Arun Surya

"I am a young researcher, passionate about algorithms. I have been working for the past 3 years as a research associate at Indian Institute of Astrophysics on image retrieval techniques and algorithms to turn 'bad' astronomical images in to 'good' ones. I look forward to work and enjoy more of image processing and network algorithms."

Contact Information

Senior Research Fellow
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Born

December 02, 1986

Research Interests

Algorithms for Data Analysis, Network Algorithms and Network Security Astro Satistics, Speckle Techniques in Astronomy, Image Processing, Optical Interferometry

Computer Skills

C, C++, MATLAB ,IDL, R Statistical Software, C , Zemax, Python , PHP , Linux shell script

Languages

English (Full professional proficiency)   **Spanish** (Limited working proficiency)

French (Elementary proficiency)   **Hindi** (Full professional proficiency)

Education

Masters(Tech) in Astronomical Instrumentation 2008-2010

From Indian Institute of Astrophysics and Applied Optics & Photonics Department , Calcutta University

Overall **CGPA 8.8** (With **2nd** university rank)

Main courses attended : *Optical techniques in Astrophysics* , *Observational techniques in Astronomy*, *Computational Astrophysics:Statistics and data Mining*, *Optical and Digital Image Processing*

Engineering Degree In Computer Science 2008

From Kannur University. Overall Percentage **75%** (With **3rd** university rank)

Main courses attended : *Artificial Neural Networks , Algorithm Design and Analysis ,*

Programming Language Theory , Control Systems

WorkShops and Training Attended

Astro Statistics School , Indian Institute of Astrophysics , Kavalur , India 2013

VLTI Summer School on Optical Stellar Interfeometry, Barcelonette, France 2013

PUBLICATIONS

- Speckle Imaging with Hypertelescope

  Arun Surya; Swapan K.Saha; Antoine Labeyrie

  Monthly Notices of Royal Astronomical Society (September 1, 2014) 443 (1): 852-859

  DOI: 10.1093/mnras/stu1215

  http://mnras.oxfordjournals.org/content/443/1/852

- Computationally efficient method for retrieval of atmospherically distorted astronomical images

  Journal of Optics , Springer (July 11, 2014)

  Arun Surya; Swapn K. Saha

  DOI: 10.1007/s12596-014-0159-z

  http://link.springer.com/article/10.1007/s12596-014-0196-7

- Concept study of an Extremely Large Hyper Telescope (ELHyT) with 1200m sparse aperture for direct imaging at 100 micro-arcsecond resolution

  Antoine Labeyrie ; Denis Mourard ; FatmÃ© Allouche ; Rijuparna Chakraborthy; Julien Dejonghe ; Arun Surya ; Yves Bresson ; Claude Aime ; David Mary ;Alexis Carlotti

  Proc. SPIE 8445, Optical and Infrared Interferometry III, 844512 (September 12, 2012)

  DOI:10.1117/12.926541

  http://proceedings.spiedigitallibrary.org/proceeding.aspx?articleid=1357072

- Construction of a 57m hypertelescope in the Southern Alps

  A Labeyrie ; F. Allouche ; D. Mourard ; F. Bolgar ; R. Chakraborty ; J. Maillot ;N. Palitzyne ; J. R. Poletti ; J.-P. Rochaix ; R. Prud'homme ; A. Rondi ; M. Roussel ; A. Surya

  Proc. SPIE 8445, Optical and Infrared Interferometry III, 844511 (September 12, 2012)

  DOI:10.1117/12.926168

  http://proceedings.spiedigitallibrary.org/proceeding.aspx?articleid=1357071

- Imaging Exoplanet Transits with Hypertelescopes

  A.Surya , S.K.Saha and A.Labeyrie

  Optical Society of India Symposium XXXVI: International Conference on Contemporary Trends in Optics and Optoelectronics 2011 (Submitted and Accepted)

- Limiting magnitude of hypertelescopes

  Arun Surya

  31st ASI Meeting, ASI Conference Series, 2013, Vol. 9, pp 137

  http://adsabs.harvard.edu/abs/2013ASInC...9..137S

PROJECTS

Development of Triple Correlation Algorithm to retrieve atmospherically degraded astronomical images. 2010-2012 (Masters Project)

Prof Swapan K Saha , Indian Institute of Astrophysics, Prof Antoine Labeyrie , College de France, France

Summary : Speckle Imaging based on triple correlation is a very efficient image reconstruction technique which is used to retrieve Fourier phase information of the object in presence of atmospheric turbulence.

We have developed both Triple correlation and Radon transform based Tomographic speckle masking algorithms to retrieve atmospherically distorted astronomical images. The latter is a much computationally efficient technique because it works with one dimensional image projections. Tomographic speckle imaging provides good image recovery like direct bispectrum but with a large improvement in computational time and memory requirements.

Speckle imaging with Hypertelescopes 2013-2014

with Prof Swapan K Saha , Indian Institute of Astrophysics, Prof Antoine Labeyrie , College de France, France

Summary : Future large direct imaging interferometers having many subapertures will provide direct images of milli-arc second resolution, with the help of advanced cophasing systems and beam combination schemes. With "densified pupil imaging€•, arrays as large as 100,000km are in principle operable for direct imaging with nanosecond resolution. Pending adaptive phasing, useful observations of high resolution can be still done with these systems in speckle mode. A study of speckle techniques with such hypertelescope systems is thus of great interest. The project involved the development of the speckle masking software and the simulation of speckle imaging of hypertelescopes.

Sentimental Analysis using Artificial Neural Networks 2008 Engineering Project

Under guidance of: Mr Gilesh M , Government College of Engineering Kannur

Summary: The project involved building a web based software to analyze documents and RSS feeds from the internet and understand its bias in opinion. The project aimed in using the perceptron model in the developing area of sentimental analysis. The system was built in PHP and MySql and could be used in review sites of products and general discussion forums.

Automated Software for Sunspot Detection from Solar Images of Kodaikanal Observatory using maximum entropy 2011

Under guidance of : Prof. Dipankar Banerjee

Summary: A novel algorithm based on maximum entropy was developed to automatically detect sunspots from solar images. The algorithm also contours the umbra and penumbra regions inside the sunspot. The algorithm is an advancement over the manual thresholding used in older techniques.

Maximum Likelyhood Estimation and Markov chain Monte Carlo analysis for NEAT double blind test.

I was part of the international team which participated in the double blind experiment for devoloping suitable analytical methods to detect exoplanets from precesion astrometric data of stars.We used MLE and MCMC to detec exoplanet signals from astrometric data.

Image processing solar eclipse images 2010

Under guidance of: Dr Dipankar Banerjee , Indian Institute of Astrophysics

Summary: The project involved building image processing code to process solar eclipse images to increase the dynamic range of these images. Due to the steep intensity gradient in solar eclipse images the fine coronal features are hidden .Image processing techniques like radial unsharp masking and composition techniques were employed to obtain Coronal images of high dynamic range. The technique was tried on images of solar eclipse on July 22 , 2009 with great success.