

Nicolas Burrus

Computer Vision Engineer

S U M M A R Y

I have 10 years of experience leading 3D computer vision projects in fast-paced startups by combining research and software engineering. I started as an academic researcher, then got enthusiastic about the Kinect and developed a popular opensource project for RGBD image processing. The traction around it led me to enter the startup world by founding a company, getting selected for a Microsoft/Techstars program and building a successful 3D scanning software. Since my company got acquired I have been leading computer vision teams to transform cutting-edge research into practical consumer products.

P R O F E S S I O N A L E X P E R I E N C E

2013 - now **Computer Vision Team Lead at Occipital / Arcturus Industries (remotely).** *Occipital is a US startup focused on spatial computing. It created Structure Sensor, a depth sensor that became the #6 most successful project on Kickstarter. Arcturus Industries is a spin-off focusing on 3D perception for AR/VR.*

Team leadership. Leading the computer vision team (up to 12 people) while being remote. Help define priorities, give technical directions, push best practices, hiring.

Research. Focus on real-time performance and robustness for untrained consumers in uncontrolled environments. Main tracks include **SLAM** (dense RGBD, feature-based monocular/stereo), **visual-inertial fusion** (UKF, keyframe-based), sensor rig **calibration** (in factory and live), **3D reconstruction** from RGBD (object and room-scale) and **texturing**.

Software engineering. Developed the main prototyping, visualization and evaluation platform for our computer vision algorithms. Overall software architecture, performance/system optimization (ensuring low-latency, leveraging **SIMD**, **GPU**). Integration into **mobile apps** and SteamVR drivers. Design of public SDK API. Python bindings and integration into Blender for synthetic visual-inertial dataset generation.

Products shipped by my team. *Structure SDK* (general purpose RGBD SLAM and 3D reconstruction), *Calibrator* (calibration app between Structure Sensor and an iPad camera), *Canvas* (real-time room scanning on iPad), *BridgeEngine* (SLAM & 3D room perception for AR/VR), *TapMeasure* (iOS app to take 3D measurements).

2011 - 2013 **Co-founder at ManCTL SARL (France) and ManCTL Inc (USA).**

R&D, business development, company management. Built **Skanect, a real-time 3D scanning software for RGBD cameras**. Still selling in 2021.

Selected as one of the 11 companies out of 500+ candidates in the **Microsoft Kinect Accelerator program, powered by Techstars**. Acquired by Occipital in 2013.

2009 - 2012 **Postdoctoral position at UC3M (Madrid).** Computer vision for robotic grasping.

2009 **Postdoctoral position at ULG (Liège).** Sign language recognition in videos.

2004 **Intern at Siemens Research (USA).** Particle filters to segment DT-MRI scans (1 patent).

EDUCATION

- 2005 - 2008 **PhD at UPMC (Paris 6).** Highest honors, **nominated for DGA best thesis awards.**
- 2004 - 2005 **Master of Artificial Intelligence at UPMC.** Highest honors.
- 1999 - 2004 **EPITA (Paris):** M.S in Computer Science. **Highest honors.** Selected as one of the 5 students to be part of a special research-oriented program (LRDE) during the last two years.

ACADEMIC RESEARCH & TEACHING

- Publications 15+ papers during my early academic career, including one book chapter in *Hacking the Kinect* (Apress) and one paper in *Journal of Pattern Recognition* (impact factor 2.04). Full list on my personal website.
- Teaching Courses in engineering schools and universities: computer vision, computer architecture, C++ programming, Java programming, design patterns, Linux.
- UC3M Introduced RGB-D cameras to the lab and developed new 3D reconstruction algorithms based on both Time-of-Flight and Kinect cameras. Co-supervised a PhD student.
- Co-led a project in collaboration with Airbus Military. Proposed a new a-contrario based method to detect airplanes to refuel in very noisy outdoor Time-of-Flight images.
- ULG Pictorial models, non-parametric belief propagation with importance sampling and a-contrario likelihoods to detect body parts in a video sequence for sign language recognition.
- UPMC Robust visual event detection using an **a-contrario statistical framework**. Led to new applications of the framework, including image segmentation and object matching.
- Designed and implemented algorithms on massively parallel architectures.
- LRDE Genericity and performance in C++ through advanced metaprogramming.

PERSONAL PROJECTS

- RGBDemo Opensource software to experiment and share potential applications of RGBD sensors. Demos include feature-based SLAM, marker-based object 3D reconstruction, single-view table-top object 3D reconstruction, people tracking, and multiple Kinect calibration. C++ and cross-platform.
- Dalton Lens MacOS utility to assist colorblind people with various real-time filters (OpenGL, Metal, Swift, Dear ImGui). Deep learning approach to segment anti-aliased plots and charts.
- Transforms Visualization and conversion of 3D rotations (HTML, WebGL, JavaScript ES6).
- Tiny Watchdog Minimalistic tool for home video surveillance with a Raspberry Pi (Python, ZeroMQ).

LANGUAGES

- English Fluent: 1 year living in the United States, 8 years working remotely for US companies.
- Spanish Fluent: 8 years living in Spain, 2 years teaching and working in Spanish.
- French Mother tongue.