Hemanth **Kandula**

Machine Learning Researcher

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- 5+ years of academic and professional machine learning experience in Healthcare and Robotics
- Led multi-phased research initiatives with a direct impact on patient healthcare.

Education

Tufts University *Medford, MA*

Master of Science in Computer Science (AI focus) *Aug. 2019 - May. 2021*

- *Coursework:* Reinforcement Learning, Natural Language Processing, Machine Learning, Big Data, Programming Languages, Algorithms

SASTRA University *Thanjavur, India*

Bachelor of Technology in Electronics and Communication Engineering *Jul. 2014 - May. 2018*

- **Thesis:** Portable Internet-of-Things enabled rapid semen analysis system
- **Activities and Societies:** Engineering Project Coordinator at **Robotics Club**, Student Volunteer at **National Service Scheme**

Experience

Brigham and Women's Hospital, Harvard Medical School *Cambridge, MA*

Research Assistant, Machine Learning *Dec. 2017 - present*

Managed projects that solved few of the major unmet needs in human fertility, viral diagnostics with diverse team of clinicians and engineers resulted in 14+ journal and conference articles

- Designed & developed a **state-of-the-art** adversarial unsupervised and self-supervised domain adaption methods and investigated on domain shifted medical datasets. Accepted for **publication at Nature BME Journal**
- Created and curated benchmark **medical datasets of 500,000+ images** for domain adaption
- Developed deep learning framework for In Vitro fertilization (IVF) which **outperformed embryologists**
- Developed and deployed smartphone-based low-cost point-of-care Ovulation prediction device using deep learning into android application which **predicts Ovulation at-home with 99% accuracy.**
- Proposed generalization method using unsupervised adversarial learning for smartphone-based **viral(SARS-COV-2) diagnosis**
- Developed webmobile apps (Vue.js, Flask, Android) for medical image datasets acquisition and annotation, and for deployed ML algorithms which was used by **clinicians from 9+ hospitals** and health clinics in US.
- Built point-of-care **low-cost diagnostics (<$1)** devices interfaces with embedded internet of things (IoT) systems
- Lead & managed team of research interns in applying computer vision and deep learning in medical imaging projects

SASTRA University *Thanjavur, India*

Student Researcher *Apr 2016 - Nov 2017*

At Electric Vehicle Engineering and Robotics (EVER) Lab, I worked on projects in mobile and aerial robotics

- Deployed algorithm with semantic segmentation (SegNet) for indoor autonomous navigation in ROS instead of high-cost Lidar sensors on CoroBot (mobile robot) which **decreased costs by 40%**
- Designed and implemented end-to-end autonomous control for drone GPS navigation system for agricultural crop spraying

300dpi *Thanjavur, India*

App Developer *Aug. 2016 - Oct. 2017*

- Developed android applications for college cultural festivals for participants and organizers of Sastra University which were **used by 10,000+ students** from various colleges in India.

Relevant Skills

Programming/Scripting	Python, JAVA, SQL, C/C++, MATLAB, Bash, Linux
Tools/Frameworks:	PyTorch, Keras, TensorFlow, NumPy, Pandas, SKLearn, CUDA, Spark, Git, Spark, Docker, AWS, GCP
Mobile/Web Frameworks	Android, Vue.js, Node.js, Flask,REST API, Firebase, MongoDB

Selected Achievements

2019	**Full tuition scholarship,** from Brigham and Women's Hospital	*Cambridge, MA*
2018	**Grand Prize Award ,** MakeMIT-2018, Massachusetts Institute of Technology	*Cambridge, MA*
2019	**Winners,** Sharkhack 2019, Simmons University	*Boston, MA*
2017	**Winnerof Gauntlet challenge,** in DAKSH'17, SASTRA University	*Thanjavur, India*
2017	**Winner of Eleckart challenge,** in SHAASTRA'17(tech festival), Indian Institute of Technology-Madras	*Chennai, India*

