Yuvaraj Munian

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Education

Texas A&M University-San Antonio (TAMUSA)   **San Antonio, Texas**

Post-Doctoral Research Associate   *August 2023 - Present*

- *Department of Computing and Cyber Security*
- *Specialization: Working in High Performance Computing & Cyber Security*
- *Advisor: Dr. Izzat Alsmadi*

The University of Texas at San Antonio (UTSA)   **San Antonio, Texas**

Ph.D. in Electrical Engineering   *August 2019 - May 2023*

- *Cumulative GPA: 3.82/4.0*
- *Thesis: AI-based Intelligent System for Animal Detection in Automobile Applications,*
  AI-based Image Processing in Biomedical Imaging detection and classification &
  AI-based solar Photovoltaic array soil and dust detection.
- *Advisor: Dr. Miltos Alamaniotis*

The University of Texas at San Antonio   **San Antonio, Texas**

MS in Electrical Engineering   *January 2018 – July 2019*

- *Cumulative GPA: 3.81/4.0*

PSG College of Technology   **Tamil Nadu, India**

M.E. in Electrical Engineering (Applied Electronics)   *June 2008 – June 2010*

- *Cumulative GPA: 8.42/10*
- *Thesis: An Efficient Optimization Technique for Digital Watermarking in*
  Image Processing
- *Description: The scope of this project is to optimize the quality and visual precision*
  of the image and preserve the image from geometric attacks.
- *Advisor: Dr. S. Sumathi*

Arulmigu Meenakshi Amman College of Engineering   **Tamil Nadu, India**

B.E. in Electronics and Communication Engineering   June 2003 – June 2007

- Cumulative GPA (FCSA): 3.54/4.0
- Thesis: Surveillance Security System
- Description: The scope of this project is to provide security by detecting any
  movement and alert the user by alarm

Research Experience

Texas A&M University - San Antonio   **San Antonio, Texas**
Post-Doctoral Research Associate   *August 2023 – Present*
1. **Adversarial Machine Learning in Social Networks and Text based application**
   - *Sentimental Analysis.*
   - *Spam Detection.*
   - *Check the restriction and vulnerability of using machine learning algorithms.*
2. **AI applications using High Performance Computing**
   - *Big Data Analysis.*
   - *Performance measure of the machine learning and deep learning algorithms.*

The University of Texas at San Antonio   **San Antonio, Texas**
Research Assistant   *August 2019 – May 2023*
1. **Automobile Applications**
   a) Comparison of image segmentation, HOG, and CNN Techniques for Animal Detection using thermography images
   - *An intelligent system for animal detection in vehicle collision.*
   - *State-of-the-art methods in comparison with all the existing classifiers.*
   - *The image processing technique is used to optimize the accuracy of the system.*

   b) Design and Implementation of a Nocturnal Animal Detection Intelligent System in Transportation applications
   - *An alert service system*
   - *Based on the Detection, driver will be notified for vehicle collision.*

   c) Intelligent System for Detection of wild Animals using HOG and CNN in Automobile Applications
   - *Accident prevention by detecting an animal using thermography images for autonomous vehicle.*
   - *Thermal images are used for nocturnal Detection.*
   - *Posture of the animal is identified to notify the driver in the car.*
2. **Biomedical Applications**
   a) Medical Image Classification – Aorta Aneurysm
   - *Image Segmentation and **Artificial Intelligence-based Image Processing Techniques** in Bio-Medical Applications (**Abdominal Aortic Aneurysm** (AAA) Detection) **in collaboration with UT Health, San Antonio, Texas.***

   b) Tissue Remodelling and myopathy in Peripheral Arterial Disease
   - *Peripheral Arterial Disease - chronic lack of blood supply.*
   - *Clinical classification standards are used to produce the labels for our dataset, and we successfully developed 11 different Artificial Neural Network Models for objective patient classification.*
3. **Power Systems Applications - PV Panel dust and soil classification**
   - *AI-based classification method to circumvent the problems in solar panels.*
   - *This research presents a novel image classification method for increasing the efficiency of large-scale industry co-generation plants' efficiency by detecting and classifying dust and soil on PV arrays simultaneously.*

