Tanmaey Gupta

Research Fellow
Center for Societal impact through Cloud and Artificial Intelligence
Microsoft Research India

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Education

Indian Institute of Technology Gandhinagar *2017 - 2021*
B.Tech. in Electrical Engineering with Minor in Computer Science and Engineering
GPA: 8.84/10

Research Experience

Microsoft Research India *2021-Present*
SCAI Research Fellow
Advisors: Dr. Akshay Nambi & Tanuja Ganu

- **Dependable IoT:** Developed a robust and scalable fault detection system for IoT sensors, being used by multiple partners in real-world deployements across 1000s of devices. The work involved signal processing and its algorithms; writing low level, multithreaded and resource efficient code; building an SDK to enable cloud connectivity and control; and designing and fabricating hardware to increase compatibility of the fault-detection system.
- **AI for Sustainability:** Working on accurate semi-superised and unsupervised techniques for water usage disaggregation in large residential and commercial settings with minimal available sensor deployments and labelled data.

IRACS Lab, IIT Gandhinagar *2020 - 2021*
Research Assistant
Advisors: Prof. Uttama Lahiri

- **Real-time Exercise and Rehabilitation Guidance Platform:** Researched on developing an interactive, real time exercise guidance and rehabilitation platform based on pose estimation, which accurately records and matches body joints for trainer and patient movements, without being affected by position, rotation and size of the subjects relative to the camera.

Publications

1. **Verified Telemetry: A General, Easy to use, Scalable and Robust Fault Detection SDK for IoT Sensors*** **Tanmaey Gupta**, Shubhankar Handa, Akshay Nambi
   ACM/IEEE IoTDI 2023.
   ∗under review

Software

1. **Verified Telemetry : Fault Detection for IoT Sensors***.
   Sumukh Marathe, Nishant Shrivastava, Ryan Winter, Akshay Nambi, **Tanmaey Gupta**, Shubhankar Handa.
   Microsoft Research India, 2021 - present.
   ∗under discussion to be added to Azure Edge Stack

Talks

1. **Robust, Scalable Fault Detection for IoT Sensors (Demo Talk)** *January 2022*
   - MSR India TAB 2022

Research and Development Internships

ITC India *April - June 2020*
Technology track KITES Intern

- **Energy Efficient Industry:** Researched on existing inefficiencies in energy consumption of 3 flour plants across India by analyzing 2 year logged data using statistical methods and collaborating with domain experts on process mechanisms study. Proposed 3 key factors of improvement and designed sensor aided automation system which could improve energy efficiency by 3%. The deployment of design was not possible due to COVID restrictions.

Detect Technologies, IIT Madras Research Park *May - July 2019*
Firmware Developer

- **Drone Telemetry:** Developed firmware on STM32 MCU to enable real-time data stream and feedback of custom sensor mounted on drone to the controlling base station using a proprietary RF communication protocol.

Invent@IITGn (Invention Factory, USA), IIT Gandhinagar *May - July 2018*
Inventor

- **Invent for Road Safety:** Developed a novel collision shock absorption system and underrun prevention assembly for high rise vehicles. Collaborated with domain experts (ARAI India), built simulation models and prototype and filed a provisional patent for the same.

Undergraduate Projects

1. **LSTM based 3D-motion Text and Gesture Recognition**
   Used LSTM models for text recognition using accelerometer data of an IMU sensor to enable air-writing.
2. **Git from scratch in C++**
   Implemented Git version control system in C++ from scratch, using content addressable file system and SHA1 hashing.
3. **Mobile Cable-Driven Parallel Collaborative Robots**
   Simulated path planning (using A*) and interactions for 4 MCDPR robots to collectively transfer a load in a constrained environment.
4. **FPGA based Two Level Morse Code Encoder-Decoder**
   Developed a two tier encryption-decryption machine on Basys 3 FPGA board with I/O using Morse code and Base 64.
5. **Robust, Low-resource Parking Space Identification**
   Used image processing of surveillance camera feed to detect empty parking spaces. Solution was robust against false positives and capable of running on highly resource constrained devices.

Selected Awards and Honors

- Winner of Microsoft Global Hackathon, 2021(Future Of Edge Computing Track) *2021*
- Selected for Inter- IIT Tech Meet (IIT Madras, IIT Bombay) *2017, 2018*
- Enlisted in Dean's List for Academic Excellence at IIT *2017, 2018*
- Among top 0.15% of 1.2 million candidates in IIT-JEE Examination *2017*
- Kulpati K.M.Munshi Award in Mathematics *2015*

Professional Responsibilities

- *Mentor:* Peer-Assisted-Learning, IIT Gandhinagar *2021*
- *Undergraduate Teaching Assistantship* - ES102 Computing course, CSE, IIT Gandhinagar *2020*