




# ARCHANA KANNAN

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## EDUCATION

-  UNIVERSITY OF SOUTHERN CALIFORNIA, Viterbi School of Engineering August 2021 - Present  
PhD in Electrical Engineering
  -  UNIVERSITY OF SOUTHERN CALIFORNIA, Viterbi School of Engineering August 2018 - May 2020  
MS in Electrical Engineering
  -  ANNA UNIVERSITY, MIT Campus August 2014 - May 2018  
BE in Electronics and Instrumentation
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## RESEARCH EXPERIENCE

- University of Southern California | Research Assistant | Los Angeles, CA May 2019 – Present
- Currently working at the MiXIL (Microwave systems, Sensors, and imaging lab) as a research assistant to Prof. Mahta Moghaddam involved in following projects:
    - D-SHIELD(Distributed Spacecraft with Heuristic Intelligence to Enable Logistical Decisions)
    - SoilSCAPE (Soil Moisture Sensing Controller And oPtimal Estimator)
    - SPCTOR (Sensing-Policy Controller and OptimizeR)
- University of Southern California | Summer research Intern | Los Angeles, CA May 2020 – August 2020
- Worked with Prof. Erik Johnson, where we investigated the bounds on sample size for reliable model falsification.
  - Used VC generalization to estimate a lower bound to the sample size. Results were published at SIAM CSE21.
- Indian Institute of Technology-Madras | Research Intern | Chennai, India April 2017 – May 2017
- Conducted research to devise a novel methodology to control unstable second-order systems and critically damped second-order systems.
  - Published a peer-reviewed conference paper in IEEE Indian Control Conference (ICC-2018). Future work consisted of implementing Multiple Dominant Pole and Direct Synthesis to obtain a design for Mag-Lev system.
- Indian Institute of Technology-Bombay | Intern | Bombay, India October 2016 – March 2017
- Headed a team of 4 to build an all-terrain robot using Firebird V platform interfacing various sensors(Gyroscope, IR, Sonar, color, White line), simulating modelling of surface of Mars and communicate it with base communication center.
  - Based on information communicated, home computer creates a 2D representation of Mars surface using Blender software. Transmission was done using XBEE wire-less communication with a time lag of 5-10 seconds.
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## PEER-REVIEWED CONFERENCE PAPERS

- [1] **Archana Kannan**, Grigorios Tsagakatakis, Ruzbeh Akbar, Daniel Selva, Vinay Ravindra, Richard Levinson, Sreeja Nag, Mahta Moghaddam (2022), “Forecasting Soil Moisture Using a Deep Learning Model Integrated With Passive Microwave Retrieval”, International Geoscience and Remote Sensing Symposium (IGARSS2022), accepted and presented at IGARSS 2022.
- [2] Ruzbeh Akbar, Sam Prager, Agnelo Silva, Kazem Bakian-Dogaheh, **Archana Kannan**, Erik Hodges, Asem Melebari, Dara Entekhabi, Mahta Moghaddam (2022), “Field Demonstrations Of SPCTOR: Sensing Policy Controller And Optimizer”, International Geoscience and Remote Sensing Symposium (IGARSS2022), accepted and presented at IGARSS 2022.
- [3] S. Ashwin Kumar, **K. Archana**, Simi Santosh, M. Chidambaram (2018), “[Design of PID controllers for Critically Damped SOPTD systems](#)”, Indian Control Conference (ICC2018), IEEE. DOI: 10.1109/INDIANCC.2018.8307965
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## OTHER RESEARCH OUTCOMES

- [1] **Archana Kannan**, Grigorios Tsagakatakis, Ruzbeh Akbar, Daniel Selva, Vinay Ravindra, Richard Levinson, Sreeja Nag, Mahta Moghaddam (2021), “[Forecasting global geophysical states using a deep learning model for Spacecraft constellation scheduling and planning](#)”, poster presentation at AGU Fall meeting 2021.

