RESUME
Krishna Kumar Sunil
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WORK DETAILS

Researcher in **TCS Research And Innovation Labs, Bangalore**, in Analytics of Cyber Physical Systems (Data & Decision Sciences) Research group.
Period: Sep 2018 - Present

ACADEMIC QUALIFICATION

Bachelor in Technology with Honors, (Mechanical Engineering), Indian Institute of Technology (IIT), Hyderabad, 2014 – 2018; CGPA: **8.71/10**

RESEARCH PUBLICATIONS

- **City Scale Monitoring of On-Street Parking Violations with StreetHAWK.**

  Co-authored this research publication which was accepted in *The 6th ACM International Conference on Systems for Energy-Efficient Buildings, Cities, and Transportation* **(ACM BUILDSYS 2019)**, Newyork and patented in India.
  Demo with a working model was accepted and presented at COMSNETS 2020, Bangalore.

- City Scale Monitoring of On-Street Parking Violations with StreetHAWK- **India Patent**

- **Uberizing the Charging Ecosystem for Electric Vehicles**

  This work on developing a model for demand shaping of EV charging network and proposing an uberization model has been accepted in **ACM eENERGY 2020**.

RESEARCH PROJECTS

- **"City Scale Monitoring of On-Street Parking Violation using StreetHawk"**   accepted in *ACM Buildsys 2019*
  TCS Research and Innovation Labs (Aug 2018 - July 2019)

  ○ The project involved developing an edge-centric, real time IoT system for monitoring city wide parking violations. This system leverages the rear camera of a dashboard mounted smartphone and performs visual scene and location analytics to identify potential parking violations.

  ○ Performed object detection by extensive training on Deep Learning based object detection framework SSD (Single Shot Detector) with MobileNet Feature Extractor.

  ○ Trained the network with real time traffic data collected in the city of Bangalore and conducted experiments with the system which showed that this system running on a typical Android smartphone, was able to detect (on an average) 80 % of the parking violations. Contributed towards developing the trained model on the said framework using Tensorflow front-end.

  ○ A detailed research paper has been published in *ACM Buildsys 2019* and **patented** in India.

- **Uberizing the Charging Ecosystem for Electric Vehicles using Reinforcement Learning**   Aug 2019 - Ongoing
  TCS Research and Innovation Labs   accepted in *ACM eEnergy 2020*

  ○ Developed a model of Electric Vehicle charging network to locate hotspots in simulation of city of Luxembourg and theorized an uberized model to mitigate these hotspots

  ○ Worked on algorithm for dynamic price allocation to maximize the overall revenue for private owned charging stations. We are currently testing different RL techniques to maximize to utilization of the charging ecosystem. We plan to present this system in IEEE Percom.

  ○ We have simulated real-time traffic behavior of Luxembourg city using an open source software SUMO of Luxembourg city to perform Spatio-temporal variability of demand and supply,

  ○ A short paper explaining the current strategies in shaping the demand of EV charging network and compared with the uberization model has been accepted in *ACM eEnergy 2020*.

- **Demand Shaping for Parking Management for urban spaces**   March 2020 - Ongoing
  TCS Research and Innovation Labs

    ○ The objective is to shape the parking demand such that there is a significant demand shift from on-street to off-street parking practices.
    ○ We have created simulation traffic of Luxembourg city with current parking behaviour. Our aim is to identify the hotspots in off-street parking and shape the demand to incentivize usage of off-street parking.

- **Bubble rise in a viscoplastic medium (3D simulation)**
  Honors' Project (Guide: Dr. K Badarinath and Dr Kirti Chandra Sahu , Aug' 2017 - April 2018)

    The project was aimed to develop a code in Basilisk (an open source software) and simulate the bubble rise (a 3D environment) in Bingham fluid (a visco-plastic medium). Based on the experimental results, a code was tested to simulate the results without assuming axial symmetry for the bubble, thereby detecting the shape and path oscillations occurring due to development of wake during the rise of the bubble.
    Platform: Basilisk (an Open source software for CFD simulations)

- **Analysis and Simulation of pressure , Flow of petroleum product Erosion modelling of SRS-VVSPL Pipelines, Hindustan Petroleum Corp. Ltd**   (Summer Intern' 2017)

    The vision of this project is to analyse the design of the pipeline of SRS as per the new demand requirements after division of Andhra Pradesh State. Flow and pressure information at any point in the pipeline was simulated using Ansys Fluent (using k- turbulent model). Recirculation zones and the Pressure losses in the pipeline were simulated. Ansys' Fluent Erosion model was utilized to detect the erosion prone areas in the pipeline.

ACADEMIC PROJECTS

- **Tin Can Crusher** (Mini Project)

  Guide: Dr. K Badarinath, *Indian Institute of Technology, Hyderabad*, Jan' 2017 - Apr' 2017

    ○ A device was fabricated with our college workshop resources. This machine employs Slider-crank mechanism to exert a large amount of mechanical leverage to provide a crushing impact on the tin cans. Spur gear mechanism was utilized to reduce the mechanical effort.Stress Analysis was done through Abaqus. It was designed to account for manufacturability and assembly. 3D model with all the considerations was designed in SolidEdge

- **Six-Bar lifting mechanism**

  Guide: Dr. R Prasanth Kumar, *Indian Institute of Technology, Hyderabad*, Jan' 2016 - Apr' 2016
    ○ Analysed the kinematics of 6 bar mechanism so as to get vertical movement as output. Designed it to satisfy the kinematic constraints using MATLAB. Simulated the mechanism using Solidworks.

- **Generating NC code for a Bezier surface**

  Guide: Dr. N Venkata Reddy, *Indian Institute of Technology, Hyderabad*, Aug' 2017 - Dec' 2017
    ○ Generated a Bezier surface using MATLAB. Generated an optimal tool path for machining the Bezier surface by by optimizing the scallop height and surface tolerance. Generated a NC code for optimized tool path to manufacture the surface using 3-axis milling machine using hemispherical cutter.

HONORS AND AWARDS

- Received **Academic Excellence Award** for securing a highest SGPA of **9.27/10** in the batch of Mechanical Engineering for the academic year 2017-2018.

- Selected in State level of National Talent Search Examination(2010).

POSITIONS OF RESPONSIBILITY

- Involved as a Teaching Assistant under Dr. Mahesh, Asst. Professor, IIT Hyderabad for the course 'Dynamics', Jan – Apr 2018

- Worked as Co-Ordinator in the organizing committee 2016 Nvision-Technical Fest of IIT Hyderabad, Mar 2015 – Feb 2016

- Teaching Assistant under Dr. Bhabani S. Mallik, Assoc. Professor and Dr. Surendra Kumar Martha, Assoc. Professor, IIT Hyderabad for the course Dynamics of Chemical Systems, Aug – Dec 2015

- Worked as teaching Assistant under Dr. Vandana Sharma, Asst. Professor, IIT Hyderabad for the course 'Photonics', Jan – Apr 2015

- Krishna Kumar Sunil Komadam