

## Sathyanarayanan N. Aakur

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Department of Computer Science  
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<b>RESEARCH INTERESTS</b>	<b>Application of Cognitive Models in Computer Vision</b> Predictive Learning for Active Event Perception in Videos; Commonsense Reasoning for Visual Understanding; Contextual Models of Memory for Event Perception	
<b>TEACHING INTERESTS</b>	Image/Video processing, Computer Vision, Introduction to Programming, Data Structures, Pattern Recognition	
<b>EDUCATION</b>	<b>University of South Florida</b> , Tampa, FL	Summer 2019
	<i>Ph.D.</i> , Computer Science and Engineering Advisor: Dr. Sudeep Sarkar	
	<b>University of South Florida</b> , Tampa, FL	Fall 2015
	<i>Master of Science</i> , Management Information Systems	
	<b>Anna University</b> , Chennai, India	Spring 2013
<b>PROFESSIONAL EXPERIENCE</b>	<i>Bachelor of Engineering</i> , Electronics & Communications Engineering Advisor: Prof. Leena Jasmine Thesis: Real-time Data Acquisition for Production Report Generation	
	<b>Assistant Professor</b> Aug 2019 - Present	Oklahoma State University Stillwater, OK
	<b>Applied Scientist Intern</b> May 2018 - Aug 2018	Amazon Go Boston, MA
	<b>Programmer Analyst</b> Oct 2012 - November 2015	CTSI-Global Chennai, India
	<b>Programmer Analyst Intern</b> Apr 2012 - Oct 2012	CTSI-Global Chennai, India
<b>ACADEMIC HONORS AND AWARDS</b>	Outstanding Reviewer at CVPR 2020 (Top 3.9% of reviewers)	<b>2020</b>
	Senior Fellow, USF NSF I-Corps	<b>2019</b>
	Oral Presentation, Conference on Computer Vision and Robotic Vision	<b>2017</b>
	Outstanding Contribution to the Company, CTSI-Global	<b>2015</b>
	Best Student Project Award, Velammal Engineering College	<b>2010</b>
<b>PEER REVIEWED PUBLICATIONS</b>	Best Student in Foreign Language - French, Leo Matriculation School	<b>2009</b>
	1. Sai Narayanan, Akhilesh Ramachandran, <b>Sathyanarayanan Aakur</b> , Arunkumar Bagavathi. Genome Sequence Classification for Animal Diagnostics with Graph Representations and Deep Neural Networks. IEEE International Conference on Machine Learning Applications (ICMLA), 2020. Accepted, to appear.	
	2. Sanjoy Kundu, Nikhil Gunti, Bailey Hendrickson, Sunil More, <b>Sathyanarayanan Aakur</b> . Benchmark and Evaluation of Low Resource Object Detection in Biomedical Images. IEEE Workshop on Applied Imagery and Pattern Recognition, 2020. Accepted, to appear.	
	3. <b>Sathyanarayanan N. Aakur</b> , Sudeep Sarkar. Action Localization through Continual Predictive Learning. European Conference on Computer Vision (ECCV) 2020. Accepted, to appear.	