- *Coupled Convolutional neural network (CNN)-based models for feature extraction and Long short-term memory (LSTM) models for learning sequential meteorological data to enable joint classification and detection tasks.*

4. **Environmental architectural applications**

   - *By analysing the time series raw data using LSTM and CNN to predict the recommended time for the customers to use the fitness center.*

5. **High Performance Computing and Cyber Security (Post-Doctoral Research)**

Professional Experience

Teaching Experience

Month & Year		University Name	Position	Experience
Aug 2023	*Present*	*Texas A&M University-San Antonio, USA*	*Post- Doctoral Research Associate*	*1 Year*
Aug 2019	*May 2023*	*University of Texas at San Antonio, USA*	*Teaching Assistant*	*4 Years*
Jun 2012	*May 2016*	*Agni College of Technology, India*	*Assistant Professor*	*4 Years*
Jun 2010	*Apr 2012*	*Mailam Engineering College, India*	*Assistant Professor*	*2 Years*
Jun 2007	*May 2008*	*Sri Venkateswara Polytechnic, India*	*Lecturer*	*1 Year*

Roles & Responsibilities

- *Worked as a Lab in charge of the research laboratory for six years and trained students to do real-time projects like auto-detection, rover design for the planet's solid surface, watermarking using MatLab, and image classification and object detection.*

- *During those six years, I handled software like Tanner, PSPICE, Matlab, java, c, C++, HTML, and Xilinx.*

- *Hardware systems like Arduino board, Raspberry pi 1 model A and B, DSP kit, Communication systems kit, and Microprocessor (8051, 8086) kit.*

- *Acted as a Research Coordinator for both undergraduate and postgraduate students and helped the department design the research Schedule for the academic year.*

- *Organized and attended software-based workshops and faculty development programs sponsored by the All India Council for Technical Education (AICTE).*
- *Class In-charge, Placement Officer, Master's Coordinator, Project In-charge, Organizing Secretary*
- *Teaching Assistant and Research Assistant*
- *Handled subjects like Computer Networks & Computer Networks Lab, Logic Design, Electronic Circuits I, Introduction to Control Systems, Introduction to Electrical Engineering, Advanced Engineering Mathematics and Artificial Intelligence.*

Post-Doctoral Research Associate   San Antonio, Texas

Cyber Security and HPC – Texas A&M University – San Antonio   **Aug. 2023 – Present**

- *Perform research on various topics related to AI, machine learning, cyber security, virtualization, storage systems, and high-performance computing;*
- *Participate/assist in writing of publication in scientific journals and/or presentations.*

- *Prepare and help preparing and submitting grants*
- *Prepare and help conducting training workshops for faculty and student*
- *Present research progress and finding at meetings and conferences;*
- *Work closely with advisor on other assigned tasks.*
- *Teaching computer Networks and its Lab class for undergraduate students.*

Research Assistant   San Antonio, Texas

Artificial Intelligence (AI) Lab – The University of Texas   **Aug. 2019 – May 2023**

- *Acquiring animal thermography images by mounting a camera in the car.*
- *Acquiring biomedical images in **Dicom format through CT and MRI scans** from various medical universities.*
- *Data redefining, filtering, and labeling for complex data to Deep Learning algorithms.*
- *Designing deep learning-based classification algorithms **like Convolution neural networks, State-of-art methods, Classifiers, Supervised and Unsupervised learning algorithms, and Artificial neural networks**.*
- *Executed data analysis and visualization with univariate analysis using **Python (Pandas, NumPy, Seaborn, Sklearn, Keras, TensorFlow, and Matplotlib)**.*
- *Designing and improving existing healthcare systems into AI-based implementations for accurate detection.*

