

Valentin Radu - Curriculum Vitae

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At a Glance

Work and Education Summary

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2017 - present	University of Edinburgh	Research Associate
2017	Intel R&D, Ireland	Computer Vision Research Intern
2012 - 2017	University of Edinburgh	Ph.D. in Computer Science
2016	University of Cambridge	Visiting Researcher
2015	Samsung Electronics Research Institute	Research Intern
2010 - 2011	University of Edinburgh	M.Sc. Computer Science
2006 - 2010	Polytechnic University of Bucharest	B.Eng. in Computer Systems

Selected Awards

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2016	Google IoT Research Award	Received early Google products to use in academic research
2015	Best student presentation, SICSA	Awarded in competition with other students across 14 universities
2014	Best Paper Award, IPIN	One of 5 awards at the International Conference IPIN 2014, France

Teaching

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Supervised 3 M.Sc. students (distinction marks); co-supervised 2 M.Sc. students;
Teaching support for 6 undergraduate and postgraduate courses in CS and AI.

Professional services

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Organiser EuroSys '21, AccML '20, EDLA '19; PC IQ2S '15; PC SICSA Conf. '14; SPC EuroSys '19;

Ongoing Research Collaborations

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Sony Mobile	Computer vision based sensor data labelling
Huawei	Deep learning inference stack for the Kiran processor

Selected Grants

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Innovation Fund (£30,000) from VINNOVA-Sweden, with Sony Mobile Sweden

Selected Publications

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Multimodal Deep Learning for Activity and Context Recognition

Valentin Radu, Catherine Tong, Sourav Bhattacharya, Nicholas Lane, Cecilia Mascolo, Mahesh K Marina, Fahim Kawsar;
ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT), vol. 1, issue 4, 2018; (23 citations)

A Semi-Supervised Learning Approach for Robust Indoor-Outdoor Detection with Smartphones

Valentin Radu, Panagiota Katsikouli, Rik Sarkar and Mahesh K. Marina
ACM Conference on Embedded Networked Sensor Systems (SenSys '14), USA, 2014; (84 citations)

HiMLoc: Indoor Smartphone Localization via Activity Aware Pedestrian Dead Reckoning with Selective
Crowdsourced WiFi Fingerprinting

Valentin Radu and Mahesh K. Marina
IEEE Indoor Positioning and Indoor Navigation (IPIN '13), France, 2013; (85 citations)

Work Experience

University of Edinburgh, UK **Research Associate** **Aug. 2017 – present**

- Researching optimisation techniques across the deep learning inference stack to make machine learning efficient on smaller devices. This includes model compression and distillation, efficient operator selection, and system optimisations using ML. These solutions radically reduce memory footprint and inference time.

Intel R&D, Republic of Ireland **Computer Vision Research Intern** **May 2017 – Aug. 2017**

- Designed and trained efficient deep neural networks to perform real-time pedestrian detection on Myriad, Intel's energy-efficient VPU (Visual Processing Unit) for edge inference.

University of Cambridge, Computer Lab **Visiting Researcher** **Nov. 2015 – Mar. 2016**

- Adapted execution of deep learning algorithms to run on resource constrained devices in the wearable technology class, achieving an average of 8x speedup for various computer vision tasks running on the Snapdragon 410 processor (a popular processor for wearable devices).
- Built multimodal deep learning architectures to perform context detection from sensor signals, achieving an 8% accuracy improvement for user activity recognition compared to previous solutions.

Samsung Electronics Research Institute **Research Intern** **Jun. 2015 – Oct. 2015**

- Developed a service that controls GPU frequency on commercial smartphones using reinforcement learning and neural networks in a multi-parameter search space (power consumption, frames per second, temperature and load) for graphics intensive applications.
- Researched machine learning techniques, implemented and evaluated their performance on our system.
- Results indicate a consistently higher performance (frames per second) for an extended period of time compared to benchmark systems.

University of Edinburgh, UK **Research Assistant** **Oct. 2011 – May 2012**

- Processed large datasets of mobile phone measurements to produce mobile coverage reports in a project for the Scottish Parliament, which were used in regulatory missions and policy making.
- Collected requirements from beneficiaries and contributed to developing the research agenda.
- Validated results through on-field inspection.
- Architected and lead development for a web interface to present our results on an interactive map.

CCMMM SA, Romania **Software Engineer** **Mar. 2009 – Aug. 2010**

- Developed software components for research projects: Java interface for user interaction with backend system; implemented a communication protocol between two software components running in C and Java.
- Reduced communication costs by 30% by linking the VoIP (Voice over IP) network (controlled by the Asterisk PBX) to 3G networks, through Topex Mobilink, and landline networks, through the GXE.

