Vaibhav **Kulkarni**

M.Sc. Electrical Engineering & Communication Systems · Research Assistant (Information Systems)
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Summary

I am a Doctorate candidate at the Distributed Object Programming Lab (DopLab) at the Faculty of Business and Economics (HEC) Lausanne, Switzerland. My research lies at the intersection of modeling human/crowd mobility dynamics and the technical/social aspects of location-data privacy. Prior to joining DopLab (November 2015), I worked at ETH Zürich on a project aimed at facilitating wireless coexistence research in IoT networks. I completed my masters in Information and Communication Technology at TU Berlin in 2014 and a masters in Embedded Systems at TU Eindhoven in 2015. I have a bachelors in Electronics and Telecommunication Engineering and a minor in Business & Entrepreneurship.

Education

Université de Lausanne (HEC-Lausanne) — *Lausanne, Switzerland*
PhD in Information Systems — *Nov. 2015 - Present*
- Research Topic: Human-mobility dynamics; technical & social aspects of location-data privacy

Technische Universiteit Eindhoven — *Eindhoven, Netherlands*
MSc, Embedded Systems (Graduated with Cum Laude) — *2014-2015*
- Thesis: Facilitating wireless coexistence research

Technische Universität Berlin — *Berlin, Germany*
MSc, Information & Communication Technology (Graduated with Honors) — *2013-2014*
- Specialization: low-power wireless communication, computer architecture

European Institute of Technology (EIT-ICT) — *Berlin, Germany*
Minor, Business & Entrepreneurship — *2013-2014*
- Specialization: IP rights, Law & Economics of Media Platforms

College of Engineering, Goa — *Goa, India*
BSc, Electronics & Telecommunication Engineering (Graduated with Distinction) — *2008-2012*
- Thesis: Localization and communication within a swarm of mobile robots

Work & Research Experience

HEC-Lausanne — *Lausanne, Switzerland*
Graduate Research & Teaching Assistant (Advisor: Prof. Benoit Garbinato) — *Nov. 2015 - PRESENT*
- Fall semester: Algorithms & computational thinking (2016, 2017, 2018), Introduction to distributed systems (2015, 2018)
- Spring semester: Practical Python programming (2017), Emerging distributed architectures (2018)

ETH Zürich (Distributed systems group) — *Zürich, Switzerland*
Project Assistant (Master Thesis) (Advisor: Prof. Friedemann Mattern, Anwar Hithnawi) — *Jan. 2015 - Aug. 2015*
- Thesis: Facilitating wireless coexistence research

TU Eindhoven (Electronic systems group) — *Eindhoven, Netherlands*
Project Assistant (Advisor: Prof. Majid Nabi) — *Sept. 2014 - Nov. 2014*
- Project: Controllable interference generation techniques in 15.4 networks

University of Twente — *Twente, Netherlands*
Project Assistant (Advisor: Dr.Majid Nabi Najafabadi) — *Nov. 2014 - Dec. 2015*
- Project: Energy efficient multichannel communication in low-power networks

TU Berlin (Telecommunication networks group) — *Berlin, Germany*
Project (Advisor: Prof. Vlado Handziski) — *Mar. 2014 - July. 2014*
- Project: Gesture controlled music generation using sensor networks

Bolt IoT — *Bangalore-India*
Embedded Design Engineer — *Aug. 2012 - Aug. 2013*
- Design and testing of embedded platforms for mobile robots and sensor network devices

College of Engineering, Goa — *Goa, India*

Teaching Assistant — *June 2012 - Aug. 2013*

- Conducted lab sessions for courses: Embedded systems, Peripheral devices & interfacing, Computer architecture

Freelance — *Goa, India*

Web Designer — *Jan. 2010, Aug. 2012*

- Web design and development for university organizations and technical events

Publications

1. **V.Kulkarni**, N. Tagasovska, T. Vatter, B. Garbinato. Nonparametric Approaches for Generating Mobility Trajectories. In proceedings of 32^{nd} Conference Neural Information Processing Systems (NIPS) Workshop on spatiotemporal modeling, 2018. Montreal, Canada.
2. **V.Kulkarni**, A. Moro, B. Chapuis, B. Garbinato. Capstone: Mobility Modeling on Smartphones to Achieve Privacy by Design. In Proceedings of 17^{th} IEEE International Conference On Trust, Security And Privacy In Computing And Communications (TrustCom), 2018. New York, USA.
3. **V.Kulkarni**, A. Mahalunkar, B. Garbinato, J.D. Kelleher. On the Failure of Markov Models to Capture Criticality in Human Mobility. Under review Nature Physics, 2018.
4. **V.Kulkarni**, D. Naous, C. Legner, B. Garbinato. Location Information Disclosure: A Multi-dimensional Privacy Calculus Model. Under review, European Conference in Information Systems (ECIS), 2018.
5. **V.Kulkarni**, A. Moro, B. Chapuis, B. Garbinato. Extracting Hotspots without A-priori by Enabling Signal Processing over Geospatial Data. In Proceedings of 25^{th} ACM Conference on Advances in Geographic Information Systems (SigSpatial), 2017. LA-California, USA.
6. **V. Kulkarni**, B. Garbinato. Generating Synthetic Mobility Traffic using Recurrent Neural Networks. In Proceedings of ACM SIGSPATIAL Workshop on Artificial Intelligence and Deep Learning for Geographic Knowledge Discovery (SigSpatial), 2017. LA-California, USA.
7. **V. Kulkarni**, B. Chapuis, B. Garbinato. Privacy-Preserving Location-Based Services by using Intel Software Guard Extensions. In Proceedings of ACM SenSys Workshop on Human-centered Sensing, Networking, and Systems, 2017. Delft, Netherlands.
8. **V. Kulkarni***, A. Moro*, B. Garbinato. MobiDict: A Mobility Prediction System Leveraging Realtime Location Data Streams. In Proceedings of ACM SIGSPATIAL Workshop on GeoStreaming, 2016. San Fransisco-California, USA (*co-primary authors).
9. B. Chapuis, A. Moro, **V. Kulkarni**, B. Garbinato. Capturing Complex Behavior for Predicting Distant Future Trajectories. In Proceedings of ACM SIGSPATIAL Workshop on Mobile Geographic Information Systems, 2016. San Fransisco-California, USA.
10. **V. Kulkarni**, A.Moro, B.Garbinato. A Mobility Prediction System Leveraging Realtime Location Data Streams. In Proceedings of the 22^{nd} ACM Conference on Mobile Computing and Networking (MobiCom), 2016. New York, USA.
11. A. Hithnawi, **V. Kulkarni**, S. Li, H. Shafagh. Controlled Interference Generation for Wireless Coexistence Research. In Proceedings of ACM MobiCom workshop in Software Radio Implementation Forum, 2015. Paris, France.

