Luca Ferranti

Curriculum Vitae

July 17, 2023

My mission in life is not merely to survive, but to thrive; and to do so with some passion, some compassion, some humor, and some style. - Maya Angelou

PERSONAL DETAILS

Birthdate	May 3, 1996
✉	luca [dot] ferranti [at] uwasa [dot] fi
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EDUCATION

PhD Computer Science   2020-Present
University of Vaasa, Vaasa, Finland
    Thesis topic: Computational methods for robust and efficient positioning.

M.Sc Electrical Engineering   2018-2019
Tampere University of Technology, Tampere, Finland
    Graduated on 18.12.2019 with distinction, GPA: 4.89/5.0
    Major: Signal Processing and Machine Learning **Minor**: Wireless Communications
    Thesis: *Confidence Estimation in Image-Based Localization*, grade: 5/5

B.Sc Electrical Engineering   2015-2018
Tampere University of Technology, Tampere, Finland
    Graduated on 25.05.2018 with distinction, GPA: 4.82/5
    Major: Electronics **Minor**: Physics
    Thesis: *Continued fractions in modelling of passive circuit components and transmission lines* (written in Finnish), grade: 4/5

CURRENT POSITION

Project Researcher & Project Manager   January 2020-Present
University of Vaasa, Vaasa, Finland
> **Research** for my doctoral dissertation. Focused on computational methods for positioning.
> **Teaching** graduate level courses and supervising one master thesis.
> **Project manager** in the INCUBATE project, which focuses on indoor positioning with Low
> Earth Orbits satellites. I coordinate a team of 20 researchers around 4 Finnish institutions
> (Vaasa, Aalto, Tampere, FGI), organize events, report to steering group and funding agencies.
> Moreover, ensure the team is on track and the project goals can be achieved.

Visiting Researcher   January 2020-Present
Aalto University, Espoo, Finland
> For my doctoral research, I am also affiliated with Aalto University.

Julia Software developer (freelancer)   September 2022 – ongoing
PlantingSpace
> I consult as freelance software developer in a Swiss startup with focus on artificial intelligence.
> My tasks involve developing algorithms for natural language processing, code generation,
> knowledge representation and auotmated reasoning.

PREVIOUS POSITIONS

Google Summer of Code   June 2022 - August 2022
Julia Programming Language
> Collaborating in the JuliaReach organization. Developed state-of-the-art algorithms for
> reachability analysis with non-convex sets. Also developed an API for rigorous bounding the
> range of functions with several interval arithmetic based methods.

Google Summer of Code   June 2021 - August 2021
Julia Programming Language
> I developed IntervalLinearAlgebra.jl, a package containing state-of-the-art algorithms to
> perform numerical linear algebra rigorously using interval arithmetic.

Julia Season of Docs   October 2020 - March 2021
Julia Programming Language
> I developed the website (`https://juliaintervals.github.io`) containing documentation
> and learning materials for Julia packages related to interval arithmetic.

Visiting Researcher   March 2020-April 2020
Lund University, Lund, Sweden
> Visiting researcher at the department of mathematics. Numerical methods for sensor
> networks self-calibration.

Master Thesis Worker   June 2019-December 2019
Aalto University, Espoo, Finland
> In my thesis I investigated state-of-the-art pose estimation algorithms, with focus on indoor
> localization, and proposed novel approaches to improve algorithms robustness.

Research assistant   May 2017 - December 2019
Tampere University of Technology
> Various positions in different research groups.
> algorithms for image-based localization, GPU programming for image denoising with openCL,
> numerical methods for heat transfer problems in superconducting cables, main teaching
> assistant for two undergraduate courses.

Employee   October 2015- April 2017

McDonald's, Tampere, Finland

   By my colleagues' initiative, I was chosen employee of the month in April 2016 and "day saver 2016" in summer 2016.

Italian Teacher   August 2015 - September 2015

Tampere Classical High School, Tampere, Finland

   I taught a short introductory Italian course in Tampere Classical High School. I designed the lessons and prepared the materials myself.

