OKSI specializes in the development of turn-key electro-optical sensor systems covering the UV, VNIR, SWIR, MWIR and LWIR. Primarily, OKSI develops systems that combine imaging and spectroscopy, including the mechanical assembly (high vacuum dewars for cryogenic operations), electronics, optics, computer interface and signal acquisition, algorithms for signal and data processing. OKSI excels in R&D projects where off-the-shelf solutions are unavailable.

1. Intelligent Imaging and Vision Technology

OKSI is seeking a team of 3 CSE students to tackle three separate tasks this summer. The first two tasks are highly related and if you have the skills required, please apply. The third task requires unique skills. Please be specific in mentioning the skills you have for task #3. Ideally, we would like to hire three students who have the skills for all three.

Task 1: Data being captured from various cameras (via Camera Link, Firewire, GigE, USB, Serial LVDS, etc.) is being time-stamped (IRIG/GPS/computer time, depending on configuration), saved to drives (including RAID arrays), and processed with our algorithms. Currently, the image processing is CPU-intense. Project would involve moving the image processing away from the CPA and to a GPU, including massively parallel processing GPUs such as the latest from AMD and nVidia. Additionally, efficiency aspects of the project could include taking better advantage of the PCIe bus (may become necessary if processing bottleneck is reduced).

Task 2: Project related to same system described above, project would involve improving the computer-based data acquisition system to increase the speed at which data can be transferred to storage. Current bottlenecks will need to be explored and resolved.

Task 3: FPGA development- This would involve interns working to implement and port algorithms developed in high level languages to a Xilinx FPGA for real time processing of streaming video data. The algorithms include image fusion of multiple cameras, anomaly detection in hyperspectral imagery, and aerial scene analysis with optical flow (or other tracking algorithms). Among the extra objectives, we would like to create a fused-image video-output for display on a computer monitor and be able to stream raw imagery and processed data to hard drives.

Essential Skills for Tasks 1 & 2:

- Experience with GPU programming
- Knowledge of image and/or signal processing
- Strong background in object-oriented programming (C++ preferred)
- Understanding of data acquisition process

Essential Skills for Task #3:
- Experience with FPGA programming (experience with optimization of FPGA a plus)
- Knowledge of or experience in various image processing algorithms
- Any embedded programming experience is a plus.

Desirable Skills for all 3 Tasks:
- Ability to work independently is critical
- Excellent communication skills
- The desire to learn new technical tasks with which they might not be comfortable.

Seeking 3 seniors and graduate students in CSE.

Applicants must be US Citizens or permanent residents.

Location: Torrance, CA