch-to-Volume Reconstruction for Large Area Motion Correction of Fetal MRI, **IEEE Trans Med Imag** 36, (2017), 2031-2044
10. **Kainz, B.,** Steinberger, M., Wein, W., Kuklisova-Murgasova, M., Malamateniou, C., Keraudren, K., Torsney-Weir, T., Rutherford, M., Aljabar, P., Hajnal, J.V., and Rueckert, D., Fast Volume Reconstruction From Motion Corrupted Stacks of 2D Slices, **IEEE Trans Med Imag** 34, (2015),1901–1913