[2] Ruzbeh Akbar, Agnelo Silva, Samuel Prager, Kazem Bakian Dogaheh, **Archana Kannan**, Asem Melebari, Erik Hodges, Dara Entekhabi, Mahta Moghaddam (2021), "[Integration of in situ Wireless Sensor Networks and UAVs for Soil Moisture Mapping](#)", oral presentation at AGU Fall meeting 2021.

[3] **Archana Kannan**, Agnimitra Dasgupta, Julia Woome, Erik A. Johnson, Steven F. Wojtkiewicz (2021), "*Investigation of bounds on sample size for reliable model falsification*", oral presentation at SIAM CSE21.

[4] Ruzbeh Akbar, Agnelo Silva, Richard Chen, Negar Golestani, Kazem Bakian Dogaheh, **Archana Kannan**, Dana Kahn, Mahta Moghaddam, Dara Entekhabi (2019), "[Recent Progress and Development in Energy Efficient and Smart in situ Wireless Sensor Networks: SoilSCAPE](#)", poster presentation at AGU Fall Meeting 2019.

[5] Archana Kannan (2018), "Modelling and design of Fractional order controller for HTST milk pasteurization process", B.E Thesis. Adviser: Prof. Manamalli D.

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## RESEARCH PROJECTS

- Prediction of forest fire using machine learning algorithms January 2022 - May 2022
- Explored various distribution-free (Nearest means, Support Vector Machines, Perceptron), Artificial Neural Networks (Multi-Layer Perceptron), and probabilistic (Naive Bayes, Kernel Density Estimator, K Nearest neighbours) machine learning methods for predicting 'fire' or 'no fire' classifications in the Algerian forests.
  - Attained a 98.24% accuracy on the testing data set using K Nearest neighbours feature engineered with Linear Discriminant Analysis for dimensionality reduction.
- D-SHIELD May 2020 - Present
- Part of project funded by NASA AIST, collaborating with NASA ARC, MIT, Texas A&M, working on methods to predict global soil moisture with high fidelity. Presently using ConvLSTM deep learning method to predict global soil moisture with 0.05 RMSE.
  - Working on soil moisture retrieval methods for joint retrieval with radar and radiometer observations.
- SoilSCAPE May 2019 - Present
- Designed PCB boards for the wireless sensor networks. Part of team that implemented Wake-up Over Radio feature on existing circuitry. Add-on was field tested at Cary Institute of Ecosystem Studies site, New York. Results were documented and published at the AGU Fall 2019 Conference.
  - Worked on upscaling soil moisture in the Missouri basin, USA for flood monitoring using Random Forest regression method.
- Comparison of a Parametric and a Non-parametric method of identifying Non-linear system January 2019 - April 2019
- Compared the parametric and non-parametric system identification methods for non-linear systems emphasising on the significance of the persistency of excitation.
  - Considered the Radial Basis Functions (RBF) approximation of multivariate nonlinear mapping as a linear parametric regression problem and identified the linear system.
- Fractional order controller design for HTST milk pasteurization process January 2018 - April 2018
- Proposed a Fractional Order PID controller for the HTST Milk pasteurization process. Collected input-output dataset, identified plant using Grunwald-Letnikov approximation, formulated a Fractional Order PID minimising ISE by Nelder-Mead Algorithm.
  - Results were compared with integral PID controller by computing performance criteria (ISE, IAE, gain margin, Phase margin, Maximum sensitivity) and the error was reduced drastically.
  - Validated method by applying it to an existing Aavin Milk Pasteurization plant at Chennai, India, to know scope of new technique.
- RTD Temperature Transmitter January 2017 - April 2017
- Developed a temperature sensing device, displaying temperature in °C and °F with an accuracy of  $\pm 0.5\%$ .
  - Encompassed signal conditioning, zero and span adjusting circuit to RTD sensor. Documented various temperature value against resistance to standardise a datasheet.
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## TECHNICAL SKILLS

- MATLAB, Mathematica
  - LabView
  - Proteus, Eagle, KiCAD
  - Arduino, Raspberry Pi
  - Blender software
  - C, C++, Python, R
  - TensorFlow
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## EXTRA CURRICULARS

Treasurer of the USC IEEE GRSS-APS-SSCS student chapter. Part of USC Drishti, Indian classical dance team.