Shahzad Kirmani

246 Daniel Webster Hwy., #1223, Merrimack, NH 03054
skirmani@yahoo.com
207.200.5868

Vision systems and software engineer and executive with strong hands-on multidisciplinary technical knowledge and proven leadership ability. Produced more than 1.2 million lines of code, more than 100 opto-mechanical designs, spanning over 16 products.

Apricart, Inc., Portland, ME (5/17 – Present)

CTO / Principal Engineer

- Developed core object recognition technology based on multi-dimensional parametric clustering machine learning.
- Leading engineering team designing software, ruggedized housings, high efficiency computation engines and overall system integration design.
- Involved in securing IP through several patent applications and modular encryption techniques.

L3 Technologies, Inc., Insight Warrior Systems, Londonderry, NH (8/17 – Present)

Principal Systems Engineer, Consultant

- Algorithm selection and enhancements for image feature extraction, description and matching used in weapon scope and warrior goggle real-time target acquisition.
- Feature extraction algorithm optimization for processor and FPGA implementation to minimize power requirements in the field. i.MX7 processor and Xilinx Zynq 7020, UltraScale+ evaluated.
- IMU, compass, gyroscope sensor fusion and image correlator-based error correction to achieve optimum feature matching and target acquisition power performance.

VisionMaster, Inc., Portland, ME (3/96 – Present)

President / Principal Engineer / Director of Technical Sales

- Next generation, massively parallel 3D imaging and measurement system with an effective resolution of up to 1.3 gigapixels running on up to 100 independent Snapdragon 802 SoCs.
- Machine vision architecture for seamless functioning of cameras, optics, lighting and software to produce 3D images for an industrial high precision inspection product.
- Algorithms for feature segmentation and background separation in 3D images.
- 3D visualization library using OpenGL using buffer objects for fast data updates of LOD pyramids.
- Contextual SPC chart data drill-down and efficient data structures and database queries for nested chart updates of voluminous statistical data.

- Processing algorithm parallelization using OpenCL to achieve up to 25X performance gains on mixed CPU/GPU platforms. OpenMP and Intel TBB for CPU execution enhancement.
- Image processing algorithms using OpenCV for texture recognition by using arbitrarily shaped, non-rectangular kernels.
- Parametric classification algorithms to match components from existing object libraries using OpenCV sequences.
- Human and vehicle segmentation and tracking algorithms in a surveillance application using gait and stride vectors after basic classification using Haar classifiers.
- GSL, BLAS, Boost used for matrix manipulation, non-linear optimization, best fit and general mathematical functions.
- US-based manager for off-shore 30+ person engineering team developing integrated software, hardware and mechanical system designs. Liaised with sales, marketing and support.
- Multi-threaded 4-axis motion system API. Gigabit Ethernet, RS-485 interface.
- Proprietary real-time data transmission protocols based on standard UDP Ethernet packets for high resolution cameras using WinPCap library.
- Imaging system API development for cameras based on USB and Gigabit Ethernet interfaces.
- Camera system development with USB and GigE interfaces, Micron/Aptina CMOS sensors and Xilinx Spartan-3 FPGAs.
- Software security schemes based on AES encrypting. SSH/SSL protocols for remote, multi-layered authentication of the software.
- ERP system implementation. Open source ERP customized in PHP.
- Agile methodology while still emphasizing some traditional aspects of project management.
- First benchtop Moiré interferometry based 3D precision measurement system in the world. Successfully launched the product in 1998.
- Handled most aspects of software development. Windows API to develop the software user interface.
- Mechanical systems design using AutoCAD. Production supervision of mechanical system components.

Consulting Assignments

Position Imaging / 3D Wifi, Inc., Portsmouth, NH (3/16 – 5/17)

- Optimized cross-functional engineering matrix-based team allocation for disparate development paths like wireless, imaging, mechanical, software and firmware.

