

Luc Vincent

Palo Alto, CA
USA

lvincent@gmail.com
www.vincent-net.com/luc

SUMMARY

Senior tech executive with a decade experience leading large, globally distributed engineering teams, and turning innovation into material business impact. Strong technical background in computer vision, mapping, robotics, geospatial imagery, machine learning, large scale systems, image processing & analysis, document imaging, and more. Equally effective in startup or large company environments. Experienced leading cross-functional efforts involving software engineering, hardware development, product management, partnerships, operations, finance, sales, and more.

PROFESSIONAL EXPERIENCE

Lyft

Feb 2017–present

Vice President, Autonomous Technology (Engineering & Product)

Lead Lyft's fast growing Self-Driving Division. In particular, I bootstrapped the "Level 5 Engineering Center", Lyft's ambitious push to build a Self-Driving System (software & hardware) specifically focused on Transportation as a Service. I am also responsible for Lyft's Autonomous Open Platform initiative, and a range of supporting technologies, notably HD Mapping and Machine Learning platform tools.

This division is headquartered in Palo Alto, with offices in Munich, London and San Francisco. It has grown to over 300 engineers and product managers in about 18 months. Our mission is to launch self-driving cars at scale on the Lyft network, alongside with AVs from our Open Platform partners.

Before focusing 100% on autonomous technology, I also had responsibility for Lyft's Marketplace Division. I led a number of critical core services for Lyft, including accurate real-time location services for passengers and drivers, routing, supply/demand matching, pricing, predicted and real-time traffic, event prediction and detection, multimodal navigation, crowdsourcing, mapping and more.

Google, Inc.

2004–2017

My career at Google has focused on products and platforms based on the collection and organization of geographic imagery at global scale. The most well-known is Google *Street View*, but it is only one of the many projects and products I have been responsible for starting and scaling over my 12 year tenure with the company.

Senior Director, Engineering & Product (2012–2017)

Led globally distributed Geo Imagery organization including several hundred engineers, product managers, operations managers, technical program managers, and other functions, plus a much larger number of temps and vendors. Org is headquartered in Mountain View, CA, but includes (or has included) teams in Boulder, Seattle, Los Angeles, New York, Tokyo, Beijing, Paris, Zürich and Munich. Mission is to (1) efficiently capture petabytes of imagery around in the world, from cars, boats, planes, satellites, web crawls, power users, etc; (2) organize pixels: georeference, align, stitch, blend, orthorectify, 3D-reconstruct, recognize objects, index geographically & by content, and more; (3) use imagery and derived semantics to power a range of Google platforms, data quality efforts, end-user products (eg, Google Maps & Google Earth) and emerging initiatives.

- Scaled *Street View* to over 80 countries. In addition to being one of Google's best recognized brand assets, *Street View* remains a uniquely differentiating feature of Google Maps.
- Led Google's efforts to leverage deep learning in order to create high quality map and local data globally, from imagery and other sources.
- Bootstrapped and scaled efforts to capture high-resolution aerial oblique imagery and create 3D models of the world's top metropolitan areas. Our efforts have far outpaced the competition in both geographic coverage and quality.

- Successfully integrated *Skybox Imaging* (\$500M acquisition, focused on small imaging satellites) in 2014; now rebranded as *Terra Bella*. Team built outstanding tech stack, successfully launched 5 sub-meter resolution satellites and was on track to launch many more, before Google decided to get out of the business.
- Led multiple camera-centric hardware efforts, from initial R&D through production and deployment at scale.
- Responsible for several apps and consumer products, including *Google Earth*, *Street View App* and more, across Web, Android and iOS platforms.
- Led efforts to define, build and scale a Geo platform business, in collaboration with Google Cloud team.

Director, Engineering (2008–2012)

Led Mountain View, CA, and Zürich-based engineering team responsible for scaling *Google Street View*. Drove efforts to apply the Street View “formula” to adjacent areas (eg, aerial/satellite imagery), thereby reducing engineering complexity and fragmentation. Championed and grew Google’s efforts to derive exponentially more value from these global imagery assets.

