

## Suman Saha

Email: [suman.saha-2014@brookes.ac.uk](mailto:suman.saha-2014@brookes.ac.uk), Webpage: <https://sahasuman.bitbucket.io/>

### Contact Information:

Robotics and Vision Lab. room no. T2.06,  
Turing Building, Wheatley Campus,  
Artificial Intelligence and Vision Research Group,  
Dept. of Computing and Communication Technologies,  
Oxford Brookes University, OX33 1HX, United Kingdom,  
Mobile: +44 7899265467/7448306073, Office : +44 (0) 1865 48 4574



### RESEARCH INTERESTS

*Computer Vision and Machine Learning*

### RESEARCH EXPERIENCE

#### Disney Research Zurich

(April 10, 2017 - till date)

*Research Intern*

Project title: *Unsupervised and semi-supervised learning of audience facial expressions using deep generative models*. Improved the classification accuracy by 9% over the existing method.

#### University of Bedfordshire

(June, 2013 - September, 2013)

*Research Intern*

Project title: *New Foundational Structures for Engineering Verified multi-UAVs*  
Collaborator: Department of Computer Science, University of Oxford

### DEEP LEARNING SKILLS

- **Deep CNN architectures:** AlexNet, VGG-16, Faster-RCNN, SSD.
- **Deep generative models:** VAEs (Variational Autoencoders), GANs (Generative adversarial networks), semi-supervised deep generative models.
- **Deep learning software tools:** Torch, Caffe, Theano.
- **GPU application:** multi-GPU training / testing in Torch.

### EDUCATION

#### PhD in Computing and Mathematics

(September 2014 - Present)

**Artificial Intelligence and Vision research group**, Oxford Brookes University

Thesis direction: *Spatiotemporal human action localisation in videos*

Supervisors: Professor Fabio Cuzzolin, Professor Nigel Crook, Dr Tjeerd Olde Scheper

#### MSc in Computer Science

(September, 2012 - March, 2014)

**University of Bedfordshire**, United Kingdom

Grade: **double distinction** (Scored 94.27% marks)

Thesis: *A Monocular Vision Approach for Obstacle Detection and Collision Avoidance for Low-cost Quadrocopters*.

Supervisors: Ashutosh Natraj, Sonia Waharte

Related Publication link, Project page link, MSc thesis poster

#### Polytechnic Diploma Engineering in Computer Science

(August, 1999 - June, 2002)

Siddaganga Polytechnic College, Tumkur, Karnataka, India

## PUBLICATIONS

- **Suman Saha**, Gurbir Singh, Fabio Cuzzolin. 2017.  
*AMTnet: Action-Micro-Tube regression by end-to-end trainable deep architecture*, arXiv preprint arXiv:1704.04952. Accepted in **ICCV** (International Conference on Computer Vision, Venice), Italy, October, 2017.
- Gurbir Singh, **Suman Saha**, Michael Sapienza, Philip H. S. Torr, Fabio Cuzzolin. 2017.  
*Online Real time Multiple Spatiotemporal Action Localisation and Prediction on a Single Platform*, arXiv preprint arXiv:1611.08563. Accepted in **ICCV** (International Conference on Computer Vision, Venice), Italy, October, 2017.
- **Suman Saha**, Gurbir Singh, Michael Sapienza, Philip H. S. Torr, Fabio Cuzzolin. 2017.  
*Spatio-temporal human action localisation and instance segmentation in temporally untrimmed videos*, arXiv preprint arXiv:1707.07213 (2017).
- Fabio Cuzzolin, Michael Sapienza, Patrick Esser, **Suman Saha**, Miss Marloes Franssen, Johnny Collett, Helen Dawes. 2017.  
*Metric learning for Parkinsonian identification from IMU gait measurements*, Journal Gait & Posture 54 (2017): 127-132.
- **Suman Saha**, Gurbir Singh, Michael Sapienza, Philip H. S. Torr, Fabio Cuzzolin. 2016.  
*Deep Learning for Detecting Multiple Space-Time Action Tubes in Videos*, In Proceedings of the 27-th British Machine Vision Conference (BMVC), York, United Kingdom. Our proposed method **achieved the state-of-the-art results to date** in spatiotemporal human action localisation in videos.  
Project page link, YouTube video link.
- **Suman Saha**, Ashutosh Natraj and Sonia Waharte. 2014.  
*A real-time monocular vision-based frontal obstacle detection and avoidance for low cost UAVs in GPS denied environment*, 2014 IEEE International Conference on Aerospace Electronics and Remote Sensing Technology, Yogyakarta, pp. 189-195. Project page link, Paper link.
- **Suman Saha**. 2014.  
*A Monocular Vision Approach for Obstacle Detection and Collision Avoidance for Low-cost Quadcopters*, MSc thesis, University of Bedfordshire, UK.
- **Suman Saha**. 2014.  
*Face Recognition using PCA and Multilayer Feedforward Neural Networks*, European Journal of Applied Sciences and Technology.
- **Suman Saha**. 2014.  
*Parallelization of Genetic Algorithms using MapReduce*, European Journal of Applied Social Sciences Research.