- Accelerated existing code based on OpenCV to increase overall throughput from 3-5 fps to more than 15 fps on dense 3D point clouds. This was achieved by implementing significant changes to the existing algorithm logic and fine-tuning parameters of an existing nearest-neighbor search library.
- Studied and developed optimizations of nearest neighbor point search algorithms for multi-core and GPU processing in 3D point clouds using OpenCL.
- Developed a fast OpenGL based method to determine real-time object occlusion. GL scenes rendered into frame buffers for subsequent object occlusion determination using OpenCV.

Navico, Inc., Tulsa, OK (9/13 – 7/15)

- Real-time clustering, segmentation and surface reconstruction of massive point cloud data from sonar returns using PCL, Qhull and OpenCV.
- Feature and object isolation and classification in under-water sonar point cloud.
- Contributed to the overall architecture and design of the new 3D sonar product.
- Optimized computations and assisted with cross-platform porting to embedded Linux on ARM9 devices.

SRI International Sarnoff, Princeton, NJ (5/13 – 8/13)

- Efficient data rendering, transfer and optimized depth map processing of high-resolution UAV images using OpenGL.
- Speed optimization of large code-base with extensive use of OpenCV, Intel TBB, IPP and MPI.
- Parallel computing performance and processor load distribution analysis using Intel VTune and embedded performance profiling.
- TI DSP functionality porting, integration using Code Composer and inline debugging.

Dayton Hudson Corporation, Minneapolis, MN (1/97 – 4/99)

- Texas Instruments' IEF for warehousing design of a 17 TB employee payroll and benefits DB2 database.
- Complex Tesseract report design to correlate and mine employee benefits data for deep trends.

Racotek, Inc., Minneapolis, MN (3/95 – 3/96)

Senior System Engineer

- Full wireless middle layer data protocol for transportation companies with DB2 database running on AS/400 on the back-end and Symbol handheld communications devices on the front-end. Middleware developed using multi-threaded C on OS/2 systems.

CyberOptics Corp., Minneapolis, MN (3/90 – 3/95)

Research Engineer

- Several optical systems using OSLO and Zemax for telecentric and concentric viewing of laser scanner fields of view.
- Highly optimized image processing and mathematical modeling algorithms including a very fast C implementation of a pyramid-based image correlation technique.
- Initial proof of concept of Moiré white light measurement processing using MathCad models.
- Software/image processing tools used to build laser section microscopes using C/Watcom and Numerical Recipes libraries.
- Video framegrabbers interface software for real-time imaging.
- Several computational libraries for integrating with a LabVIEW front end used for product prototyping.

Education

M.S.E.E. (Signal Processing and Optics), **University of Minnesota**, Minneapolis, MN (90-91)

Graduate Coursework (Signal Processing), **Drexel University**, Philadelphia, PA (89-90)

B.S. (Electrical Engineering), **King Fahd University of Petroleum and Minerals**, Dhahran, Saudi Arabia (85-89)

Languages/Tools

Expert:	C, OpenCV, OpenGL, OpenCL, Windows API
	Visual Studio, Eclipse, MinGW, Borland, SVN
Strong:	C++, Qt cross-platform, Boost, Linux, Code Composer Studio
	Intel TBB, IPP, MKL, MPI, OpenMP, VTune
	CMake, CygWin, GIT, VSS, AccuRev, LabVIEW
	Gnu Scientific Library (GSL), Point Cloud Library (PCL), Qhull Library
	MathCad, Xilinx Vivado/HLS/SDSoC, Protel DXP
	Open source utility libraries (SSH, SSL, AES, Blowfish, 7z, zip, PCAP)
	Pro Engineer Wildfire/Creo, AutoCAD, Oslo, TracePro, IEF
	Ethernet/GigE, USB, RS-232/RS485, IEEE 488.2/GPIB, MODBUS
Knowledge:	MySQL, DB2, SQLite, PHP, ScrumWorks, Matlab, GLSL, CUDA