Gopi Krishna Tummala

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Summary

Highly motivated software developer with interests in designing algorithms related to Computer Vision, Machine Learning, Deep Learning, Mobile systems and Autonomous vehicles. Skilled in programming with C++ (3+ years), Python (7+ years) Java (2 years), HTML, CSS, JavaScript and MySQL.

Education

1.	IIT, Madras, India	Electrical Engineering.	B. Tech	3.6	May 2012
2.	Ohio State University, Columbus	Computer Science	MS	3.6	May 2018
3.	Ohio State University, Columbus	Computer Science	PhD	3.6	Aug 2019

Work Experience

1.	Senior Systems Engineer	Qualcomm Research, San Diego, CA	Jan '19 – Present
2	Engineering Intern	Qualcomm Research, San Diego, CA	May '18 – Aug '18
2.	Research Assistant	Ohio State University, Columbus, OH	May '13 – Dec'18
3.	Research Intern	Microsoft Research, Bangalore, IN	May '16 – Aug'16
4.	Teaching Assistant	Ohio State University, Columbus, OH	May '13 – May'15
5.	Software Analyst	Standard Chartered Bank, Chennai, IN	Jun '12 – May'13
6	Project Intern	Tata Elxsi Chennai, Chennai, IN	May '11 – Aug'11

Technical Skills

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- Languages and Scripting: Python, C/C++, Java, SQL, Shell/Bash, HTML/CSS.
- Others: GNU Radio, NS3, Arduino, Wireshark, SUMO, OpenCV, ROS-Framework, TensorFlow, Keras, XGBoost, MATLAB, SUMO.
- Project and Software Managements: JIRA, Git, Fisheye

Software and Research Projects

1. [**2019 to Now**] Designing machine learning based algorithms for Behavior Planning and Prediction of Autonomous vehicles.
   a. Developed behavior prediction algorithms; Implemented end-to-end system and demonstrated superior performance. (*prototyping in python and implemented end-to-end system in C++*).   [Aug 2019 - Now]
   b. Written simulation framework for developing Behavior Planning and Prediction algorithms. (*Python, ROS and C++ experience*).   [Feb 2019 – Aug 2019]
   c. Designed a framework for analyzing the driving behavior by selectively aggregating the driving events. (*Python based analysis pipeline*).   [June 2018 – Aug 2019]
   d. Developed algorithms which are responsible for yielding to the cut-in vehicles for Autonomous vehicles. (*ROS and C++*).   [Aug 2019 – Oct 2019]
   e. Developed noise models for the sensors-fusion output. Developed ML based learning models which can synthesize artificial noise.   [May 2018 – Aug 2018]

2. [**2013 to 2018**] Advancing Vehicular Navigation and Manufacturing by Exploring Location services. (Supervised by Prasun Sinha and Rajiv Ramnath, The Ohio State University).

    a. Designed a system *DashCalib* for hands-free Dashboard camera calibration. (*Python based prototype and Android, CV based app design*)
    b. Designed a system *VMaps* for generating Local Vehicular Neighborhood Map with Frequency-Pair Analysis. (*GNU Radio Python wrappers, MATLAB data processing pipeline*)
    c. Designed a system *Soft-Swipe* for Enabling High-Accuracy Pairing of Vehicles to Lanes using COTS Technology. Real-time system implemented in C++ (Patent bought by Honda)
    d. Designed a system *RoadView* for viewing the Road Ahead through Collaboration of vehicles and improves vehicles sensed by a factor of 1.8x. (*Implemented in C++ using NS3, SUMO simulator libraries*).
    e. Designed a system *RoadMap* for mapping vehicles observed over a dashboard camera to respective IP-Addresses. (*Implemented in C++ using NS3, SUMO simulator libraries*).

3. [**Summer of 2018**] Behavior planning and prediction research for Autonomous vehicles (Supervised by Monu Surana, Ahmed Sadek, Arunandan Sharma and Feng Han Qualcomm, San Diego, CA).
    a. Developed different concepts to evaluate the behavior of Autonomous vehicles.
    b. Developed a VIRES Virtual Test Drive (VTD) based autonomous vehicle simulator to pipeline testing of different behavior planning and prediction algorithms. (*Implemented in python*).
    c. Designed calibration error, sensors fusion noise models based on several real-world driving runs of Qualcomm autonomous vehicle.

4. [**2016 to 2017**] Designing Automatic Traffic Camera calibration techniques. (Supervised by Ramjee Ramachandran, Ganesan Ramalingam and Prasun Sinha, Microsoft Research, India)
    a. Designed a scalable system AutoCalib for hands-free traffic camera calibration with speed estimation errors of <10%. (*Python based implementation running on azure*)

5. [**2016 to 2017**] Indoor Navigation and sensing solutions for People with Visual Disabilities. (Supervised by Prasun Sinha The Ohio State University)
    a. Designing a system *CaneScanner* for low powered object detection using smart white canes. (*Implemented using Raspberry Pi and OpenCV*)
    b. Designed a system Vision-Track for accurate Indoor tracking of a moving camera with < 3% tracking errors. (*Android and OpenCV integration*)

6. [**2013 to 2014**] Implementation and Evaluation of Wireless cutthrough routing. (Supervised by Kannan Srinivasan, The Ohio State University, USA)
    a. Implemented Full-Duplex analog and digital cancellation modules on NI PXI.
    b. Designed a large-scale wireless network simulator for testing different routing algorithms based on real world channel traces and interference models.