- Grew *Street View* from a US-centric experiment into a critically important Google product, globally. *Street View* was recognized as the fastest growing product at Google in 2008, and has continued to grow strongly ever since.
- Took Google’s aerial imagery acquisition efforts from their “garage phase” to meaningful scale by applying the same disciplined engineering approach used for Street View; merged projects/teams related to camera hardware, onboard software, field support, leading to significantly improved velocity, efficiency and scale.
- Continued to drive innovation in a number of areas: eg, introduced VR-like “Smart Navigation” in Street View by leveraging extracted 3D data; bootstrapped efforts to recognize objects in imagery at scale, to refine understanding of the physical world.
- Engineering sponsor for a string of Google acquisitions. In particular, I co-led the acquisition of *reCAPTCHA* and I have played a key role in growing it into a highly successful Google product (to date I am still responsible for *reCAPTCHA*).

Uber Tech Lead / Engineering Manager (2004–2008)

Responsible for several engineering aspects of *Google Book Search*. Head of Google OCR-related initiatives. Founder and leader of multiple novel engineering efforts, including *Street View*.

- Led efforts to grow *Google Book Search* indexing to dozens of new languages.
- Instrumental in “resurrecting” the *Tesseract OCR* package, open sourcing it, and leading its eventual transformation into one of the world’s best OCR engines.
- Started *Street View* project in “20% time”; hired an all-star team of software engineers, computer vision scientists and operations specialists; successfully launched product in May 2007, and turned it into an iconic Google success story.

Angel Investing & Advising

2012–present

Investor and/or advisor in 20+ startups since 2012. Investments range from \$10k to \$200k depending on the situation:

- Focus on tech I know well and where I can add value with minimal involvement: computer vision, machine learning, robotics, mapping, imagery. Secondary focus on “French Tech” (through alumni & expat networks) and Green Tech.
- 3 successful exits so far (acquisitions), and several companies doing great (eg, large A and B rounds).
- Representative portfolio companies:
 - Banjo (content discovery)
 - Cape Analytics (insurance / aerial imagery)
 - Grokslyle (visual search, acquired by Facebook)
 - Plato (engineering/product leadership mentoring as a service)
 - Spotangels (live parking maps)
 - Mapillary (crowdsourced HD mapping)
 - Aclima (environmental mapping)
 - Sturfee (street-level AR)
 - Spotscale (drone-based 3D modeling)
 - Unsupervised.ai (robotics)

LizardTech, Inc. (LTI)'s business was focused on the compression and efficient distribution of complex imaging content. In 2000, LTI acquired the *DjVu* document compression and delivery technology from AT&T Labs, which is why I decided to join. Despite our efforts, *DjVu* never gained broad acceptance, but over a decade later it remains state-of-the-art for scanned document compression and representation.

Vice President, Document Imaging (2003–2004)

Responsible for all aspects of the LTI document imaging product line, including, marketing, strategy, product management, partnerships, etc.

- Overhauled document imaging strategy following Company's acquisition by Celartem Technology.
- Led aggressive product development efforts to support new strategy with key features and product improvements. Drove design and implementation of new watermarking and document rights management (DRM) capabilities.
- Focused LTI's marketing efforts on high-leverage activities, including a rebooted web site, regular newsletters and webinars, targeted interviews and selected trade shows.
- Negotiated partnerships with scanner vendors, content management providers and other technology partners, in a bid to enhance the company's distribution channels and to increase end-user exposure to the *DjVu* technology.

Chief Scientist, Document Imaging (2001–2003)

Share time evenly between technical activities, product development and business development, for the *DjVu* product line.

- Chief company-wide technical resource on document imaging.
- Led efforts to expand product line to *electronic* document conversion via virtual printer driver and other tools.
- Embedded with product management team to support all aspects of document imaging product line: feature sets, UX, platforms, competitive analysis, schedule, pricing, licensing, documentation, packaging, distribution, etc.
- Relentlessly evangelized *DjVu* technology via conference presentations, publications, and the creation of compelling *DjVu* content.
- Identified, negotiated and closed deals with several strategic partners.

Director of Applied Research, Document Imaging (2000–2001)

Led *DjVu* Applied Research team while remaining active individual contributor.

- Responsible for large portions of company's core imaging technology.
- Championed and led new R&D initiatives focused on growing scope of product line and size of addressable market.
- Key contributor to company strategy, and proactive business development champion.
- Advocate for LTI's continued involvement in open-source activities.

Xerox Palo Alto Research Center (PARC), Advanced Systems Development Laboratory

The Advanced Systems Development Lab (ASD)'s mission was twofold: help Xerox realize the value of PARC research through effective technology transfer; bring business group needs and perspective back to PARC.