Italian Teacher   September 2014 - April 2015

Onlus Terzavia, Ancona, Italy

   As volunteer, I taught Italian to immigrants targeting levels from A1 to B2. In addition to contact teaching, I designed the lessons and prepared materials myself

RESEARCH OUTPUTS

Publications:

- **L. Ferranti**, J. Boutellier, *FuzzyLogic.jl: a Flexible Library for Efficient and Productive Fuzzy Inference*, 2023 IEEE International Conference on Fuzzy Systems (FUZZ-IEEE), 2023, to appear

- M. Fahim, I. Söchting, **L. Ferranti**, J. Kannala, J. Boutellier, *TBPos: Dataset for Large-Scale Precision Visual Localization*, Scandinavian Conference on Image Analysis 2023, to appear, preprint: arXiv:2302.09825

- N. Revol, L. Benet, **L. Ferranti**, S. Zhilin, *Testing interval arithmetic libraries, including their IEEE-1788 compliance*, Parallel Processing and Applied Mathematics 2022. Lecture Notes in Computer Science, Springer

- F. S. Prol et al. (including **L. Ferranti**), *Position, Navigation, and Timing (PNT) Through Low Earth Orbit (LEO) Satellites: A Survey on Current Status, Challenges, and Opportunities*, IEEE Access, 2022, doi: 10.1109/ACCESS.2022.3194050.

- **L. Ferranti**, K. Åström, M. Oskarsson, J. Boutellier and J. Kannala, *Multiple Offsets Multilateration: A New Paradigm for Sensor Network Calibration with Unsynchronized Reference Nodes*, 2022 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2022, doi: 10.1109/ICASSP43922.2022.9746922.

- **L. Ferranti**, K. Åström, M. Oskarsson, J. Boutellier and J. Kannala, *Homotopy Continuation for Sensor Networks Self-Calibration*, 29th European Signal Processing Conference (EUSIPCO), 2021, doi: 10.23919/EUSIPCO54536.2021.9616184.

- **L. Ferranti**, K. Åström, M. Oskarsson, J. Boutellier and J. Kannala, *Sensor Networks TDOA Self-Calibration: 2D Complexity Analysis and Solutions*, 2021 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2021, doi: 10.1109/ICASSP39728.2021.9414634.

- **L. Ferranti**, X. Li, J. Boutellier and J. Kannala, *Can You Trust Your Pose? Confidence Estimation in Visual Localization*, 25th International Conference on Pattern Recognition (ICPR), 2021, doi: 10.1109/ICPR48806.2021.9413234.

- **L. Ferranti** and J. Boutellier, *Towards Algebraic Modeling of GPU Memory Access for Bank Conflict Mitigation*, IEEE International Workshop on Signal Processing Systems (SiPS), 2019, doi: 10.1109/SiPS47522.2019.9020385.

Software:

- FuzzyLogic.jl: Julia software for fuzzy inference. The library has its own embedded domain specific language to describe fuzzy models in a simple and expressive manner, perform inference with state-of-the-art performance, generate stand-alone optimized code and read fuzzy models from popular industry standard formats.

- IntervalLinearAlgebra.jl: Author, maintainer and lead developer of IntervalLinearAlgebra.jl, a software written in Julia to perform numerical linear algebra rigorously using interval arithmetic.

- IntervalArithmetic.jl: Developer and maintainer, heavily involved in the effort to reach compliance with the IEEE 1788-2015 standard for interval arithmetic.

- JuliaIntervals: Maintainer and developer in the JuliaIntervals organization. General maintenance to keep the packages working and up to date. Author and maintainer of the org webpage.

- GeometricTheoremProver.jl: A native Julia library for automated deduction in Euclidean geometry, under development.

