bfree@graphcomp.com **Robert Free** 408-812-1952

Vision Analytics
Image Processing / Computer Vision / Face Recognition

I specialize in building/managing/mentoring engineering teams from 0-50 developers and designing/building 3D Cloud/IoT/Mobile systems - while remaining a 3D Computer Vision researcher, ML & AI developer, and a hands-on full-stack developer augmented with AI Coding Tools.

Career focus: 3D Computer Vision innovations for Cloud, IoT, Mobile, and cross-platform SDKs; medical imaging/segmentation, lidar, structured IR, body/face/behavior/building scanning; designing/building 3D multi-spectral sensors.

I strive to work with companies that aim to benefit society and health.

Received 15 computer vision patents: **8,244,003**, **8,244,004**, **8,254,646**, **8,315,461**, **8,326,001**, **8,358,812**, **8,358,813, 8,451,346, 8,559,708, 8,660,323, 8,824,747, 8,855,422, 9,076,029, 9,437,035, and 10,733,797**.

LinkedIn Profile: **https://linkedin.com/in/bfree** Portfolio: **https://graphcomp.com/bfree**

Technologies

ML & AI: HAAR Cascades, TensorFlow, LLMs, 3D Pose Estimation, Correlation and Clash Detection
Cloud (AWS): EC2, S3, RDS, Bedrock, security/crypto
Cross-platform development: Linux:Ubuntu/RPiOS, MacOS/iOS, Android, Windows
Embedded: 3D/Thermal Sensors, IoT Devices, SBC/Raspberry PI, FPGAs, Inference Chips
Languages: C/C++, Objective-C, C#, Java/JNI, NodeJS, Object-oriented Perl, x86 assembler
2D/3D Imaging/Video: OpenGL/WebGL/GLSL, Three.JS, GLTF/OBJ/PLY/DICOM, OpenCV
Math Libs: large number, 2D/3D vectors, matrices, dot/cross/inversion/etc
Crypto: Hashes, block cyphers, implemented first commercial SSL client/server lib
Networking: Bluetooth/BLE, UPD/TCP, WebSockets, IPX
DB: MySQL, Postgres, SQLite, MS SQL Server

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Employment History

- **BuildTrue - VP of Engineering** **2024-present**
  Developed a scalable/distributed/optimized Cloud-based 3D clash-detection system exposed via our AI agent for large scale facilities management. Drove our AI product features.

  Hands-on development in NodeJS for our AWS Cloud service, C# for our 3D CAD plugin. Drove our 3D architecture using: Google Model-Viewer, WebGL/Three.js/ GLTF/OBJ. Developed an LLM-based multi-lingual interface for natural language queries such as: "Find all clashes between walls and ducts using a 20mm tolerance" through multiple 3D models in large infrastructure projects (hospitals, airports, etc).

  Innovation: developed a highly optimized 3D collision/clash detection system with boolean intersections and material tolerances for clash-pairs across multiple AutoDesk Revit 3D CAD models.

- **AEMASS - VP of Engineering** **2020-2024**
  Developed a Cloud system and IoT station with Kinect and iPhone 3D cameras, for 3D processing and download to mobile apps for healthcare analysis. Developed a modular/extensible pipeline for our 3D AI processing systems.

  Hands-on development in NodeJS for our AWS Cloud and IoT kiosk, C++ for our imaging engine. OpenGL/WebGL/Three.js/GLTF. Drove architecture for distributed teams in the US and Taiwan.

  Innovation: developed a 3D streaming server and 3D/IR/Depth imaging algorithms.

- **BELLUS3D - Director of HW/SW Engineering** **2019**
  Designed/built a NodeJS-based IoT device that connects 7 of our own 3D sensors, and through AI aggregated/stitched our IR scans to capture a photo-realistic color 3D model of face/heads; won Best of Show at the 2019 Visual 1st Awards. Managed 5 hw/sw engineers in the US and Taiwan.

  Hands-on development in NodeJS, OpenGL/WebGL for our IoT device, Android/ Javascript development for our 3D sensors, and C++ for our hotspot management system.

  Innovation: I created an algorithm to auto-discover sensor placement within our multi-camera array.

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- **SKUR - Sr Computer Vision Engineer** **2018**
  10 month full-time contract through my company Graphcomp.

  We created a 3D Lidar-based system to measure differences between large-scale construction (airports, refineries, etc) vs their CAD designs - identifying missing components, unplanned additions, relocated or deformed components.

  Innovation: I developed a Computer Vision process that automatically aligns 3D Lidar point-cloud scans with CAD vector models - independent of scale, rotation, and translation. I also developed our Node/Three.js Cloud and Browser rendering/viewing systems.

- **NAKED LABS – VP of Software Engineering** **2015-2018**
  Personally designed/developed all our Cloud, IoT, and Mobile software for the first year and a half. We completed our first working 3D body scanner with 8 employees within a year, leading to significant pre-sales orders and our Series A funding. Shipped out first mass-produced product in 2018. Drove our 3D AI pipeline for capturing/processing 3D scans to IoT, Cloud Service and Mobile App.

  Hands-on development for Cloud (AWS, DB/SQL, Linux, NodeJS), IoT (Linux, C/C++, NodeJS), Mobile (iOS/Obj-C, Android/Java, portable C/C++, OpenGL), WiFi/UDP/TCP/SSL, Bluetooth/BLE.

  Innovation: I created a new/accurate 3D hit-test for body-part detection on mobile/touch devices, a 3D body-kerning system for displaying arrays of body scans, and a framework of NodeJS modules shared between our Cloud and IoT applications.