Education

2012 – 2017 **Ph.D. in Computer Science** **University of Edinburgh**

Thesis: “Multimodal Sensing for Robust and Energy-efficient User Context Detection with Mobile Devices”

Supervisor: Prof. Mahesh K. Marina

2010 – 2011 **M.Sc. in Computer Science (with Distinction)** **University of Edinburgh**

2006 – 2010 **B.Eng. in Computer Systems** **Polytechnic University of Bucharest**

Teaching and supervision

- **Teaching support roles at The University of Edinburgh:**
 - Machine Learning Practical (2016-2017),
 - Internet of Things: Systems, Security and Cloud (2018),
 - Distributed Systems (2015, 2014),
 - Introduction to Computer Systems (2014),
 - Computer Networking (2013, 2012),
 - Informatics Research Review (2016)
- **Seminars with the general-public:**
 - Delivered one session on smartphone-based sensing at the uCreate Studio, Edinburgh (2017).
- **Independent Supervisor of MSc students:**
 - David Strömbäck, research topic: Multimodal Activity and Exercise Recognition (2019 -)
 - Luca McArthur, research topic: Multi-task Neural Architecture Search (2019 -)
 - David Ivorra, research topic: Efficient Video Inference at the Edge (2019 -)
 - Maximilian Henne, “*Automatic Ground-truth Collection in Mobile Systems Through Multimodal Sensing*” (2018) - **Distinction mark**; paper from his work accepted at **ACM IMWUT, 2019**.
 - Xijia Wei, “*Smartphone-based Location Tracking using Recurrent Neural Networks*” (2018) - **Distinction mark**; paper from his work accepted at **IEEE IPIN, 2019**.
 - Xingji Chen, “*WiFi-based Indoor Localization using Deep Neural Networks on Smartphones*” (2018) - **Distinction mark**; paper from her work under review at **ACM TSAS**.
- **Co-supervisor of MSc students:**
 - Boxiang Zhang (with Prof. Michael O’Boyle, 2018)
 - Konstantinos Balampekos (with Dr. Mahesh K. Marina, 2012) - **Distinction mark**

Professional Services

- Local Arrangements Co-Chair for EuroSys 2021 to be held in Edinburgh, April 2021.
- Co-organising with Google and DeepMind the Accelerated Machine Learning (AccML) workshop at HiPEAC 2020, Bologna, Italy;
- Organiser of the Deep Learning for Resource-constrained Systems workshop at HiPEAC CSW 2019;
- Co-organiser of the first workshop on Emerging Deep Learning Accelerators (EDLA) at HiPEAC 2019, Valencia, Spain (<http://workshops.inf.ed.ac.uk/edla/>);
- Shadow Program Committee member for ACM EuroSys 2019;
- Committee member for IEEE IQ2S workshop 2015;
- Committee member for the SICSA PhD Conference 2013;
- Member of the Coordination Group for the Edinburgh IoT Initiative (<http://iot.ed.ac.uk/>), chaired by Prof. Ewan Klein at the University of Edinburgh, until May 2017;
- Co-organiser of the IoT Challenge during 2017 Festival of Creative Learning (runner up as “Best Collaborative Event” across all the university events);
- Reviewer of research grants (HiPEAC Collaboration Grant), of journal papers (submitted to IEEE TMC, ACM IMWUT, IEEE JSAC, ACM TOSN, IEEE IOT, IEEE COMST, ACM TIOT and Springer IJMLC) and of international conference papers (submitted to ACM Ubicomp, ACM MobiSys, IEEE INFOCOM, IEEE CCNC, IEEE IQ2S, IEEE WoWMoM, IEEE MASS, etc.) 100+ reviews
- Founder and co-organizer of the monthly SNACK (Synergizing Non-Aligning Centres of Knowledge) Club (<http://snackclub.weebly.com/>) - the only periodic PhD student journal club spanning across the School of Informatics at the University of Edinburgh, with an audience of 30+ PhD students per event. Secured funding of £2,000 for the events in 2015-2016 from the Informatics Graduate School;
- PhD student representative in the Institute for Computing Systems Architecture (30+ students), 2014-2016;

