John Kua

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Specialties Robotic perception, with emphasis on laser and vision based algorithms for navigation, modeling, and recognition.

Education

May 2008 Robotics Institute / Carnegie Mellon University Pittsburgh, PA
Master of Science, Robotics (3.89 GPA)
Thesis: "Pose Estimation Using Starfield Occlusion"
Advisor: Professor William "Red" Whittaker

May 2006 Rensselaer Polytechnic Institute Troy, NY
Bachelor of Science, Electrical Engineering
Graduated summa cum laude (3.98 GPA)

Publications

J. Kua, N. Corso, A. Zakhor, "Automatic Loop Closure Detection Using Multiple Cameras for 3D Indoor Localization," IS&T/SPIE Electronic Imaging 2012, Burlingame, California, January 22-26, 2012.

T. Liu, M. Carlberg, G. Chen, J. Chen, J. Kua, A. Zakhor, "Indoor Localization and Visualization Using a Human-Operated Backpack System," International Conference on Indoor Positioning and Indoor Navigation (IPIN), Zurich, Switzerland, September 2010.

G. Chen, J. Kua, S. Shum, N. Naikal, M. Carlberg, and A. Zakhor, "Indoor Localization Algorithms for a Human-Operated Backpack System", 3D Data Processing, Visualization, and Transmission (3DPVT), Paris, France, May 2010.

N. Naikal, J. Kua, G. Chen, and A. Zakhor, "Image Augmented Laser Scan Matching for Indoor Dead Reckoning," International Conference on Intelligent RObots and Systems (IROS), St. Louis, MO, October 2009.

Experience

2014 – present Berkeley Applied Analytics Arlington, VA
Senior Engineer
- DARPA SIGMA – Developing a city-scale radiation detector system utilizing networked sensors.

2012 – 2014 Lawrence Berkeley National Laboratory Berkeley, CA
Research Scientist
- Developed highly multimodal aerial and ground sensor platforms which fuse data from a wide range of sensors, including radiation detectors/imagers, visible/IR/ hyperspectral cameras, lidar, GPS, and IMUs.
- Developed scientific data curation systems to handle the large amount of data generated by such platforms.
- Led the Data Team for the Nuclear Security Technologies Group, tasked with developing and operating the aforementioned data collection platforms as well as the data ingest pipelines.

2008 – 2012 University of California, Berkeley Berkeley, CA
Research Scientist (Specialist, Step II)
- Indoor Modeling Project – Developed a multi-sensor system (cameras, lidars, IMU) for constructing 3D models of building interiors from a human-borne backpack platform. Maintained and extended the localization algorithms. Responsible for the mechanical and electrical design of the system, as well as the data collection software, including sensor interfacing and synchronization.

- Hindsight Project – Redesigned the Indoor Modeling project's backpack system for a rover platform. Lead engineer in the development of software for navigation as well as lidar point cloud reconstruction and analysis. Work performed for Army Research Labs' Vehicle Technology Directorate.
- Assisted in the writing of grant proposals and statements of work.

2008 – 2012 Signetron, Inc. Berkeley, CA

Consultant

- Developed a multi-sensor system (cameras, lidar, GPS) for building 3D models of building exteriors and detecting apertures from a vehicle platform. Responsible for the development of the aperture detection software.
- Led the development of software to reconstruct and analyze point clouds from vehicle-borne lidar, including object detection.
- Also developed software to perform surface triangulation and terrain classification of lidar data from both aerial and ground platforms.

2006 – 2008 Field Robotics Center / Carnegie Mellon Pittsburgh, PA

Graduate Research Assistant

- Developed a novel method for localizing a rover within a crater using starfield occlusion (PI: Red Whittaker)
  - Performed small-scale experiments to demonstrate the basic concept
  - Explored the theoretical limits of the method in simulation and developed methods to increase localization precision
- Developed a multi-laser light striper range sensor for the Penn State Electro-Optics Center (PI: Sanjiv Singh)
  - Created simulation software to explore various laser configurations
  - Ran field trials to test the sensor in outdoor settings and integrated with GPS navigation information to build terrain maps
  - Performed system calibration and component calibration
  - Performed bench tests of optical components
- Worked on the team designing Scarab, a proof-of-concept lunar rover for NASA (PI: Red Whittaker, David Wettergreen)
  - Developed a sensor plan, including sensor selection and mounting strategies

2000 – 2003 Capella Microsystems, Inc. San Jose, CA

IT Manager/Engineering Support

- Tested and evaluated PDICs (photodiode ICs), including building test jigs and writing test control software
- Maintained a network of 25+ PCs and printers
- Coordinated two relocations of the LAN, Internet, PBX/telco services
- Provided system support for Windows 2000 Professional and Windows 9x
- Created and updated product datasheets

1998 – 2000 Accel Power/Addonics Communications Fremont, CA

Design Engineer

- Designed, prototyped and debugged
  - Motherboard for a Windows-based Terminal – ART2000
  - Single-board industrial PC for a custom vending machine application
  - A number of controller boards for military computer applications
- Troubleshooter – was sent to identify problems on field units and determine if engineering changes were necessary

Eng. Tools Python, C/C++, MATLAB, OpenCV, fisheye & rectilinear camera calibration, Visual Studio, Linux, SVN, Git, LaTeX, LabView, OrCAD Capture, PADS PowerPCB, CAM350, SolidWorks

Skills Board-level electronics prototyping, Basic mechanical prototyping, Machine shop certification (basic skills: mill, lathe, bandsaw). Trained in the operation of Leica/Z+F HDS laser survey scanners and Applanix POS-LS inertial navigation systems. Familiar with the interfacing of Velodyne and Hokuyo laser range finders and Point Grey cameras.

Awards/ Honors

- 2006 Ricketts Prize Recipient – Rensselaer Polytechnic Institute
- Member of the Tau Beta Pi Engineering Honors Society
- Member of the Eta Kappa Nu Electrical & Computer Engineering Honors Society

Professional Activities Member of the Institute of Electrical and Electronics Engineers (IEEE)
Reviewer: IEEE Transactions on Automation Science and Engineering

References

Prof. Kai Vetter, Applied Nuclear Physics Program Head
Nuclear Science Division, Lawrence Berkeley National Laboratory

Dr. Daniel Chivers, ANP Nuclear Science Technologies Group Lead
Nuclear Science Division, Lawrence Berkeley National Laboratory

Prof. Avideh Zakhor, Qualcomm Professor of Electrical Engineering
EECS Department, University of California, Berkeley

Prof. William "Red" Whittaker, University Professor and Fredkin Professor of Robotics
The Robotics Institute, Carnegie Mellon University

Citizenship United States