4. Vishalini R. Laguduva, Shakil Mahmud, **Sathyanarayanan Aakur**, Robert Karam, Srinivas Katkoori. Dissecting Convolutional Neural Networks for Efficient Implementation on Constrained Platforms. *IEEE International Conference on VLSI Design (VLSID)*, 2020. *(Oral)*
5. Vishalini R. Laguduva, **Sathyanarayanan Aakur**, Srinivas Katkoori. Latent Space Modeling for Cloning Encrypted PUF-based Authentication. *IFIP International Internet of Things (IoT) Conference*, 2019. *(Oral)*
6. Vishalini R. Laguduva, Sheikh Ariful Islam, **Sathyanarayanan Aakur**, Srinivas Katkoori and Robert Karam. Machine Learning based IoT Edge Node Security Attack and Countermeasures *IEEE Computer Society Annual Symposium on VLSI (ISVLSI)*, 2019. *(Oral)*.
7. **Sathyanarayanan Aakur**, Sudeep Sarkar. A Perceptual Prediction Framework for Self Supervised Event Segmentation. *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2019. [pdf].
8. **Sathyanarayanan Aakur\***, Daniel Sawyer\*, Sudeep Sarkar. Fine-grained Action Detection in Untrimmed Surveillance Videos *Winter Conference on Applications of Computer Vision Workshops*, 2019.
9. **Sathyanarayanan Aakur**, Fillipe DM de Souza, Sudeep Sarkar. Going Deeper with Semantics: Exploiting Semantic Contextualization for Interpretation of Human Activity in Videos. *Winter Conference on Applications of Computer Vision*, 2019. [pdf].
10. **Sathyanarayanan Aakur**, Fillipe DM de Souza, Sudeep Sarkar. Generating Open World Descriptions of Video using Commonsense Knowledge in a Pattern Theory Framework. *Quarterly of Applied Mathematics*. [pdf].
11. Gilbert Rotich\*, **Sathyanarayanan Aakur\***, Rodrigo Minetto, Mauricio Segundo, Sudeep Sarkar. Using semantic relationships among objects for geospatial land use classification. *IEEE Applied Imagery Pattern Recognition Workshop*, 2018.
12. **Sathyanarayanan Aakur**, Fillipe DM de Souza, Sudeep Sarkar. On the Inherent Explainability of Pattern Theory-based Video Event Interpretations. Book Chapter, *Explainable and Interpretable Models in Computer Vision and Machine Learning in the Springer Series on Challenges in Machine Learning*. [pdf].
13. **Sathyanarayanan Aakur**, Fillipe DM de Souza, Sudeep Sarkar. Inherently Explainable Model for Video Activity Recognition *AAAI Workshop On Reasoning and Learning for Human-Machine Dialogues*, 2018 *(Oral)*. [pdf]
14. **Sathyanarayanan Aakur**, Fillipe DM de Souza, Sudeep Sarkar. Towards a Knowledge-based Approach to Video Comprehension. In *Conference on Computer and Robot Vision (CRV)*, 2017 *(Oral)*. [pdf]
15. **Sathyanarayanan Aakur**, Mithun Singh. Real Time Data Acquisition System for Production Report Generation. In *International Conference on Computational Intelligence and Advanced Manufacturing Research (ICCIAMR)*, 2013.

#### PUBLICATIONS UNDER REVIEW

1. Kenneth Malmberg\*, **Sathyanarayanan Aakur\***, Sudeep Sarkar. A Bayesian Network Model of the Reinstatement of Autobiographical Context. Under Review.
2. **Sathyanarayanan Aakur**, Sudeep Sarkar. Abductive Reasoning as Self Supervision for Common Sense Question Answering. Under Review.
3. **Sathyanarayanan N. Aakur**, Arunkumar Bagavathi. Unsupervised Gaze Prediction by Energy-based Surprise Modeling. Under Review.

## TECHNICAL REPORTS

1. **Sathyanarayanan Aakur**, Daniel Sawyer, Michal Balazia, Sudeep Sarkar. An Examination of Proposal-based Approaches to Fine-grained Activity Detection in Untrimmed Surveillance Videos *Proceedings of TRECVID 2018, NIST, USA, 2018*.
2. **Sathyanarayanan Aakur**, Michael Goltz, Alanould Alsalam. An Automated Jigsaw Puzzle Solver using Local and Global Discriminant Features. *University of South Florida (USF), 2016*.
3. **Sathyanarayanan Aakur**. An Evaluation of Methodologies for Predicting the Forest Cover Type via Visual Features. *University of South Florida (USF), 2014*.