Awards

- 2017 Associate Fellow of the Higher Education Academy (HEA)**
- 2016 Google IoT Research Award**
- 2014 Best student presentation at the SICSA PhD Conference**
Awarded by academic panel as jury to 16 finalist presentations.
- 2013 Best paper at the International Conference on Indoor Positioning and Indoor Navigation (IPIN) IEEE**
- The Edinburgh Award for personal development as Resident Assistant**
Awarded in recognition of my contribution to student counseling and leadership in my role as Resident Assistant at the University of Edinburgh Accommodation Services.
- 2012 Runner-up poster at the SICSA PhD Conference**
Out of 32 presented posters covering various research disciplines in Computer Science from 12 Scottish universities.
- 2011 First Place at the SVc2UK (Silicon Valley comes to the UK) Hackathon 2011, nationwide competition**
The prize was a trip to 10 Downing Street where I had the pleasure of meeting the Prime-Minister at that time, David Cameron.
- MSc. with Distinction, The University of Edinburgh**
- 2006 Silver Medal at the International Exhibition of Inventions in Geneva**
Presented my invention patented RO 122069 B1/30.12.2008.

Grants

- 2018 Innovation Fund VINNOVA-Sweden (~£30,000)**
Funded by Sweden Innovation Agency to enable research collaboration between Sony and The University of Edinburgh.
- Conference participation and travel grant (~ \$500)**
Intel sponsored my participation at the HiPEAC 2018 conference in Manchester.
- 2016 The Google IoT Research Award (~ \$1,000)**
My research proposal was awarded to extend my indoor positioning research by using Google equipment and their cloud services, this being our first connection with the Google IoT Research group.
- Collaboration grant from the European Network of Excellence on High Performance and Embedded Architecture and Compilation (€5,000)**
My research proposal to explore computer vision for wearable devices at the University of Cambridge was selected for funding after competing with applications from across Europe. This collaboration initiated my multimodal deep learning work.
- 2015 Innovation Initiative Grant from the University of Edinburgh Development Trust (£1,600)**
My grant proposal was selected from many innovative applications at the University of Edinburgh. This expanded my sensor fusion solution to perception on aerial vehicle for flight stabilisation.
- 2014 Scottish Informatics and Computer Science Alliance Elevate Grant (£12,000)**
One of three winners from across 14 Scottish universities to receive this grant in order to develop commercial interest around my academic research. I formed a team of 3 people to develop and

implement a business plan, built a demo app and presented this to partners and investors. We found the market was not ready for our product yet, so we terminated the commercial initiative 6 months later.

2012 SICSA PhD Scholarship for 3.5 years

My PhD research proposal for sensing with mobile devices was backed by the University of Edinburgh and was successful out of applications from across all Scottish universities.

Co-authored the Centre for Doctoral Training in Security, Privacy and Trust EPSRC proposal (£6M), being responsible for the Network, System and IoT Security section, in 2018 – *unsuccessful grant bid*.

Industrial Collaborations

Sony Mobile, Lund, Sweden (2019 - ongoing)

We have secured £30,000 from Sweden's Innovation Agency, grant managed by Sony, to enable the collaboration between Sony and The University of Edinburgh. This funding explores the opportunity for a wider collaboration in sensing with mobile devices and computer vision for sensor data labeling. I am supervising one M.Sc. students in Edinburgh using Sony devices and software tools to identify explore new solutions for multimodal sensing and vision inside smart buildings.

Samsung R&D, Staines-upon-Thames, UK (2018 - ongoing)

Discussions are ongoing to initiate a group of research projects covering several of my research interests in making deep neural networks available on mobile devices. A potential direction for this collaboration is to produce an EU research project proposal on deep learning for embedded devices, which will be very similar to the work currently done in Edinburgh within the EU project Bonseyes, so we can build on the connection with our other European partners to form a consortium. Contacts with Samsung R&D Staines are long-lasting, initiated through my internship in their group in 2015.

Huawei, Shanghai, China (2018 - ongoing)

Huawei is very interested in my research in multimodal sensing and also in the optimisations across the deep learning inference stack. I was invited to attend the Da Vinci Forum, an exclusivist event at the launch of the Da Vinci architecture in Shanghai, bringing together top researchers from around the world (such as Yoshua Bengio and Luc van Gool). Huawei are committed to investing substantial resources in the type of research I have on my roadmap.

Intel Research Lab, Dublin, Ireland (2017 - 2018)

This collaboration began in 2017 with my internship in Dublin where I developed Deep Learning models for vision-based recognition to operate on resource constrained devices. I advanced the work initiated then to automated labeling of sensor data of wearables using energy-efficient computer vision models. Intel are keen on exploring deep learning for IoT devices, with potential for collaboration in the future.