Industry Experience

25: 2 Solutions LLC, 815 S. First Ave STE A, Pocatello, ID 83201

Computer Engineer Intern   *May – August, 2021*

- *Development of **Image Processing and Deep Learning tools** for data collection and analysis.*
- *Contribute to the development of web applications and desktop software implementation.*
- *Different stages of testing and implementation of the developments.*
- *Applications developed to reduce the time consumption and manual resources in fieldwork.*
- *Automated the image cropping technique and reduced the **auto-cropping time from 3 days to 45mins**.*
- *Implemented a Convolutional Neural network model for detecting healthy and defective plants from the farm.*
- ***Heat-map python library** is used to identify the healthy plants in the agricultural farm based on the temperature of the plants.*
- *The color palette table is generated with the **pretty table python libraries** to detect the mixture of colors in the plants, which tells about the health of the plants.*
- *The quality of the strawberry is measured by counting the yellow seeds and the depth of the seed hole.*
- *Experience retrieving **Unmanned Aerial Vehicle (UAV) image** data from hybrid data sources using Tableau and creating the dashboards for the reports.*

IVW Pvt. Ltd., India   *June 2016 – Dec 2017*

Research Coordinator

- *The recent trends includes the Electricfying of all the automobiles and household appliances. The design of lithium battery increase the power capacity and usage of the power in the houses. Now a days all the cars are battery oriented, so, the motorbikes also comes with the battery. These demand paves the path for this project to the client. Here based on the orders, the batteries designed and delivered to the customers more efficiently.*
- *Development of design the architect of the battery model by collecting the customer requirements.*
- *The requirements are fullifiled and the process goes to the implementation stage, before that using simulation tool test the design model.*
- *Different stages of testing and implementation of the developments.*
- *Contribute to the development of web applications and desktop software implementation.*

Award

- *Awarded the 2022* **Outstanding Graduate Research Award (OGRA) by the faculty in the department of Electrical and Computer Engineering** *for the best performance in academic and research achievements.*

Publications

Journals

- *Karaiskos Panagiotis,* **Munian Yuvaraj**, *Martinez-Molina Antonio, Alamaniotis Miltiadis "Indoor air quality prediction modeling for a naturally ventilated fitness building using RNN-LSTM artificial neural networks" Smart and sustainable built environment, 13 May 2024.*

- *Dimitrios Miserlis,* **Yuvaraj Munian**, *Emma Fletcher, Josh Crapps, Pedro Teixeira, Lucas Ferrer, Joseph DuBose, William T. Bohannon, Peter Monteleone, Miltiadis Alamaniotis, Panagiotis Koutakis, "Evaluating the diagnostic ability of six different artificial neural networks, from the subcellular nano-micro environment to the clinical manifestation"doi: 10.1161/atvb.43.suppl_1.544, Journal of Arteriosclerosis, Thrombosis, and Vascular Biology, https://doi.org/10.1161/atvb.43.suppl_1.544, AHA journals, 2023.*

- *Dimitrios Miserlis,* **Yuvaraj Munian**, *William T. Bohannon, Marissa Wechsler, Miguel Montero-Baker, Lucas Ferrer-Cardona, Mark G. Davies, Panagiotis Koutakis, Miltiadis Alamaniotis," Benchmarking EfficientNetB7, InceptionResNetV2, InceptionV3, Xception Artificial Neural Network Applications for Aortic Pathologies Analysis", Journal of Vascular surgery, DOI: https://doi.org/10.1016/j.jvs.2023.03.475, 2023.*

- ***Yuvaraj. M***, *A. Martinez-Molina, Dimitrios Miserlis, Hermilo Hernandez and M. Alamaniotis, Intelligent System Utilizing HOG and CNN for Thermal Image-Based Detection of Wild Animals in Nocturnal Periods for Vehicle Safety, Applied Artificial Intelligence, DOI: 10.1080/08839514.2022.2031825, 2022.*

- *Mowen, D.,* **Munian, Y.**, *& Alamaniotis, M. (2022). Improving Road Safety during Nocturnal Hours by Characterizing Animal Poses Utilizing CNN-Based Analysis of Thermal Images. Sustainability, 14(19), 12133. https://doi.org/10.3390/su141912133.*

- ***Yuvaraj. M***, *A. Martinez-Molina, and M. Alamaniotis, Active Advanced Arousal System to Alert and Avoid the Crepuscular Animal Based Vehicle Collision, Intelligent Decision Technologies, vol. 15, no. 4, pp. 707-720, 2021.*

- ***Yuvaraj. M***, *Kumaratharan. N, An efficient optimized comparative analysis of genetic algorithm and particle swarm optimization for digital watermarking in image processing, International Journal of Applied Engineering and Research, vol.10, Special issue, pp.-12474-12756, 2015.*

Conferences

- **Y. Munian**, A. Martinez-Molina and M. Alamaniotis, "Comparative Analysis of Thermogram and Pre-Processed HoG Images Using Machine Learning Classifiers," *2023 14th International Conference on Information, Intelligence, Systems & Applications (IISA)*, Volos, Greece, 2023, pp. 1-8, doi: 10.1109/IISA59645.2023.10345890.