- **MEDCHROMA – Founder / CTO** **2014-2015**
  Created an online 3D Computer Vision service and mobile app that converts 2D grayscale CT/MRI scans into interactive, color 3D views. Developed a browser-based DICOM parser that allows users to preview 3D CT/MRI scans, pre-process, dramatically reducing upload bandwidth/time.

  Innovation: I created a new, GPU-optimized ray caster that segments body materials, and renders 2D CT/MRI scans in realtime 3D color for Cloud, Mobile, and browser apps. Developed an interactive, optimized 3D DICOM viewer in AngularJS.

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- **JABICO – VP of Engineering** **2013-2014**
  1 year full-time contract through Graphcomp.

  We built custom AWS/Cloud solutions for clients such as Hyundai, and IoT solutions for various video-production firms.

  Innovation: I developed a video processing system for IoT devices.

- **GRAPHCOMP – Proprietary Computer Vision Development** **2010-2013**
  Developed proprietary algorithms for GPU-optimized replacement for Viola-Jones; created a face detector significantly faster/smaller than OpenCV's. Developed Machine Learning tools for HAAR Cascades. Developed new perceptual color models that improved compression and object detection. Created a faster ray-caster, later used by MedChroma. Various mobile apps.

- **APPLE – Senior Face Recognition Researcher** **2009-2010**
  Responsible for driving face recognition and related Computer Vision technologies for various groups at Apple.

  Significantly improved our face/presence detection/matching/clustering technologies. Unified face recognition technologies between multiple Apple desktop products. Created an Apple benchmarking standard for evaluating face recognition tech and ML training.

  Innovation: awarded 14 Computer Vision patents authored solely by me.

- **BLUE PLANET - Sr Computer Vision Engineer** **2009**
  Full-time contract through Graphcomp.

  Innovation: I developed algorithms and an app to automatically decimate a large archive of photos into a specified album size, sorted by category (people, outdoors, indoors, sky, foliage, water), selected/ordered by the *best* photos of each category, filtering out duplicates and similar photos. Managed 15 engineers.

  I was originally brought in to replace their VP of Engineering; at the end of the project I was offered the position of CEO. Instead, accepted offer from Apple.

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- **EBAY/PAYPAL - Sr 3D Imaging/Animation Engineer** **2008-2009**
  Contract through Graphcomp.

  I was asked to create eBay/PayPal's first iPhone app, including a 3D OpenGL animation engine with audio - to demo within 4 days at Apple's WWDC iPhone 3G launch. I had very little MacOS experience, and had never touched an iPhone; I delivered a working iPhone app by early Monday morning in time for their demo. Continued to contract with them for about a year.

  Innovation: I developed a 3D GPU-based animation engine for Mobile apps.

- **APPSCIO – CTO** **2007-2008**
  Service startup for Actionable Video Intelligence.

  We correlated face recognition with speaker/voice recognition to significantly improve people recognition/tracking for certain government agencies.

  Innovation: developed a cross-platform, abstracted pipeline that supported modular plugins for correlated video object/people tracking, audio speaker recognition, and events like badge swipes.

- **FABRIK – VP of Engineering / Technologist** **2005-2007**
  Founding member of a tech startup, which created a new embedded media appliance - with just 4 engineers (self included) within 4 months. OEM'd by Maxtor/Seagate as 'Fusion' in Q3 2006.

  Innovation: I created new algorithms for optimized visual searches and sorting - based on spatial/color segmentation relationships.

- **ADOBE – Sr. Engineering Manager / Sr. Computer Scientist** **2002-2005**
  Managed 20+ software engineers, in San Jose and Seattle, plus dotted-line reports in India.

  Established an Adobe-wide infrastructure to support "*mix&match suites*" – used for Adobe's **Creative Suites** and **Video Collections** products.

  Innovation: I designed/implemented a scalable image server architecture for an Adobe photo-sharing seed project.

- **CLUB PHOTO – VP of Engineering** **2000-2002**
  Led **Club Photo** to become the first profitable online print fulfillment company, during a time of industry consolidation in 2001. Managed 10+ engineers in San Jose, Austin, and Taiwan.

  Led teams in San Jose and Austin to develop e-commerce services, print lab systems, and desktop/handheld products.

  Innovation: I developed new auto-enhancement imaging filters.

- **PHOTOLOFT – VP of Production and Engineering** **1999-2000**
  Transitioned **PhotoLoft**, the first publicly traded photo-sharing company, from a dot-com advertising model – to a scalable B2B photo-ecommerce Application Service Provider model – resulting in eventual acquisition by **Canon USA**.

  Managed 10+ engineers, web designers, QA, support and IS.

  Innovation: I developed a porn-filtering system, and all our image processing technologies for online/printed photo-cards/books.

- **ISD CORP – Director of Engineering; managed 20 hw/sw developers** **1998-1999**
- **LIVE PICTURE – Sr Manager for 3D Applications; managed 50 developers** **1997-1998**
- **NETMANAGE – Sr Ecommerce Systems and Crypto Engineer** **1995–1996**
- **BORLAND INTERACTIVE – Senior R&D Engineer for OBEX** **1994–1995**
- **NOVELL / STI – Cross-platform Graphics and Networking Architect** **1990–1994**
- **MCDONNELL DOUGLAS – Lead Engineer for 2D/3D CAD Technologies** **1984–1986**
- **DATA GENERAL / SYSCOMP – Systems Engineer for 3D Technologies** **1983–1984**
- **GRAPHCOMP – Founder & Principal Consultant for 2D/3D/Imaging** **1982–Present**