Selected Research Projects

MD-nets: Medical Domain Adaption Networks

Accepted in Nature BME

Research Assistant - Harvard Medical School, Shafiee Lab — *May. 2019 – Nov. 2020*

- Designed & developed a novel adversarial unsupervised and a self-supervised domain adaption method shown state-of-the-art results on benchmarks.
- Investigated the use of adversarial learning on shifted distribution and medical image qualities which enabled using **low-cost diagnostics devices (<$1)**

SPyDERMAN

Published in ACS Nano

Research Assistant - Harvard Medical School, Shafiee Lab — *Nov. 2019 – Aug. 2020*

- Smartphone-based pathogen detection (SARS-CoV-2, Zika, HIV, HBV HCV) multiplier using adversarial networks
- Created a data library by generating synthetic images with StyleGAN for all viral datasets
- Proposed generalization method using unsupervised adversarial learning with target pathogen and data library

Artificial Intelligence for In-Vitro fertilization (IVF)

Published in various journals

Research Assistant - Harvard Medical School, Shafiee Lab — *Sep. 2018 – Dec. 2019*

- Developed deep learning models(Keras, TensorFlow) for automated human embryo assessment for an In Vitro fertilization (IVF)
- Deployed ensemble of deep learning models for low-cost portable (<$100) and smartphone-based embryo imaging devices (<$1)

Domain Adaptation in UAV Navigation & Obstacle Avoidance using Deep RL

Available on GitHub

Research project; Advisor: Prof. Jivko Sinapov — *Sep. 2020 – Dec. 2020*

- Implemented a adversarial domain adaption method to retain knowledge different environments in indoor settings.
- Showed significant performance improvements over Reinforcement Learning tasks learned from scratch and direct transfer learning

Cross-Lingual Sentiment Analysis via Conditional Language Adversarial Adaptation

Under Review

Research project; Advisor: Prof. Bonan Min — *Jan. 2020 – Aug. 2020*

- Developed conditional Language Adversarial Network (CLAN) which is designed to learn language invariant features that are also discriminative for sentiment classification.
- Showed that CLAN outperforms all previous methods for both in-domain and cross-domain CLSA tasks.

OVA: Point-of-Care Ovulation Testing

Published in Lab-on-a-chip

Research Assistant - Harvard Medical School, Shafiee Lab — *Dec. 2017 – Jun. 2017*

- A smartphone-based low-cost point-of-care diagnostics device to accurately predict ovulation at-home
- Developed with convolutions neural networks(CNN) and deployed into android application.

Personal Projects

Smart Cane for Visually Impaired

Link

MakeMIT 2018 Hackathon — *Jan. 2018*

- Build with the software stack of TensorFlow object detection API, SegNet (semantic segmentation) for detection objects and surfaces on a Nvidia Jetson TX2 and integrated with haptic and audio feedback to a cane

Shafieelab.bwh.harvard.edu

Link

Shafiee Laboratory Website — *Jan 2019 – Apr 2019*

- Developed and maintained the web app with Vue.js front end framework

Extracurricular Activity

Robotics Club, SASTRA University

Thanjavur, India

Project Coordinator — *Aug. 2015 - Oct. 2017*

- Organized Robotics Workshops to encourage budding Engineers to learn and explore the field of Robotics.
- Managed 60+ people and led 6 computer vision and robotics projects
- Worked and concluded projects include: Gesture Controlled Quadcopter, PID Controller Based Line Follower Robot, Autonomous Mobile Robot, and recognition-based Robot Writing Using Character Segmentation Algorithm

National Service Scheme

Thanjavur, India

Student Volunteer — *Jan. 2016 - Oct. 2017*

- The National Service Scheme (NSS) is a Central Sector Scheme of the Government of India, Ministry of Youth Affairs & Sports. It provides an opportunity to the students of India to take part in various government led community service activities & programs.
- Participated in children's educational activities in local villages of Thanjavur area.