Fabrice Mayran de Chamisso

Scientist & Software engineer

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Overview and Career Objectives

I am a recent PhD in computer science with a master of engineering, a master of (nano)physics and an extensive knowledge of a large number of fields within and outside of science. I have already taught these fields to students and given popularization conferences. **My career goal is to build bridges between approaches, such as between physical reality described by physics and virtual reality described by computer science. This goal implies developing new paradigms as well as new ways to express existing paradigms.** I am ready to carry projects from theoretical research to industrialization. I have already managed teams and have theoretical knowledge and hands-on experience of prototyping, economics, industrial property law and collaborative work.

Education

- **PhD in Artificial Intelligence, university of Paris-Saclay & CEA LIST**
  - Developed a new bio-inspired paradigm called "Lifelong Exploratory Navigation" for mobile robot movement in arbitrarily large and complex environments. This paradigm presents an integrated view of planning, navigation, Simultaneous Localization and Mapping (SLAM) and resource management. All software components are held together by a new asynchronous architecture designed for safety.

2013 - 2016

  - Implemented (C++) the paradigm on a Kobuki and a Pioneer robot running on ROS with a Kinect 1 camera and MEMS compass. Both robots were able to move completely autonomously in a large-scale highly-cyclic environment while carrying missions such as finding an item with or without a position hint.
  - Work notably published at the IJCAI 15 conference ("Exploratory Digraph Navigation using A*"). Patent filed (PCT/FR2016051039).
  - Extension of the work outside the field of robotics is possible. For instance, graph traversal algorithms developed may be used for semantic database search.

- **Master of Engineering, Ecole Centrale Paris (now CentraleSupélec)**
  - Obtained with highest level of distinction.
  - Emphasis on fundamental and applied physics as well as other fields of science including advanced mathematics and genomics.

2010 - 2013

  - Emphasis on management, intellectual property law and economics
  - **Including 6 months in TU Darmstadt, Germany**, studying Quantum Field Theory and programming evolutionary processes on multi-GPU architectures in a multicultural team.

- **Master of Nanophysics, Paris-Sud university/Ecole Centrale Paris (now CentraleSupélec)**
  - Theoretical knowledge of condensed matter theory, light- and heat- propagation in nanostructures, hazards due to nanotechnologies, ...
  - Experience of nanofabrication (clean room)

2011 - 2013

  - Long research internship ($>$ 6 months) at LPQM simulating femtosecond light modulation in a micrometric photonic crystal with the aim of obtaining an all-optical switch operating well above 10 GHz.
  - Implemented a massively parallel Finite Difference-Time Domain (FDTD) code from scratch (35'000 lines of C++). This code allows real-time GPU-accelerated visualization of light at the nanoscale.

- **Bachelor of theoretical physics, Paris-Sud university** obtained with highest level of distinction
- **Two years of preparatory classes (Math-Physics) for the highly competitive national exams to enter top engineering schools** - more than 12 hours of mathematics and 9 hours of physics per week
- **Scientific Baccalaureate** obtained with highest level of distinction

Professional experience

- **PhD in Artificial Intelligence, university of Paris-Saclay & CEA LIST** (2013 - 2016)
  - Experience of a large research organization (CEA).
  - Worked in a team with computer vision experts and hardware developers (ASIC, FPGA)
  - Approach implemented with 35'000 lines of C and C++ code optimized for speed. Code shared with fellow developers (version control and complete documentation)
- **Manager and treasurer of an association** (2012 - now)
  - 2015: organized the second edition of the 2012 event. This second edition lasted one week and was organized with a tight budget of 2866€ (from public subsidies, donations and sales), maintaining free entrance. Over 25 artists and 600 visitors.
  - 2012: organized an artistic weekend with painters, sculptors, engravers, musicians (three concerts) and craftspeople. Free entrance. Over 20 artists and 400 visitors.
- **Speaker for a series of popularization conferences on 21st century issues** (2013 - now)
  - Computers: "Computers: from User Interface to Quantum Field Theory", "Video Games", "The web"
  - Ecology: "Things you don't know about climate change", "Energies (next conference)"
  - Science and Arts: "Arts and Mathematics", "People, Arts and Nature"
- **Teacher, Paris-Sud university (128 hours)** (2014 -2015)
  - Teaching optics and computer science for physicists to groups of 8 to 20 graduates and postgraduates
- **Designed numerous posters, flyers, logos and websites to communicate on ideas or events**
  - Mastery of 2D and 3D design software including The Gimp, Blender and Inkscape

Other skills and qualifications

- **Deep knowledge of computer architectures, hardware and software** (2007 - now)
  - Years of practice handling issues on Windows and Linux (Red Hat, Ubuntu) systems
  - Knowledge of C, C++, VB.net and MATLAB for software programming and data management
  - Knowledge of VHDL for ASIC and FPGA programming
  - Experience of script languages such as Python, HTML or Javascript
- **Created a 2D/3D game engine from scratch (work in progress, 30'000 lines of C++ code)** (2011 - now)
  - Alpha version used in the FDTD simulation code mentioned in the "Education" section
  - Experience of low-level highly optimized code for real-time gaming and scientific computations
  - Experience of projective geometry and associated matrix algebra
  - Knowledge and coding experience of metaprogramming, design patterns and "modern" C++
  - Using Visual Studio since 2005. Using SVN and Git for projects, alone or with fellow developers.
  - Knowledge of software development practices (pair programming, scrum, V cycle, ...)
  - Cross-platform development using the SDL v.2 library and OpenGL.
- **Created multiple software for 2D and (GPU-accelerated) 3D drawing**
  - including fractals and stereograms
- **Built an RC FPV quadcopter** (2012)
  - Experience of prototyping technological products
- **Built a custom cloud server for storage and VPN** (2016)
  - Operating on an Odroid C2 ARM64 micro-server (more powerful version of a Raspberry Pi 3)
  - Experience of networks, network security and Linux tools related to network configuration and VPN
- **Multilingual, French – English – German**
  - Speaking French as mother tongue,
  - Scientific English (TOEFL 623/677, peer-reviewed papers as well as PhD thesis written in English) and
  - good German (6 months alone in the country).

Appendices

Available publications (as first author)

- Mayran de Chamisso, F., Lifelong Exploratory Navigation. PhD thesis, University of Paris-Saclay, 2016.
- Mayran de Chamisso, F., Soulier L. and Aupetit, M., Exploratory Digraph Navigation using A*. In: *proceedings of the Twenty-Fourth International Joint Conference on Artificial Intelligence*, AAAI Press/International Joint Conference on Artificial Intelligence, 2015.
- Mayran de Chamisso, F., Soulier L. and Aupetit M., Method, computer program and system for controlling a movement of a moving agent within a networked environment. Patent number PCT/FR2016051039 - WO/2016/177963, 2015.
- Mayran de Chamisso, F., Soulier L. and Aupetit M., Robust topological skeleton extraction from occupancy grids for mobile robot navigation. In: *proceedings of the twentieth national congress on Shape Recognition and Artificial Intelligence (RFIA'16)*, 2016.

References

- Laurent Soulier, Research Engineer, CEA LIST
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