Manager, Imaging Components & Services

Led a team of 8 researchers and developers. Supported ASD's mission in the area of imaging through development of rock-solid software components. Collaborated with other PARC teams and coordinated efforts with geographically distributed Xerox business groups.

- Led development and deployment of *DataGlyph* technology (high density, high reliability, visually pleasing 2D barcodes) in a range of Xerox solutions.
- Managed development and productization of a technology known internally as *DigiPaper*. Core of technology is a "visually lossless" scanned document representation based on multi-layer segmentation, coupled with wavelet-based and token-based compression schemes. Released *DigiPaper* 1.0 in May 2000, for use in web-based legal document repositories.

ScanSoft, a document management software company, was born out of the merger of Xerox Imaging Systems (XIS, a subsidiary) and a Xerox group called *Software Solutions Division (SSD)*. In 1999, Scansoft went public through a “reverse merger” with Visioneer and in 2005 it merged with Nuance and took its name.

Director, Advanced Development, ScanSoft (Palo Alto, CA, 1997–1999)

- Led focused engineering team responsible for advanced image processing development, in support for ScanSoft’s entire product line. In particular, team developed core of *Pagis Pro*, a scanning software package that received a number of awards and became the best selling scanning suite on the market.
- Orchestrated development/productization of novel technologies for scanned document management: binarization, adaptive compression, automatic cropping, noise cleaning, deskewing, enhancement, superresolution, etc. This played a key role in differentiating Scansoft’s product offerings as well as building up the company’s IP portfolio.
- Promoted and put in place new processes for improving engineering productivity and code quality: documented requirements, engineering reviews, version control, code reviews, automatic builds, system tests, documentation, etc.
- Kept close ties with Xerox PARC and other research organizations to ensure steady flow of new ideas to ScanSoft.

Director, Software Development, Xerox Software Solutions Division (Palo Alto, CA, 1996–1997)

- Led Image Processing Core Technology Group (IPCore), a team delivering cutting-edge document image analysis software to a diverse base of internal customers (software and hardware product teams). Oversaw release of about a million lines of C code, on five different platforms (Windows NT, Windows 3.1, Macintosh, SunOS, Solaris).
- Responsible for handling SSD’s relationship with Xerox research groups, including PARC and the European Research Center (XRCE). Managed \$4M budget for contracting specific technology pieces with these research groups. Facilitated tech transfer from Xerox research into SSD, and coordinated efforts to steer PARC and XRCE into specific research directions.

Manager, Image Processing and Analysis, Xerox Imaging Systems (Peabody, MA, 1995–1996)

- Managed small team focused on developing document image analysis algorithms for the *TextBridge* OCR package.
- Bootstrapped XIS government contracting business and was awarded \$0.5M contract by NSA to develop new methods for benchmarking page segmentation algorithms. Served as Principal Investigator for this project over its two-year span.

Member of Technical Staff, Xerox Imaging Systems (Peabody, MA, 1991–1995)

- Singlehandedly developed page segmentation library that powered XIS’s entire product line, from shrink-wrap software packages (e.g., *TextBridge*) to reading machines for the blind (*The Reading Edge*). System worked reliably even for complex layouts and was rated most accurate segmentation package on the market at the 1995 UNLV OCR accuracy contest (UNLV studies were a reference in the Document Recognition world).
- Key contributor to several other pieces of XIS’ document recognition technology, including character recognition, page filtering, binarization techniques, algorithmic and architectural advances.

Postdoctoral Fellow

- Published and generalized morphological algorithmic techniques developed during my PhD work.
- Initiated collaborations with some of the best researchers in the field of computer vision.
- Participated in design of *DIP Station*, an image analysis package for the Mac.
- Developed novel technique for assessing corneal health from corneal endothelial tissue images (with USUHS). Services University of the Health Sciences).

Associate Research Fellow

- Worked towards my PhD degree, under the guidance of Prof. Jean Serra.
- Helped promote image processing expertise of the *Center for Mathematical Morphology*, and land research contracts with *Aérospatiale* and the *French Institute for Petrol (IFP)*, for which I acted as lead investigator.

