Kiron Mateti, Ph.D.

Versatile self-starter with hands-on experience and understanding of robotics, computer vision, and control systems with proven track record of implementing high level algorithms on embedded hardware

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U.S. Citizen (Male)
linkedin profile

Summary of Qualifications

- Combined 5 years experience developing real-time, production-quality C/C++ software and hardware integration for computer vision applications using OpenCV
- Expert in analyzing data and prototyping algorithms in Matlab/Simulink and Python using OpenCV, numpy, pandas, matplotlib, and sympy
- In-depth knowledge of active/passive electro-optic and infrared sensors, object detection, localization, and tracking, and image and signal processing

Experience

Research and Development Engineer — January 2017 - Present

John Bean Technologies, Automated Guided Vehicles, Chalfont, PA

- Analyzed large datasets of fleet performance, error conditions, and product placement accuracy using Matlab and Python with Jupyter Notebooks
- Developed multiple sensing solutions using the SICK TiM561 2D LIDAR, including object detection and pose estimation, feature guidance, and obstacle detection
- Developed application software and diagnostic tools for the ifm efector o3d303 3D camera, running custom software, which detected pallets and storage racks
- Technical expert in multiple areas such as digital signal and image processing, computer vision, reference frame transformations, vehicle kinematics and dynamics, AC motor control, hydraulic controls and real-time and offline data analysis
- Worked with a small, fast-moving, and talented team that developed multiple software features concurrently using Git, JIRA, and Confluence

Research Scientist — June 2012 - January 2017

US Navy, Naval Surface Warfare Center (NSWC), Crane, IN

- Developed fusion video tracking software using Matlab Computer Vision Toolbox and Extended Kalman Filter, and implemented algorithms on NVIDIA Jetson TK1 embedded hardware utilizing CUDA C/C++ and OpenCV
- Analyzed, debugged, modeled and simulated electro-optic and infrared sensor system gimbal dynamics, control systems, and target geolocation and tracking for a number of Navy programs

DoD SMART Research Fellow — September 2007 - May 2012

The Pennsylvania State University, University Park, PA

- Modeled and simulated piezoelectrically actuated flapping wing mechanism including aerodynamic lift forces in Matlab/Simulink and validated model using experimental results in air and in vacuum
- Measured large wing angular positions using high speed stroboscopic photography and image processing using Matlab, and small signal response using a laser vibrometer

Education

Ph.D. in Electrical Engineering May 2012

Pennsylvania State University, University Park, PA

Dissertation Title: *Flapping Wing Mechanisms for Pico Air Vehicle Applications Using Piezoelectric Actuators* (pdf)

Summary of Skills

Real-Time C/C++ Development (4 years):

- Implemented computer vision and control system algorithms in Microsoft Visual Studio C++ for real-time operation, and developed offline unit test methods to use simulated or recorded sensor data to evaluate implemented algorithms
- Developed real-time embedded computer vision devices using NVIDIA Jetson TK1 to track on multiple video feeds using OpenCV libraries and network interface to gimbal control systems using CUDA C/C++ using Linux environment
- Developed optical data links using MSP430G2553 and MSP430F2619 devices using UART, IrDA, ADC, and DAC peripheral control with Android audio port interface

Python (4 years):

- Experience with Python and Jupyter Notebooks for symbolic math (sympy), data analysis and visualization (numpy, pandas, and matplotlib), and web applications (dash and plotly)

Matlab/Simulink (over 12 years):

- Developed extensive custom libraries using Object-Oriented Matlab to perform modeling and simulation, prototype computer vision algorithms, and deploy GUI applications
- Experience with the Computer Vision, Image Processing, Signal Processing, Optimization, Symbolic Math, Control Systems, and Compiler Toolboxes

Electronics and Hardware Debugging (15 years):

- Tested and debugged a broad set of electronic devices, at a micro and macro scale, using probe stations, multimeters, oscilloscopes, spectrum and impedance analyzers

Patents and Publications

- Lead inventor on Patents US 9,599,532, related to wearable optical communications devices, and US 9,602,203, related to vibration characterization of optical elements
- Published 13 articles in mostly IEEE and ASME journals and conferences, see (researchgate.net profile)

Community Service

FIRST Robotics Challenge Mentor September 2013 - June 2015

Bloomington High School South, Bloomington, IN

- Led and taught students LabView, C/C++, I2C, SPI, Ethernet, PWM communication and control on a RoboRIO, a Xilinx FPGA and dual-core ARM Cortex-A9 processor to program a semi-autonomous robot for national competition