



Scott Mudge

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Software and Research Engineer with 8+ years of professional and 14+ years of personal experience in software development and team leadership for a wide variety of applications, including 3D scanning and reconstruction, advanced medical imaging, embedded control systems for autonomous medical hardware, and research.

Self-driven, autodidactic, and with a strong passion to both intuitively solve problems and learn new skills, I strive to overcome the many challenges faced throughout a career in software development and systems engineering. This drive has provided me the ability to face new problems, questions, and unknowns with the confidence, openness, and self-reliance that makes me an invaluable asset to any team.

QUALIFICATIONS & SKILLS

- 8+ years professional experience in software engineering, debugging, and reverse engineering, applied algorithm development for computer vision, machine learning, and robot control/kinematics, and UX/UI development.
- Additional knowledge and experience in hardware and embedded systems development, CAD/CAM/CNC-based manufacturing and rapid prototyping techniques, and product design.
- Worked closely with researchers and academic teams to translate research and experimental work to production-level code and applications.
- Directed two teams of 4 developers as lead developer. Responsibilities included weekly code review, task delegation and organization, development life cycle management, and code integration and testing. As lead, I acted as the interface between upper management and the software team.
- Extensive experience with all areas of product development life cycle, including initial planning and design, the development cycle, first deployment and CI/CD, and product lifetime support. I have designed, integrated, and developed distributed management systems to provide broad support to deployed products, including analytics/telemetry, bug reporting, update deployment, and distributed/cloud data services.

Please find a more comprehensive list of platforms, languages, libraries/APIs, and toolchains with which I have experience on the final page.

EXPERIENCE

SENIOR SOFTWARE ENGINEER

3DISC Americas – Sterling, VA

May '17 – Present

- Senior developer working on software powering medical devices integrating stereoscopic vision, 3D reconstruction, and 2D/3D UI design, targeting applications in dentistry and radiography.
- Team lead for project to develop software powering 3D dental scanner. Tasks included assessment of requirements, planning and lifecycle outline, team organization, task management, and much of the core development.
- Developed products using advanced computer vision technologies, providing real-time 3D reconstruction and rendering of surface topographies using stereoscopic vision, powered by CUDA and C/C++.

RESEARCH SOFTWARE ENGINEER (LEAD)

October '15 – May '17

Sheikh Zayed Institute for Pediatric Surgical Innovation – Washington, DC

- Developed and implemented image-processing algorithms (Spatial Laser Speckle Contrast Imaging, sLSCI) into CUDA-powered library to segment and quantize flow of macro- and microvascular structures in living tissue (see publication, patent pending).
- Implemented novel motion planning and kinematic control of 8-DOF robotic suturing tool for autonomous surgical tasks.
- Designed and developed integrated touch-based control software for the management and real-time display of multiple imaging systems (polarimetric, hyperspectral, NIR, and sLSCI), robotic hardware interfaces, and surgical environments (OpenGL, X11, Linux)
- Managed development team to collectively meet deadlines and solve more difficult problems affecting productivity.

PRODUCT ENGINEER

January '14 – October '15

Toomey Enterprises, D.B.A Wonder Emporium – Kissimmee, FL

- Lead software development for embedded display control systems (ARM-based) and mobile applications (Android/iOS) for products targeting entertainment and hospitality industries.
- 3D modelling, structured light scanning, and rapid prototyping of engineered products and parts.
- Designed, tool-pathed, and machined parts from client drawings, in a variety of materials (wood, PVC, aluminum, solid-surface, stone, steel, etc.)
- Design and construction of custom CNC controllers for multi-axis control (2.5, 3, 4, and 5-axis).
- Managed, operated, maintained, and repaired CNC mills, lathes, and hotwire cutters.

PUBLICATIONS

Jaepyeong Cha, Aline Broch, Scott Mudge, Kihoon Kim, Jung-Man Namgoong, Eugene Oh, and Peter Kim, "**Real-time, label-free, intraoperative visualization of peripheral nerves and micro-vasculatures using multimodal optical imaging techniques,**" *Biomed. Opt. Express* 9, 1097-1110 (2018).

Accurate, real-time identification and display of critical anatomic structures, such as the nerve and vasculature structures, are critical for reducing complications and improving surgical outcomes. Human vision is frequently limited in clearly distinguishing and contrasting these structures. We present a novel imaging system, which enables noninvasive visualization of critical anatomic structures during surgical dissection. Peripheral nerves are visualized by a snapshot polarimetry that calculates the anisotropic optical properties. Vascular structures, both venous and arterial, are identified and monitored in real-time using a near-infrared laser-speckle-contrast imaging. We evaluate the system by performing in vivo animal studies with qualitative comparison by contrast-agent-aided fluorescence imaging.

EDUCATION**UNIVERSITY OF WASHINGTON – SEATTLE, WA**

2010 – 2012

Environmental Science

UNIVERSITY OF FLORIDA – GAINESVILLE, FL

2008 – 2010

Wildlife Ecology

PROFESSIONAL SKILLS

Platforms

- Microsoft Windows
- Linux/UNIX (POSIX)
- Embedded (ARM/Linux/Windows/RTOS)

Languages

- C/C++
- Java
- C#
- CUDA
- Python
- x86/x64 Assembly

Toolchains/Tools

- GNU GCC
- CMake/Scons
- Valgrind
- Bash
- Visual Studio
- Git/Mercurial/SVN
- NVIDIA Nsight
- Vim
- Hex-Rays IDA Pro
- GDB/WinDBG/x64dbg
- Eclipse
- JetBrains Suite (Pycharm, CLion, etc)

Libraries/APIs

COMPUTING, MACHINE LEARNING, AND PARALLELISM

- CUDA (CuBLAS, CuFFT, CuDNN, NPP)
- TensorFlow
- OpenCL
- Keras
- OpenMP
- Torch

3D GRAPHICS

- OpenGL
- GLFW
- VCG
- DirectX
- VTK
- Eigen
- Shaders (GLSL/HLSL)
- SDL
- GLM

GUI

- Qt
- TKinter
- GTK
- ImGui
- Win32/MFC
- Custom Portable (OpenGL based)

COMPUTER VISION & ROBOTICS

- OpenCV
- TracIK
- QHULL
- ElasticFusion
- ROS
- Orocos/KDL
- KinectFusion
- FLANN
- ViSP
- PCL
- libSGM

NETWORKING & UTILITY

- ZLib/LZ4/GZip
- Cereal
- CANopen/CANbus
- Boost
- ZeroMQ
- PNG/TIFF/JPEG
- Protocol/Flat Buffers
- YAML/XML/JSON
- NVAPI

OPEN-SOURCE CONTRIBUTIONS

- TensorFlow
- ImGui
- Gainput
- Mido
- WDL-ol
- libSerialPort
- Asciiatics