Independent Consultant

1990–2004

In the 1990s and early 2000s, I had a lot of very interesting consulting assignments on the side, in fields including medical imaging, remote sensing, industrial inspection, optometry, and oil exploration. Some key customers and projects include:

- **Atlantic Aerospace Electronics Corporation**, Waltham MA (1991–93). Developed new algorithms for automatically extracting correlogram tracks in sonar imagery. Algorithms are capable of detecting tracks under extremely low signal-to-noise ratios, where previous approaches failed. Also designed hierarchical watershed-based algorithms to robustly extract and recognize targets in Forward-Looking Infrared (FLIR) imagery.
- **Woods Hole Oceanographic Institution**. Woods Hole, MA (1992–99). Participated in the design of a system to automate the detection and classification of plankton from towed video microscopy sequences. Provided some of the key segmentation and feature extraction algorithms used in the system.
- **Vysis, Inc.**, Downers Grove, IL (1992–96). Developed advanced segmentation and pattern recognition algorithms aimed at chromosome analysis from blood sample.
- **Chevron Petroleum Technology Company**, La Habra, CA (1996–2004). Proprietary project involving oil exploration and requiring the processing of huge 3D data sets.
- **Humphrey Systems (now Carl Zeiss Meditec)**, Dublin, CA (1998–99). Developed key image enhancement and feature extraction algorithms for ophthalmologic instruments.
- **Applied Imaging**, Santa Clara, CA (1999). Designed novel methods for discriminating between different classes of cells in microscopy slides.

EDUCATION

Ph.D. in Morphological Image Processing, École Nationale Supérieure des Mines de Paris, France, 1990

Masters (“Diplôme d’Études Avancées”) in Computer Science, Paris XI University, France, 1987

B.S. (“Diplôme d’Ingénieur”), Majoring in Mathematics and Computer Science, Ecole Polytechnique, France, 1986

RESEARCH & PROFESSIONAL ACTIVITIES

- **Author of 60+ publications** on computer vision, image processing, mathematical morphology, OCR, document understanding, and related topics. See www.vincent-net.com/luc/papers/.
- **Keynote speaker** at dozens of industry & academic events, including ISVC’15, DASFAA’15, IVRPA’15, SIGSPATIAL’14, ICCV’13, WACV’11, ION GNSS’11, ICDAR’07, and many more. Also invited to speak at companies & institutions around the world, on topics ranging from vision research to product development to leadership.
- **Supporting the Research Community:**
 - **Research grant reviewer & sponsor:** primarily while at Google, I have reviewed dozens of grant applications and been directly or indirectly responsible for millions of dollars in research awards.
 - **Associate editor** of the *IEEE Transactions on Pattern Analysis & Machine Intelligence (PAMI)*, 2000–2004, and of the *Journal of Electronic Imaging*, 1994–2002.
 - **General chair or co-chair** for dozens of conferences since 1991, including: SPIE conferences on Document Recognition, Visual Communications & Image Processing, Nonlinear Image Processing; IEEE conferences on Computer Vision & Pattern Recognition; IAPR Workshops on Document Analysis Systems; International Symposiums on Mathematical Morphology; ICDAR conferences; etc.

- **Peer reviewer** for several journals since 1988, including: *IEEE Trans. on Pattern Analysis & Machine Intelligence*, *J. of Visual Communication and Image Representation*, *Signal Processing*, *IEEE Trans. on Acoustics, Speech & Signal Processing*, *IEEE Trans. on Systems, Man & Cybernetics*, *IEEE Trans. on Medical Imaging*, *IEEE Trans. on Image Processing*, *Acta Stereologica*, *Journal of Mathematical Imaging*, *Journal of Electronic Imaging*, etc.

- **Patents & IP:**

- **71 issued U.S. patents** (as of 03/2016), plus 29 applications pending. See www.vincent-net.com/luc/patents/.
- Over a 5 year period at Google, led my product area's efforts to significantly increase patent filing rates. We were consistently ranked as one of the most prolific group in the company.
- Deposed on a few occasions in relation to patent litigation cases.

MISCELLANEOUS

- **Citizenships:** USA, France
- **Computer languages and environments:** C, C++, JavaScript, Perl, Lisp, bash, csh, Matlab, Apache, L^AT_EX, etc. Experienced Linux and Windows administrator.
- **Languages:** English (fluent), French (native), German (was excellent; now rusty)
- **Hobbies:** home automation, VR photography, adventure travel, rock climbing, backpacking, road biking, backcountry skiing, mountaineering (successfully organized and led expedition to summit of Denali, Alaska in 1991), running the IT/scoring infrastructure at mens gymnastics competitions.