- *Dimitrios Miserlis, **Yuvaraj Munian**, William T. Bohannon, Marissa Wechsler, Miguel Montero-Baker, Lucas Ferrer-Cardona, Mark G. Davies, Panagiotis Koutakis, Miltiadis Alamaniotis, "Convolutional Neural Network Analysis of Tissue Remodeling and myopathy in Peripheral Arterial Disease," 13th International Conference on Information, Intelligence, Systems & Applications, IISA, 2022.*

- *K. S. Ayyagari, **Y. Munian**, D. Inupakutika, B. Koti Reddy., R. Gonzalez and M. Alamaniotis, "Simultaneous Detection and Classification of Dust and Soil on Solar PhotoVoltaic Arrays Connected to A Large-Scale Industry: A Case Study,"* 2022 18th International Conference on the European Energy Market (EEM)*, 2022, pp. 1-6, doi: 10.1109/EEM54602.2022.9921140.*

- ***Yuvaraj. M,** A. Martinez-Molina, and M. Alamaniotis, Comparison of Image Segmentation, HOG and CNN Techniques for the Animal Detection using Thermography Images in Automobile Applications, 12th Int. Conf. Information, Intell. Syst. Appl. IISA 2021, 2021.*

- ***Yuvaraj. M**., A. Martinez-Molina, & M. Alamaniotis, Design and Implementation of a nocturnal animal detection intelligent system in Automobile Applications. International Conference on Transportation and Development 2021 – Transportation operations technologies and safety, American Society of Civil Engineers (ASCE), 2021. 438-449, https://ascelibrary.org/doi/ 10.1061/9780784483534.038*

- ***Yuvaraj. M**, A. Martinez-Molina, and M. Alamaniotis, Intelligent System for Detection of Wild Animals Using HOG and CNN in Automobile Applications, 11th Int. Conf. Information, Intell. Syst. Appl. IISA 2020, 2020.*

- ***M. Yuvaraj**, P. Surekha, and S. Sumathi, "An efficient optimization technique for digital watermarking in image processing," 2010 International Conference on Intelligent Control and Information Processing, 2010, pp. 803-808, doi: 10.1109/ICICIP.2010.5565254.*

In Progress:

- *Natural Language Processing*
- *Adversarial Machine Learning in Social Networks and Text based application*

Reviewer

- *Acting as a reviewer in the journal **" International Journal on Artificial Intelligence Tools (IJAIT)** and reviewed a few papers related to my research area. This helps in understanding the different perceptive, applications, and the recent trends in the research area.*

- *Acting as a reviewer in the journal **" Intelligent Decision Technologies (IDT)** and reviewed a few papers related to machine learning and power systems. This helps in understanding the different perceptive, applications, and the recent trends in the multi disciplinary research area.*

- *Acting as a reviewer in the journal **" Internet of Things (IoT)***

- *Acting as a reviewer in the journal **" Artificial Intelligence (AI)***

Course Projects & Mini Projects

- *Image Processing with Binary Classification or Object Recognition   - April 2020*
- *Comparison of Classifiers Using Thermal Image for Animal Detection   - November 2019*
- *Convex Optimization for Modern Machine Learning in Image Processing   - November 2019*
- *Face Detection Using CNN(Vgg16, Vgg19, Resnet20)   - April 2019*

- *Network Intrusion Detection Using Decision Tree Classification of KDD'99 DATA Set Utilizing Parallel Computing Application*   *- November 2018*
- *Design of IIR and FIR Filter to Remove the Noise from the Original Source Signal*   *- November 2018*
- *A Simple Dependency Solver*   *- April 2018*
- *Design of CMOS Inverter using Mentor Graphics and L-Edit.*
- *Traffic Light Controller using VHDL.*

