**Kiron Mateti, Ph.D.**

Versatile self-starter with hands-on experience and understanding of vehicle modeling, simulation, and control with track record of implementing advanced algorithms for real-time applications

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| 38 Highland Drive | kiron.mateti@gmail.com | U.S. Citizen (Male) |
| Telford, PA 18969 | 937-572-9655 | [linkedin profile](http://www.linkedin.com/in/kiron-mateti-b691152) |
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**Summary of Qualifications**

* Over 12 years combined experience in kinematic and dynamic modeling, simulation, and control of a broad set of electro-mechanical, hydraulic, and autonomous systems
* Expert in active/passive electro-optic and infrared sensors, object detection, localization, and tracking, and image and signal processing
* Experience prototyping algorithms in MATLAB/Python, implementing in real-time, production-quality C/C++

**Experience** **Research and Development Engineer** January 2017 - Present

John Bean Technologies, Automated Guided Vehicles, Chalfont, PA

* Modeled forklift vehicle pitch over stability for emergency braking scenarios with dependence on load height and slip conditions
* Modeled longitudinal dynamics with AC motor control, and developed and improved lateral steer control law with linearized state space model
* Developed multiple perception solutions using the SICK TiM561 2D LIDAR, including object detection and localization, feature-based guidance, and pose estimation
* Experience using Linux, ROS, and RVIZ to interface with the ifm efector o3d303 3D Time of Flight camera, and visualize detected pallets and storage racks
* 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 a system identification application in MATLAB to estimate the linearized inertia and stiffness matrices of a gimbaled electro-optic sensor
* Developed visible and infrared 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

* Developed a nonlinear model and simulated a 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 UsingPiezoelectric Actuators [(pdf)](http://www.mne.psu.edu/mrl/theses/mateti.pdf)

**Summary of Skills**

**MATLAB/Simulink (over 12 years):**

* Developed extensive custom libraries using Object-Oriented MATLAB to perform modeling and simulation, prototype computer vision algorithms, and log playback
* Expert in analyzing large test datasets, communicating with external devices, and creating visualizations to monitor system performance
* Experience with the Computer Vision, Image Processing, Signal Processing, Optimization, Symbolic Math, Control Systems, and Compiler Toolboxes

**Real-Time C/C++ Development (5 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

**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)

**Electronics and Hardware Debugging (15 years):**

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

**Patents and Publications**

* Lead inventor on Patents [US 9,599,532](https://patents.google.com/patent/US9599532), related to wearable optical communication devices, and [US 9,602,203](https://patents.google.com/patent/US9602203B2/en), related to vibration characterization of optical elements
* Published 13 articles in mostly IEEE and ASME journals and conferences, see [(researchgate.net profile)](https://www.researchgate.net/profile/Kiron_Mateti)

**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