## MENTORING

1. Nikhil Gunti (M.S. Student (OSU) Fall 2019 - Present)
2. Sanjoy Kundu (Ph.D. Student (OSU) Spring 2020 - Present)
3. Shubham Trehan (Ph.D. Student (OSU) Fall 2020 - Present)
4. Priyadharsini Ramamurthy (Ph.D. Student (OSU) Fall 2020 - Present)
5. Vineela Indla (M.S. Student (OSU), Fall 2020 - Present)
6. Gilbert Rotich (Ph.D. Student (USF), 2017-2019)
7. Daniel Sawyer (Undergraduate (USF), 2016 - 2018) [*Now at: Ph.D. Program at University of South Florida*]
8. Subramanian Viswanathan (Master's (USF), Fall 2016 - Spring 2017)[*First Job: Goldman Sachs*]

## TEACHING EXPERIENCE

**Instructor** Oklahoma State University  
Spring 2020 - Present Stillwater, OK  
Spring 2020: CS 5323 Design and Implementation of Operating Systems II  
Fall 2020: CS 4783/5783 Machine Learning

**Instructor** University of South Florida  
Summer 2017, Summer 2019 Tampa, FL  
Undergraduate Course: IT Programming Fundamentals  
Student Evaluation: 4.0/5.0

**Graduate Teaching Assistant** University of South Florida  
Spring 2016 - Spring 2019 Tampa, FL  
Spring 2019: Computer Vision (Graduate)  
Spring 2017 - Summer 2019: USF I-Corps Sessions (NSF Lean Business Canvas Course)  
Spring 2017: Biometrics (Graduate), IT Data Structures/Algorithms (Undergraduate)  
Fall 2016: IT Data Structures (Undergraduate), Computational Geometry (Undergraduate)  
Spring 2016: Automata Theory/Formal Languages (Undergraduate)

## PROFESSIONAL SERVICE

**NSF Panels:** IIS CHS (2020)  
**Track Chair:** Machine Learning for Graphs (ICMLA 2020), DEEP-DIAL (AAAI 2021)  
**Program Committee:** AAAI 2020, AAAI 2021  
**Reviewer:** ICLR 2021, IET Computer Vision, WACV 2020, ICCV 2019, CVPR 2019, CVPR 2020, CRV 2020, ECCV 2020, WACV 2021, NeurIPS 2020, ACCV 2020, IEEE Access  
**External Reviewer:** PLOS ONE, IROS 2017, CAIP 2017  
**Organizer:** Special Session on Machine Learning for Graphs (ICMLA 2020), DEEP-DIAL (AAAI 2021), AI Seminar (University of South Florida. Fall 2016 - Spring 2019)  
**Co-Organizer:** Robotics Competition, INNOWIZ Symposium 2012-2013, Velammal Engineering College  
**Web Chair:** INNOWIZ Symposium 2012-2013, Velammal Engineering College

## TALKS

**Invited Talk** *The Role of Commonsense Knowledge in Visual Understanding*. Oklahoma State University. Fall 2018

**Invited Talk** with Dr. Sudeep Sarkar. *Going Deeper with Semantics: Exploiting Semantic Contextualization for Interpretation of Human Activity in Videos*. Technical Seminar Series, Statistical Shape Analysis & Modeling Group, Florida State University. Fall 2018

**Invited Talk** with Dr. Sudeep Sarkar. *Video Event Understanding with Pattern Theory*. Robotics Technical Seminar Series, Department of Mechanical Engineering, University of South Florida. Spring 2018

**Invited Talk** *Leveraging ConceptNet to Reduce Training Requirements for Video Descriptions*, Seminar in AI, University of South Florida, Spring 2017.

## FUNDING

### Current

1. *Collaborative Research: RI: Medium: Understanding Events from Streaming Video - Joint Deep and Graph Representations, Commonsense Priors, and Predictive Learning*, NSF CISE Core Program, \$285,126, (Total: \$1,005,543) **PI**.
2. *Deep Learning Computational Algorithms for Disease Diagnosis by Genome Sequence*, USDA National Animal Health Laboratory Network, \$158,136, **Co-PI**.
3. *Accelerating Research Discoveries with GPU-enabled Computing*, Oklahoma State University Core Facility Support Program, \$150,000, **Co-PI**.
4. *Next Generation User Interfaces for Gateway Autonomous Operations*, NASA X-Hab Project, \$30,000, **Co-PI**

### Submitted, Pending

1. *Enabling Lifelong Learning for grounded Visual Understanding with Attention, Compositional Understanding and Abductive Learning*, NSF Science of Learning Program, \$425,150, **PI**.

**PROFESSIONAL** Available upon request.

## REFERENCES