Paper Presented

- *Presented a paper on "An Effective Optimization Technique for Digital Watermarking in Image Processing by Genetic Algorithm" at the National Seminar organized by Park College of Engineering, Karumathampatti, and Coimbatore. (14th & 15th August 2010).*
- *Presented an "Effective Optimization Technique for Digital Watermarking in Image Processing" paper at the National Conference organized by PSG College of Technology, Coimbatore. (26th March 2009).*

Subject Proficiency

- *Digital Image and Signal Processing*
- *Machine Learning & Deep Learning*
- *Artificial Intelligence*
- *Neural Networks and Fuzzy Systems*
- *Computer Architecture*
- *Digital Communication*
- *VLSI Design*
- *Introduction to Control Systems*
- *Advanced Engineering Mathematics*
- *Introduction to Electrical Engineering*
- *Electronic Devices and Circuits*
- *Logic Design*
- *Embedded Systems*
- *Microprocessors and Microcontrollers*

Skills

- Python
- MATLAB
- C
- Xilinx
- SQL
- Pspice
- LabVIEW
- Tanner
- Simulink
- Tableau

Core Competencies

- ***Deep Learning Algorithms:*** *State-of-art methods, CNN, DenseNet, ResNet, AlexNet, EfficientNet, Inception, Xception, NASNetLarge, DNN, LSTM, and CNNLSTM.*
- ***Machine Learning Algorithms:*** *SVM, Logistic Regression and Linear Regression, Classifiers, Decision Tree, Clustering models, random Forest.*
- ***Scientific Libraries:*** *Numpy, Scipy, Matplotlib, Pandas, Keras, Pytorch, Tensorflow, Deep Learning Toolbox.*
- ***IDE:*** *Anaconda, Spyder, PyCharm, Jupyter Notebook, Tableau Desktop*

- *Data and Quantitative Analysis*
- *Predictive Modelling*
- *Gitlab*

Mentoring, Research Guidance, and Academic Responsibilities

- **Research Experiences for undergraduates (REU) Program – Guided undergraduate student**
  - *It is a program started at the University of Texas at San Antonio (UTSA) to guide undergraduate students from various universities, build confidence, and strengthen their hands-on training experience.*
  - *June 2022 – August 2022 (Student from Trinity University) – Funded by NSF*
    - *Project Title: Leveraging Road security during nocturnal hours by characterizing animal poses utilizing Convolutional Neural Network based analysis of thermal images*
    - *Description: This paper proposes a new methodology that couples the use of a two-dimensional convolutional neural network (2D-CNN) and thermal image input to determine the risk of an animal in a specific pose during the nocturnal hours of the day present of a passing automobile.*
  - *June 2021 – August 2021 (Student from Texas A&M University, Kingsville)*
    - *Project Title: Thermal Image data analysing using Structural Similarity Index (SSIM) and Mean Square Error (MSE)*
    - *Description: To identify the difference between the consecutive image frames extracted from the full 10 or 20 secs video. Image comparison and similarity index calculation help in identifying whether the animal is moving toward the vehicle or not.*
- **Mentor and project coordinator** to Postgraduate Students.
- **Students Counsellor** in India.
- **Acted as Internal and External Examiner** for B.E., Theory & Practical Examinations conducted by Anna University, India.

Workshop, Seminar, and Faculty Development Program Attended

- *Three workshops were attended in the area, MATLAB - control system application and image processing, signal and image processing, and circuit design using PSPICE.*
- *Three seminars on wireless network security, beforming data in the tether-free world, and faculty development skills were attended.*
- *Nine faculty development programs attended from different engineering colleges titled instructional design and delivery techniques, Fuzzy systems in image processing, wireless communication and network technology, antennas, wave propagation, electromagnetic fields, transmission lines and waveguides, and real-time embedded system applications using LABVIEW.*

Membership with Professional Bodies

- *Life Member in Indian Society for Technical Education (ISTE): LM 84027.*
- *Life Member in Institution of Electronics and Telecommunication Engineers (IETE): AM-236113.*
- *American Society for Civil Engineers (ASCE) – Student member.*