GOPI KRISHNA TUMMALA

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SUMMARY

Highly motivated Ph. D. graduate with research interests in designing algorithms related to Machine learning, Computer vision, Camera calibration techniques and Autonomous vehicles. Strong mathematical background in performance analysis, modeling and algorithm design. Skilled in programming with C++, python, Java, HTML, CSS, JavaScript and MySQL.

EDUCATION

The Ohio State University *December 2018*
Ph. D. in Computer Science and Engineering GPA 3.6/4.0

Indian Institute of Technology Madras *May 2012*
Bachelor of Technology in Electrical Engineering GPA 3.5/4.0

WORK EXPERIENCE

Qualcomm Research Jan 2019 - Now
Senior Engineer *Mentors: Arunandan Sharma*

- Designing the simulator for Autonomous vehicles.
- Behavior planning and prediction of Autonomous vehicles.

Qualcomm Research May 2018 - Aug 2018
Research Intern *Mentors: Ahmed Sadek, Arunandan Sharma and Feng Han*

- Developed a VIRES Virtual Test Drive (VTD) based autonomous vehicle (AV) simulator to pipeline testing of different behavior planning and prediction algorithms. Designed sensors fusion noise models based on number of real-world driving runs of Qualcomm autonomous vehicle and integrated these models to the simulator.
- Developed KPIs for behavior planning and prediction of AV and implemented as ROS evaluation nodes.

Microsoft Research May 2016 - Aug 2016
Research Intern *Mentors: Ramachandran Ramjee, Ganesan Ramalingam, Prasun Sinha*

- Designed a scalable system *AutoCalib* for hands-free traffic camera calibration with speed estimation errors of less than 10% which is a part of Microsoft's Video Analytics software.
- Used transfer learning on the vehicle detection R-CNN to design a vehicle keypoint detection Neural Network which is used to calibrate a traffic camera.
- Implemented the complete system using OpenCV and tensorflow libraries and tested using live traffic camera video feeds from the Seattle city.

Standard Chartered Bank Jun 2012 - May 2013
Analyst *Manager: Balraju Guggilam*

- Designed a client reporting system which pulls data from databases of Standard Chartered bank to generate the account summary reports.

SELECTED PROJECTS

DashCalib: Automatic calibration techniques for Dashboard cameras.

- System for automatic and live calibration of dashboard cameras which leverages collecting images of a large number of vehicles appearing in front of the camera and using their coarse geometric shapes to derive the calibration parameters.
- It is implemented using commodity dashboard cameras and estimates real-world distances with mean errors of 5.7 % which closely rivals the 4.1% mean error obtained from traditional manual calibration using known patterns.

Roadview: Live View of On-Road Vehicular Information

- Designed a system *RoadMap*, that matches IP addresses from Inter vehicular communication (IVC) with respective vehicles observed through a camera by matching the motion signatures.
- *RoadView* is a system which runs on top of RoadMap and builds the live map of surrounding vehicles by intelligently fusing the local maps created by individual vehicles.
- RoadView can robustly fuse information from a collection of local maps and enhance vehicles to sense 1.8x number of immediate neighboring vehicles.
- The entire system is written in C++ and tested thoroughly using experiments and NS3 simulations.

Soft-Swipe: Enabling High-Accuracy Pairing of Vehicles to Lanes using COTS Technology

- Soft-Swipe is a system for highly accurate pairing of vehicles to specific lanes in a wide-range of vehicle-based multi-lane service stations.
- It matches the motion signatures of the vehicles observed over the cameras and the signatures received from vehicular to infrastructure communication (V2I) to pair vehicles to respective lanes.
- Soft-Swipe is implemented in C++ and deployed in a Honda manufacturing and testing plant and matches vehicles to respective lanes with an accuracy of 99.9%.

Vision-Track: Vision based indoor tracking in anchor-free regions

- Vision-track is a smartglass based light weight monocular visual odometry solution which exploits the ceiling points for enabling tracking services.
- The enitres system is implemented in python using OpenCV libraries and provides tracking services in an indoor college building with a median tracking accuracy of 49 cm.

SELECTED PUBLICATIONS

- SmartDashCam: Automatic Live Calibration for DashCams [ACM IPSN 19]
- AutoCalib: Automatic calibration of traffic cameras at scale [ACM BuildSys 17, ACM TOSN 18]
- Roadview: Live View of On-Road Vehicular Information [IEEE SECON 17]
- RoadMap: Mapping Vehicles to IP Addresses using Motion Signatures [ACM CarSys 16]
- Soft-Swipe: Enabling High-Accuracy Pairing of Vehicles to Lanes using COTS Technology [ACM CarSys 16]
- Vision-Track: Vision based indoor tracking in anchor-free regions [ACM HotWireless 16]
- Null-space of block convolution matrix [IEEE NCC 13]

PATENTS

- Methods and Apparatus for enabling Mobile communication device based Secure Interaction from Vehicles through Motion Signatures [U.S. Patent No. 10,032,370]
- Automatic Camera Calibration [U.S. Patent App No. 15/946,731]
- Scalable RFID Communication through Multi-Frequency Analysis [PCT/US18/58167]

AWARDS & HONORS

- **Best paper Awards:** IEEE MiSeNet 2018, ACM BuildSys 2017, ACM BuildSys 2017 (Best Demo)
- Travel grants towards IEEE SECON 2017, ACM SenSys 2018

TECHNICAL SKILLS

- **Languages and Scripting:** Python, C++, Java, C, SQL, PHP, Shell/Bash, HTML/CSS
- **Others:** OpenCV, ROS, tensorflow, Matlab, GNU Radio, NS3, Arduino, SUMO, wireshark, Android.

TEACHING EXPERIENCE

- Lecturer for Introduction to Computer Programming in Java at OSU [Spring-2014, Fall-2014, 2015]
- TA for UNIX Programming-Lab, Introduction to Low-Level Programming and Computer Organization [Fall-2013]