Google, Mountain View, US (2016)

Through the Google IoT Research Award I expanded my indoor localization research to using Google Bluetooth beacons technology. As part of this collaboration I received engineering advice from the Google IoT research group on integrating IoT devices with their cloud services.

Nokia Bell-Labs, Cambridge, UK (2015 - 2017)

My research in deep learning began through this collaboration with the Nokia Bell-Labs group in Cambridge. Together we explored methods to segment large deep neural networks to make them run more efficiently on resource-constrained devices. Also during my research visit in Cambridge we designed a multimodal deep neural network architecture that showed better performance and generalization on a number of datasets, while being lightweight to run on wearable class devices.

Publications (peer-reviewed)

- [1] **Optimal Convolutional Neural Network Size for Best Performance on Mobile and Embedded GPUs**
Valentin Radu, Kuba Kaszyk, Yuan Wen, Jack Turner, Jose Cano, Björn Franke, Michael O'Boyle
To appear in IEEE International Symposium on Workload Characterization (IISWC), 2019.
- [2] **Vision2Sensor: Knowledge Transfer Across Sensing Modalities for Human Activity Recognition**
Valentin Radu, Maximilian Henne
To appear in ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT), 2019.
- [3] **Calibrating Recurrent Neural Networks on Smartphone Inertial Sensors for Location Tracking**
Xijia Wei, Valentin Radu
To appear in IEEE Indoor Positioning and Indoor Navigation (IPIN), 2019.
- [4] **CamLoc: Pedestrian Location Estimation with Pose Recognition on Smart Cameras**
Adrian Cosma, Ion Emilian Radoi, Valentin Radu
To appear in IEEE Indoor Positioning and Indoor Navigation (IPIN), 2019.
- [5] **Characterising Cross-Layer Optimizations for Deep Convolutional Neural Networks**
Jack Turner, Jose Cano, Valentin Radu, Elliot Crowley, Michael O'Boyle, Amos Storkey
IEEE International Symposium on Workload Characterization (IISWC), 2018.
- [6] **Multimodal Deep Learning for Activity and Context Recognition**
Valentin Radu, Catherine Tong, Sourav Bhattacharya, Nicholas D Lane, Cecilia Mascolo, Mahesh K Marina, Fahim Kawsar
ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT), vol. 1, issue 4, 2018.
- [7] **Towards Multimodal Deep Learning for Activity Recognition on Mobile Devices**
Valentin Radu, Nicholas Lane, Sourav Bhattacharya, Cecilia Mascolo, Mahesh K. Marina, Fahim Kawsar
ACM Joint Conference on Pervasive and Ubiquitous Computing (UbiComp/ISWC) Adjunct, 2016.
Première venue for ubiquitous computing
- [8] **Impact of Indoor-Outdoor Context on Crowdsourcing based Mobile Coverage Analysis**
Mahesh K. Marina, Valentin Radu, Konstantinos Balampekos
ACM All Things Cellular (ATC), collocated with the prestigious SIGCOMM, 2015.
- [9] **A Semi-Supervised Learning Approach for Robust Indoor-Outdoor Detection with Smartphones**
Valentin Radu, Panagiota Katsikouli, Rik Sarkar and Mahesh K. Marina
ACM Conference on Embedded Networked Sensor Systems (SenSys), USA, 2014.
Première conference for sensing systems.
- [10] **Am I indoor or outdoor?**
Valentin Radu, Panagiota Katsikouli, Rik Sarkar and Mahesh K. Marina
ACM Mobile Computing and Networking (MobiCom), USA, 2014.
- [11] **HiMLoc: Indoor Smartphone Localization via Activity Aware Pedestrian Dead Reckoning with Selective Crowdsourced WiFi Fingerprinting**
Valentin Radu and Mahesh K. Marina
IEEE Indoor Positioning and Indoor Navigation (IPIN), France, 2013.
Première conference for indoor localization systems.
[Best paper]

[12] Pazl: A Mobile Crowdsensing based Indoor WiFi Monitoring System

Valentin Radu, Lito Kriara and Mahesh K. Marina
IEEE Conference on Network and Service Management (CNSM), Switzerland, 2013.
Première conference for network systems.

[13] A hybrid Approach for Indoor Mobile Phone Localization

Valentin Radu, Jiwei Li, Lito Kriara, Mahesh K. Marina, Richard Mortier
ACM Mobile Systems, Applications, and Services (MobiSys), UK, 2012.

