# Ajay Ramesh Ranganathan

ranganathajay@gmail.com • Portfolio • Github • (+91) 82772 93604

## EDUCATION

**Bachelor's/Master's Dual Degree in Electronics and Communication Engineering** Aug 2017 - July 2022

International Institute of Information Technology - Bangalore (IIIT-B)

- 9th Semester Student, CGPA : **3.54 / 4.0** transcript

## EXPERIENCE

**The University of Alabama Tuscaloosa, USA** Jun 2020 - Nov 2020

Research Internship Prof. Edward Sazonov

- Developed a computer-vision system to aid in automatic food intake monitoring from a wearable camera.
- Built an ensemble of YOLO object detection networks to localize food items in the scene.
- Explored data augmentation techniques to improve detection on real-world data.
- Integrated the normalized graph-cut and K-Means algorithm to segment the parts of food post detection.

**Indian Institute of Science (IISc)** May 2019 - Jul 2019

Summer Internship Prof. M M Nayak

- Built an analog laser communication and vibrometer system.
- Designed the circuitry for the optical modulation and demodulation of audio signals using a 5mW laser diode and solar cell.
- Demonstrated the use of the designed circuitry as also a vibrometer system capable of detecting low-frequency surface vibrations. Report

## PUBLICATIONS

- A. Ramesh, N. Raj, T. K. Srikanth and M. Rao, "Design of a tactile audio gallery for visually impaired students," 2019 IEEE SENSORS, 2019, pp. 1-4, doi: 10.1109/SENSORS43011.2019.8956886.
- A. Ramesh, Viprav B. Raju, M. Rao and Edward Sazonov, "Food Detection and Segmentation from Egocentric Camera Images". Accepted at the 43rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC) 2021.
- A. Ramesh, M. Beniwal, Alok M. Uppar, Vikas. V, M. Rao, "Microsurgical Tool Detection and Characterization in Intra-Operative Neurosurgical Videos". Accepted at the 43rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC) 2021.

## PRE-PRINTS

Doshi, R., Ranganathan, A. R., and Rao, S., "Modeling Influencer Marketing Campaigns In Social Networks", arXiv:2106.01750.

## SKILLS

- **Programming Languages**: Python, C++, C, MATLAB
- **Embedded Systems**: Arduino, RaspberryPi, 8051 microcontroller.
- **Machine Learning**: Numpy, Tensorflow, PyTorch.
- **Others**: Linux, OpenCV, Git, docker, Simulink, LaTeX

## TEST SCORES

- **TOEFL:** 110/120; R - 30, L - 30, S - 24, W - 26.
- **GRE:** 332/340; Q - 169, V - 163, AWA - 4

## SELECTED PROJECTS

**Surgical Tool Characterization from Neurosurgical Videos** Aug 2020 - Dec 2020

Surgical and Assistive Robotics Lab IIIT-B & NIMHANS Prof. Madhav Rao

- Developed a neurosurgical tool detection and characterization system using deep learning for the estimation of surgical skill from videos.
- Trained an object detection network to detect and localize four different surgical tools - suction, cusa, bipolar and dissecting forceps.
- Implemented a bilinear interpolation technique to improve frame-wise tool detection in videos.
- Computed the following parameters to characterize tool usage of a surgeon: usage frequency, total usage time and motion trajectory.

**Diagnosis of Malaria using Machine Learning** Oct 2019 - Dec 2019

Machine Learning Course Project Prof. G Srinivasaraghavan

- Designed a machine learning system to automatically diagnose malaria from blood smear images.
- Engineered features using the SIFT algorithm and the Bag of Visual Words approach, combined with contour and blob detection.
- Designed a Convolutional Neural Network and compared its results with traditional classification techniques. Project

**Modelling Influencer Marketing Campaigns in Social Networks** Aug 2020 - Dec 2020

Research Project Prof. Shrisha Rao

- Built an agent-based model to simulate the dynamics of influencer advertizing campaigns and study advertizing strategies.
- Simulations were performed on real-world datasets and our results reveal the importance of different kinds of influencers (e.g. micro-influencers and celebrities) in varying circumstances of advertizing.
- This work has been submitted for publication. Pre-print

**Tactile Audio gallery for Students with Visual Impairment** Oct 2018 - Mar 2019

Surgical and Assistive Robotics Lab IIIT-B Prof. Madhav Rao

- Developed a tactile-audio device to assist visually impaired students in studying tactile diagrams.
- Designed a capacitive sensor array to localize user touch, integrated with an audio content delivery system.
- Won the MEITY TIDE 2.0 ideation grant of INR 400,000 to develop the device
- Actively participated in the field-testing of the device. Demo

For a complete list of my projects and courses, please visit my Portfolio

## VOLUNTEER WORK AND EXTRA-CURRICULAR ACTIVITIES

- **Teaching Assistant** for the Basic Electronics Lab Course (Aug 2020 - Nov 2020) and the Electronic Devices and Circuit Theory Lab Course (Jan 2021 - Apr 2021). My responsibilties included teaching basic concepts and clarifying doubts.
- **Co-organized an assistive technology exhibition as part of the I-STEM event at IIIT-B in 2019**: I drafted the structure and rules of the event and successfully invited companies across India to showcase their products at the event.
- **Volunteered** for the registration and logistics team at the IEEE HiPC 2018. HiPC
- I am a sports enthusiast and play football at the university level. I also enjoy endurance sports; I successfully completed the Triathlon in Bangalore (400m swimming, 10km Cycling and 5km Running) in 73 minutes. Certificate