Ongoing Projects & Collaborations

- Project: Addressing the fare-evasion problem in Lausanne public transit network (Advisor: Mr. Nicolas Cabuil, Head of Operations(TL))
  Industry collaboration with Transports publics Lausannois, Lausanne, Switzerland
- Project: Quantifying long-term dependencies in human-mobility (Advisor: Prof. John D. Kelleher)
  Collaboration with School of Computing, Dublin Institute of Technology, Ireland
- Project: Generating Synthetic Mobility Trajectories (Advisor: Prof. Thibault Vatter)
  Collaboration with Department of Statistics, Columbia University, New York
- Project: Location data privacy and data marketplaces (Advisor: Prof. Christine Legner)
  Collaboration with Business Information Systems & Architecture Lab, UNIL-HEC Lausanne

Community Contribution: Open Datasets

- Locations of public transport controllers in Lausanne & Geneva extracted from public crowd-sourced domain
  To facilitate modeling of controller mobility patterns
- Breadcrumbs: An open mobility dataset consisting on mobility trajectories of 80 individuals in Europe
  Validate mobility modeling results against the ground truth
- STOMO: A dataset consisting of mobility traces of exchange students from UNIL and EPFL
  Analyze mobility entropy in the profiles of exchange students

Supervised Master Thesis

Generating synthetic mobility trajectories by applying machine learning — *Sept. 2017 - Jan 2018*

Yannick Patschke

Estimating probability of fare-evasion based on crowd-sourced data — *Apr. 2018 - Aug. 2018*

Arnaud Gerosa

Program Committees

2018 **Reviewer**, International Conference on Information Systems (ICIS) (**Track: Cyber-security, privacy)**

Research Grants & Awards

HEC Research Fund for Doctoral Students *Lausanne, Switzerland*
Project: Analyzing Stochasticity in Mobility Profiles of Exchange Students *Dec. 2017*

Zeno Karl Schindler Award *Geneva, Switzerland*
Project: Facilitating Wireless Coexistence Research (Master Thesis) *Dec. 2017*

EIT-ICT Scholarship *Stockholm, Sweden*
Business & Entrepreneurship Minor *Dec. 2017*

Goa Scholars, Govt. of India *Goa, India*
Grant for Master's Studies *Aug. 2013*

Dept. of Science & Technology, Goa *Goa, India*
Grant for Bachelor's Thesis *June 2011*

Certifications

Machine Learning *May 2016*
Stanford University, Coursera *Grade: 92%*

Information Security *Feb. 2017*
University College London, Coursera *Grade: 91%*

Law & Economics of Media Platforms *May 2018*
University of Chicago, Coursera *Grade: 89%*

Skills

Front-end web development with Angular, HTML/CSS, Jekyll
Android application development with android studio
Test driven development with Py.test
Basic linux server & network administration, provisioning with Salt
Web application development with NetBeans
Embedded Systems development with C/C++/ for Arduino/ESP32/Node-MCU/Atmel series
Software-defined radio development with GNU Radio for USRP N200/210/HackRF
IoT development on Contiki OS, TinyOS for TelosB/Mica2/Waspmote
DSP and FPGA development on CCS for OMAP L-138 series/Xilinx ISE, VHDL
Applied machine learning using TensorFlow, PyBrain
GIS tools - PostGIS, OpenStreetMaps, ArcGIS
Visualization with D3, Matplotlib, seaborn, tableau, Folium, deck.gl
Version control with GIT, SVN
Programming & Scripting languages - C/C++, Python, JavaScript, Bash, MATLAB, R(basics)

Languages: English (Fluent), German(B1), French(A2), Hindi (Fluent), Marathi (Native), Konkani (Native)

Invited Talks

InTech Meetup, Skopje Macedonia (March 2016), Topic: Privacy aware machine learning techniques
Kudelski Security (September 2018), Topic: Characterizing human mobility dynamics and predictability

Extracurricular

Team Sports: Ultimate Friesbee (Team: FlyHigh Lausanne)
Running: 20km de Lausanne (2016, 2017, 2018), Lausanne Marathon (2018)