**PROFESSIONAL EXPERIENCE** Tata Steel Limited, Jamshedpur, India (November, 2006 - August, 2012)  
**Software Analyst** at the Research and Development Division (R&D)

Major works include:

- Designed and developed a software to increase the thermal efficiency and reduce the fuel consumption of WRM (wire rod mill) reheating furnace.
- Designed and developed software to predict mill force, mean flow stress, strain, percentage elongation, yield strength using *ANN* (artificial neural networks).
- Maintained a software which predicts the mechanical properties of the hot rolled strip using a series of physical and microstructural based models, coupled with various techniques including *ANN* (artificial neural networks).
- Applied different Machine learning algorithms such as SVM (Support Vector Machine), PCA (Principal Component Analysis) for production data analysis.

SICT Pvt. Ltd. India (July, 2002 - October, 2006)  
**Software Developer**

**TEACHING EXPERIENCE** Oxford Brookes University, United Kingdom

- Delivered an introductory lecture on *Advance Computer Vision* to MSc students, 6th July 2015.
- Helped two MSc Computer Vision students with their final projects (2015-2016 batch).
- Teach undergraduate students *IT Skills* module (September 2016-2017 batch).

## **Tata Steel Limited, Jamshedpur, India**

- Guided 3 Bachelor in Computer Science summer interns at R&D division (2010).

## **TECHNICAL REPORT, TALK**

- Delivered a talk on spatio-temporal human action localisation at the Departmental Research Seminar, Oxford Brookes University, February 2016.
- *A survey report on Deep Learning Approach for Human Action Detection from Video* submitted to CCT Dept. Oxford Brookes University, September, 2015.
- *Performance analysis on temporal tubes: A benchmarking report* submitted to CCT Dept. Oxford Brookes University, 2014.
- *Streaming hierarchical graph based video segmentation*, a talk presented at research group seminar, Oxford Brookes University, November, 2014.
- *Streaming hierarchical graph based video segmentation: A step-by-step guide* submitted to CCT Dept. Oxford Brookes University, 2014.

## **AWARDS AND ACHIEVEMENTS**

- Our group won the reading group competition at *ICVSS 2015 Summer School* - 2015
- Received the prestigious University Research Studentship award, Oxford Brookes University - 2014
- Successfully passed ICVSS 2015 examination, July 2015.
- Nominated for the prestigious Overseas PhD Scholarship award Scheme, Aberystwyth University, United Kingdom (*declined*) - 2014
- *Best Overall Performance award* for MSc course, 3rd April, 2014
- *Best Masters Project award* on 3rd April, 2014
- *Merit Scholarship award* at Masters level, 2014
- Secured highest marks in Computers Science in standard X(96%) and XII(grade: A).
- Secured top rank in school in standard 'X' final board examinations.

## **COURSES UNDERTAKEN**

- CS231n: Convolutional Neural Networks for Visual Recognition, Stanford Vision Lab (mode - online).
- Machine Learning course, department of Computer Science, University of Oxford (mode - online).
- Attended International Computer Vision Summer School 2015, Sicily, Italy.
- Attended doctorate training programme for statistical methods of data analysis, Oxford Brookes University, 2015.
- Attended training session on the use of Oxford Brookes high performance computing facilities, 2015.
- Attended talk on *Visualizing and Understanding Recurrent Neural Networks* by *Andrej Karpathy*, Stanford Computer Science group, at Engineering and Science Department, Oxford University.
- Attended two reading groups in the Department of Engineering Science at University of Oxford, topic discussed Generative Adversarial Nets (GANs), Variational Autoencoders (VAEs), June, 2016.

- *MSc taught courses:* Intelligent Agents, Programming Embedded Systems, Distributed and Parallel Computing, Systems Architecture, Data Modelling and Management, Network Systems, Cryptography and Cryptanalysis, Professional Project Management.
- *Self-motivated learnings (MSc):* Multiple View Geometry in Computer Vision, Probability Theory and its Applications, Linear Algebra, Single and Multi-Variable Calculus.
- *Polytechnic Diploma Engineering:* Applied Mathematics, Applied Science, Digital Electronics and Introduction to Microprocessor, Electrical and Electronic Engineering, Computer Network and Architecture, System Programming, Software Engineering, Operating System, Advanced C programming and Data Structures.