Pre-prints or Under Review

[14] Distilling with Performance Enhanced Students

Jack Turner, Elliot Crowley, Valentin Radu, Jose Cano, Michael O'Boyle, Amos Storkey
Under review at NeuroIPS 2019.

[15] Automatic Generation of Specialized Direct Convolutions for Mobile GPUs

Naums Mogers, Valentin Radu, Lu Li, Jack Turner, Christophe Dubach, Michael O'Boyle
Under review at CASES 2019.

[16] Time and Space Optimal DNN Primitive Selection with Integer Linear Programming

Yuan Wen, Andrew Anderson, Valentin Radu, Michael O'Boyle, David Gregg
Under review at PACT 2019.

[17] MDNN-Loc: Cross Smartphone Sensors Location Tracking with Multimodal Deep Neural Networks

Xijia Wei, Xingji Chen, Valentin Radu
Under review at TSAS 2019.

Patents

Device for Cleaning and/or Clearing of Different Surfaces Under Water Pressure from Feeding Network

Valentin Radu
Romanian patent 122069 B1/30.12.2008

Invited Talks and Seminars

Concurrent Deep Neural Networks on Resource Constrained Devices

Abstract selected for a full-length presentation at MobiUK, University of Oxford (02 July 2019)

High Generalization of Multimodal Deep Learning

Seminar at the University of Glasgow, UK (23 April 2019)

Multimodal Deep Learning for Mobile and Wearable Devices

Selected to hold a presentation at the [DataTech](#) in the International DataFest, Edinburgh (14 March 2019)

Exploring the Deep Learning Inference Stack for Resource Constrained Devices

First UK Mobile, Wearable and Ubiquitous Systems Research Symposium (MobiUK), University of Cambridge, UK (13 September 2018)

Low-energy Accurate Detection of Human Presence or Absence in Images Using Deep Neural Networks

E3IPA: Energy Efficient Embedded Image Processing: Architectures, Tools and Operating Systems, HiPEAC Manchester (22 January 2018)

Invited to present my work developed at Intel R&D Ireland in the workshop organised by the TULIPP EU project, event lead by Prof. Diana Göhringer.

Building Intelligence at the Edge of the Internet

IoT Seminars, The University of Edinburgh (14 March 2017)

Invited by Dr. Paul Patras, coordinator of the IoT Research Programme in the School of Informatics, to present my research on mobile sensing and my vision for continuous inference with smartphones and wearable devices.

Context Detection with Mobile Devices

Scotland IoT Meetup, Edinburgh (23 February 2017)

Invited by Simon Montford, organizer of the Scotland IoT Meetups to present my work on context detection with smartphones to a general public audience. The event was broadcasted live ([video-recording](#)).

Smartphone-based Indoor Localisation with Multimodal Sensing

Cyberphysical Systems Seminars, University of Oxford (7 November 2016)

Invited by Prof. Niki Trigoni to present my research on indoor localization to other researchers working in this field at the University of Oxford. ([abstract](#))

Squeezing Deep Learning onto Resource Constrained Devices

Pervasive Parallelism Lunch talks, University of Edinburgh (8 June 2016)

This presentation covered the challenges of performing inferences with deep neural networks on limited resource devices and a proposed solution to improve memory locality for fully connected layers, while avoiding repeated computations in convolutional layers.

Deep Sensing with Wearable Devices

Joint event of the three EPSRC Centers for Doctoral Training: Data Science, Robotics and Pervasive Parallelism, University of Edinburgh (26 May 2016)

I was selected to present my work on sensing and inferences with deep neural networks on wearable devices, at the confluence of the three research fields of this event (data science, robotics and pervasive parallelism).

User Context Detection for Improved Fidelity of Wireless Communications

The Scottish Networking Event (SCONE '16), Firth, UK (14 April 2016)

I was invited by Dr. Marwan Fayed (University of Stirling) to present my work on mobile sensing for user activity detection and crowdsourced radiomap generation to improve connectivity with wireless networks.

Intelligent smartphone GPU Control Using Reinforcement Learning

Samsung R&D Institute, Staines-upon-Thames, UK (2 September 2015)

On the importance of context detection for crowdsourced mobile network measurements

The Scottish Networking Event (SCONE '14), Edinburgh, UK (5 November 2014)

Context Awareness for the Next Generation Internet and for Social Networking

The Scottish Informatics and Computer Science Alliance PhD Conference, St. Andrews, UK (10 June 2014)

Indoor localization of mobile devices for wireless monitoring

The Scottish Networking Event (SCONE '11), Edinburgh, UK (23 August 2011)

References

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