7. [**2011 to 2013**] Efficient algorithms for computing Null space of Block Convolution Matrix. (Supervised by K. Giridhar Department of Electrical Engineering, IIT Madras, India)
    a. Designed efficient algorithms for computing Null-Space of MIMO-OFDM channel matrix (block convolution matrix) exploiting its special structure.
    b. Reduced matrix inversion run-time complexity from cubic order to linear.

8. [**2011 to 2012**] Run-time optimization for LTE Downlink (PDCCH) blind decoding problem (Supervised by Pradeep J. R, Tata Elxsi, Chennai, India)
    a. Surveyed LTE protocols and identified the bottleneck runtime problems for the LTE stack.
    b. Designed optimal run-time algorithms for Downlink Control Channel (PDCCH) blind search and DCI coding problem (carrier aggregation problem).

Honors

1. **Best paper awards:** ACM BuildSys 2017, IEEE MiSeNet 2018
2. **Best demo awards:** ACM BuildSys 2017
3. **NSF Travel awards**: ACM SenSys/BuildSys 2018, IEEE SECON 2017
4. **Royalty:** Received 40% share of royalty awarded by Honda North America.
5. **Merit Scholarship:** IIT Madras Merit cum Means (MCM) Scholarship (2008 -2012) Award. KKR Educational Intuitions Merit Scholarship, top 50 of the state Andhra Pradesh, India (2006 – 2008).

6. **Academic ranks:** All India Rank-274 IIT JEE, Top 200 (top 1%) in Indian Physics & Math Olympiads.

Academic and Volunteer activities.

1. **Reviewer/TPC/PC:** IEEE/ACM Transactions on Sensor Network (TOSN) journal, IEEE/ACM Transactions on Mobile Computing (TMC) journal, Paper Management System Administrator for IEEE SECON 2016

2. **Positions of responsibility:** Mess Secretary, IIT Madras 2010-2011.Equipment Coordinator for SHASTRA, IIT Madras annual TechFest.

Thesis Publications.

1. Tummala, Gopi Krishna. *Automatic Camera Calibration Techniques for Collaborative Vehicular Applications*. Diss. The Ohio State University, 2019.

2. Tummala, Gopi Krishna. *Null Space of Channel Matrix*. Diss. Indian Institute of Technology (IIT) Madras, 2012.

Journal Publications.

1. Romil Bhardwaj (Co-Primary), Gopi Krishna Tummala (Co-Primary), Ganesan Ramalingam, Ramachandran Ramjee and Prasun Sinha, "AutoCalib: Automatic traffic Camera Calibration at Scale," in **Proc. of ACM TOSN** March 2018

Selected Conference Publications.

1. Gopi Krishna Tummala, Tanmoy Das, Prasun Sinha and Rajiv Ramnath "SmartDashCam: Automatic Live Calibration for DashCams", in Proc. Of **ACM IPSN 2019**

2. Gopi Krishna Tummala (Co-Primary), Romil Bhardwaj (Co-Primary), Ganesan Ramalingam, Ramachandran Ramjee and Prasun Sinha, "AutoCalib: Automatic traffic Camera Calibration at Scale," in **Proc. of Buildsys**, Delft, Netherlands, Nov 2017,

3. Gopi Krishna Tummala, Dong Li, Prasun Sinha, "Live View of On-Road Vehicular Information", **IEEE SECON 2017**

4. Gopi Krishna Tummala, Dong Li, Prasun Sinha, "RoadMap: Mapping Vehicles to IP Addresses using Motion Signatures", **ACM CarSys 2016**

5. Gopi Krishna Tummala, Istdeo Singh and K Giridhar, Null-Space of Block Convolution Matrix", **In Proc. of IEEE National Conference on Communications**, Delhi, India, Feb [15-17] 2013.

Patents

1. *Gopi Krishna Tummala*, Derrick Cobb, Prasun Sinha and Rajiv Ramnath, Methods and Apparatus for enabling Mobile communication device based Secure Interaction from Vehicles through Motion Signatures", **U.S. Patent No. 10,032,370**.

2. Tanmoy Das, *Gopi Krishna Tummala* and Prasun Sinha, Scalable RFID Communication through Multi-Frequency Analysis", Patent Application No. **PCT/US18/58167.**

3. Ganesan Ramalingam, Ramjee Ramachandran, Romil Bharadwaj and *Gopi Krishna Tummala* "Automatic Camera Calibration.", **U.S. Patent Application No. 15/946,731.**

Teaching

1. Lecturer for Introduction to Computer Programing in Java [Spring-2014], [Fall-2014, 2015].

2. Grader for Introduction to Low-Level Programming and Computer Organization [Fall-2013].

3. Grader for The UNIX Programming Environment [Fall-2013]