## SERVICES AND PARTICIPATION

- Presented a poster on *Deep Learning for Detecting Multiple Space-Time Action Tubes in Videos* in the *MURI Meeting* at St. Catherines College, Oxford, UK, 1st August, 2016.
- Presented a poster on *Online Human Action Localisation based on Appearance and Motion Cues* at *(ICVSS) 2015*, Sicily, Italy, July 2015.
- Actively participated in the TeenTech event at London, 1st December 2015.
- Attended the Ambassadors visit at Gipsy Lane campus, Oxford Brookes University, UK, 30th September, 2015.
- Actively participated in the BBC News live broadcast at BBC broadcasting hub, London, 14th September, 2015. Watch: [video1](#) , [video2](#).
- Taking humanoid robot Artie to Magna Carta event on 18th June 2015.
- Actively participated in the Outburst Festival with humanoid robot Artie and the Naos, 9th May, 2015.
- Actively participated in the Joint University Alliance and Deloitte research showcase, Royal Institution, 21 Albemarle Street, London, W1S 4BS, UK, 12 March, 2015.
- Attended the Real World Impact filming event organised by University Alliance on 31st January, 2015 at Gipsy lane campus, Oxford Brookes University, UK, 31st January, 2015.

## COMPUTING SKILLS

- **Programming Languages:** C/C++, Matlab, Lua, Python, Java.
- **Scientific computing software tool:** Torch, Caffe, Theano, OpenCV.
- **GPU application:** multi-GPU training/testing in Torch.
- **Operating Systems:** Linux and Windows.
- **Development Environments:** PyCharm, Lua Development Tool, GCC, NetBeans.
- **Productivity Applications:** LaTeX, Bitbuckct, Github, Vim, Kate, MS Office, Libreoffice.
- **Multi-media development software:** Inkscape, Openshot, Audacity, GIMP.

## REFERENCES

### Academic references

1. Professor Fabio Cuzzolin
  - Relationship: Director of studies and PhD Supervisor.
  - Organization: Oxford Brookes University
  - Position: Professor of Artificial Intelligence
  - Website URL: <http://cms.brookes.ac.uk/staff/FabioCuzzolin/>
  - E-mail: [fabio.cuzzolin@brookes.ac.uk](mailto:fabio.cuzzolin@brookes.ac.uk)
2. Professor Nigel Crook
  - Relationship: PhD co-supervisor
  - Organization: Oxford Brookes University
  - Position: Head of the Computing and Communication Technology Department
  - Website URL: <https://www.brookes.ac.uk/profiles/staff/nigel-crook/>
  - E-mail: [ncrook@brookes.ac.uk](mailto:ncrook@brookes.ac.uk)
3. Dr Tjeerd Olde Scheper
  - Relationship: PhD co-supervisor and research tutor
  - Organization: Oxford Brookes University
  - Position: Senior Lecturer at Computing and Communication Technology Department
  - Website URL: <http://cct.brookes.ac.uk/staff/tjeerdoldescheper.html>
  - E-mail: [tvolde-scheper@brookes.ac.uk](mailto:tvolde-scheper@brookes.ac.uk)
4. Dr Michael Sapienza
  - Relationship: PhD advisor
  - Organization: University of Oxford
  - Position: Postdoctoral research fellow
  - Website URL: <https://sites.google.com/site/mikesapi/>
  - E-mail: [michael.sapienza@eng.ox.ac.uk](mailto:michael.sapienza@eng.ox.ac.uk)
5. Dr Ashutosh Natraj
  - Relationship: MSc supervisor
  - Organization: University of Oxford
  - Position: Postdoctoral research fellow
  - Website URL: <https://www.cs.ox.ac.uk/people/ashutosh.natraj/>
  - E-mail: [ashutosh.natraj@gmail.com](mailto:ashutosh.natraj@gmail.com)
6. Dr Sonia Waharte
  - Relationship: MSc co-supervisor
  - Organization: University of Oxford
  - Position: Postdoctoral research fellow
  - Website URL: <https://www.cs.ox.ac.uk/people/sonia.waharte/>
  - E-mail: [sonia.waharte@gmail.com](mailto:sonia.waharte@gmail.com)

### Professional references

1. Dr Romann Weber

- Relationship: Project leader / supervisor
  - Organization: Disney Research Zurich
  - Position: Research Scientist
  - E-mail: romann.weber@disneyresearch.com
  - Link to the reference letter received
2. Dr Rajitha Navarantha
- Relationship: co-supervisor
  - Organization: Disney Research Pittsburgh
  - Position: Associate Research Scientist
  - E-mail: rajitha.navarathna@disneyresearch.com
3. Dr Sumitesh Das
- Relationship: Project leader
  - Organization: Tata Steel Limited, India
  - Position: Chief (Global Research Programmes) at Tata Steel Limited
  - Website URL: Google Scholar link
  - E-mail: sumitesh.das@tatasteel.com
  - Link to the reference letter received
4. Dr Abhishek Raj (M. Tech. and PhD, IIT Mumbai, India)
- Relationship: Project advisor
  - Organization: Tata Steel Limited, India
  - Position: Researcher at R&D division
  - E-mail: abhishek.raj@tatasteel.com
  - Link to the reference letter received
5. Raju Venkat Dasu (M. Tech. IIT Delhi)
- Relationship: Project leader
  - Organization: Tata Steel Limited, India
  - Position: Researcher at R&D division
  - E-mail: dvr019@gmail.com