Talks:

- *Automated Geometric Theorem Proving in Julia*, JuliaCon 2022, available at `https://www.youtube.com/watch?v=q_08LE4UOU8`

- *Status of IntervalLinearAlgebra.jl*, JuliaReach and JuliaIntervals Days 3, 10 December 2021, available at `https://youtu.be/-1JqQ9MN2tg`

- *Package development in Julia*, Research Software Seminar Series, 18 August 2021, available at `https://youtu.be/oHsLmaHSHd8`

- *IntervalLinearAlgebra.jl: linear algebra done rigorously*, JuliaCon 2021, 30 July 2021, available at `https://youtu.be/fre0TKgLJwg`

- *Confidence estimation in image-based localization*, AI day, 26 November 2020

- *Confidence estimation in image-based localization*, 2019 Indoor and Challenging Navigation (INTO) Seminar, 29 November 2019

AWARDS AND HONOURS

- **Finnish foundation for technology promotion 2022**, 5000€, merit-based award for exceptional doctoral students.

- **Nokia Scholarship 2021**, 6000€, merit-based award for exceptional doctoral students in the field of ICT.

OTHER ACADEMIC MERITS

Organized Scientific events:

- **JuliaReach and JuliaIntervals Days 3:** main organizer of this workshop focused on interval and reachability methods. I planned and chaired the event, created the website and managed subscriptions and dissemination.

- **Nordic-RSE Research Software Seminar Series:** planned and chaired several sessions, invited speakers and promoted the seminar on social media.

- **Julia Users Helsinki meetups**. I initiated the Julia Users Helsinki group, which aims to bring together researchers using Julia to share their expertise and collaboration. I organize monthly meetups, which generally feature talks on relevant topic. I have given tutorial sessions on Julia myself several times.

Positions of trust:

- **Board member, Nordic-RSE**   September 2021 - Present
  Non-profit organization to bring together and support research software engineers in the Nordics by organizing networking and training activities.

Peer-review activity:

I have peer-reviewed articles for the following forums:

- International Conference on Pattern Recognition (ICPR)

- International Conference on Acoustics, Speech and Signal Processing (ICASSP)

- International Workshop on Signal Processing Systems (SiPS)

- Journal of Open Source Software (JOSS)

TEACHING MERITS

Pedagogical training:

- **Basic of University Pedagogy**, Spring 2022, 10 credits, University of Oulu

- **Carpentries instructor training**, Spring 2021. Training on pedagogical techniques to teach computational skills and good open science practices to researchers and other professionals. As a certified instructor I can organize and teach Carpentries workshops. I teach 1-2 workshops per year.

Supervision:

- **master thesis** *Neural network based image capture for 3D reconstruction*

Taught classes:

- **Fuzzy Systems**, Fall 2021, Spring 2023, graduate level, responsible for teaching exercise sessions and grading exercises. I am **currently redesigning the course from scratch** and will be main lecturer for Spring 2024. The class is being modernized to address topical research themes such as explainable AI and planning under uncertainty. The course material and lecture videos will be made publicly available and the course will be available to everyone in Finland through the fitech program.

- **Computer Vision**, Spring 2021, Fall 2022, graduate level, co-designed the course from scratches. Created week exercises and project assignment with model solutions and grading principles. Live teaching and course grading.

- **Circuit Analysis**, Spring 2018, undergraduate level. Taught exercise sessions, graded exercises, maintained course website, developed automatically graded exercises on the course platform. Teaching in Finnish. My teaching methods received high praise in the students feedback.

- **Linear Systems**, Fall 2017, Fall 2018, graduate level, taught exercise sessions, graded exercises, maintained course website, developed automatically graded exercises on the course platform. Teaching in Finnish. My teaching methods received high praise in the students feedback.

LANGUAGE SKILLS

Italian:	Native proficiency
English:	Full professional proficiency (C1)
Finnish:	Full professional proficiency (C2)
French:	Limited working proficiency (B1)
German:	Elementary proficiency (A2)

IT SKILLS

Languages:	Julia, Matlab, Octave, Python, C, C++, Haskell (proficient) HTML, CSS, Javascript, Chapel, R (good)
Computer Algebra:	Maple, Macaulay2 (proficient), Sage, Mathematica (basic)
Tools:	Git (proficient), Make, Snakemake, Docker (good)
Operating Systems:	Linux, Windows, MacOS
Reporting:	LaTeX, Microsoft Office, Open Office