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FIELD OF INTEREST:

- Bio-medical Image informatics: Computational biology: Automated registration, segmentation: Injury detection
- Video/image analysis: Enhancement, processing and understanding: Semantics, indexing and retrieval
- Diagnostics/Prognostics: Intelligent decision support: Machine health monitoring: Biomedical MRI informatics
- Machine learning (ANN, GA and Bayesian Nets): Sensor fusion, data mining and pattern recognition
- Intelligent controls: Unpredictable dynamics: Robust industrial automation: Prototyping and integration
- Video-based surveillance/monitoring: 3D model building: Traffic and human activity modeling: Anomaly detection
- Flexible Bayesian nets: Incremental learning of topology and probabilities: Graph-based pattern discovery

EDUCATION:

INSTITUTION AND LOCATION	DEGREE	YEAR	FIELD OF STUDY
Indian Institute of Technology (IIT) Kharagpur, WB 721302, India	B. Tech	1998	<i>Electrical Engineering</i>
Indian Institute of Technology (IIT) Kharagpur, WB 721302, India	M.S.	2003	<i>Electrical Engineering:</i> Sensor fusion and intelligent process monitoring
University of California, Riverside (UCR) , CA 92507, USA	Ph.D.	2007	<i>Electrical Engineering:</i> Machine learning based video understanding

POSITIONS:

- 2015 – current Assistant Professor, Dept. of Electrical Engineering, IIT Kharagpur, WB, India
- 2012 – 2015 Assistant Professor, Dept. of Pediatrics, Loma Linda University, California, USA
- 2008 – 2012 Research Associate, Dept. of Pediatrics, Loma Linda University, California, USA
- 2005 Research Assistantship, Lawrence Berkley National Lab, Berkley, California, USA
- 2002 – 2007 Graduate Student Researcher, Visualization and Intelligent Systems Lab, University of California, Riverside, USA

AWARDS:

- Grants to Promote Collaborative & Translational Research (GCAT) award, Loma Linda University School of Medicine, Loma Linda, CA, USA (2012).
- Dean's Fellowship, University of California, Riverside, CA, USA (2002 – 2007).
- Winner in All India Virtual Instrumentation (VI)-Mantra Project Demonstration Competition, 2002, conducted by National Instruments (NI), Bangalore, India (Oct. 2002).
- Indian Student Merit Scholarship (1987 – 1994).

PROJECTS AND OTHER EXPERIENCES:

- Principle Investigator in 3-year research project: “Computational analysis of injury topology using ultrasound imaging” in IIT Kharagpur and funded by Sponsored Research and Industrial Consultancy (SRIC), IIT Kharagpur (INR 25 Lacs) (*Pending final approval*).
- Co-investigators in 5-year research project (PI: Dr. Stephen Ashwal) on *checking efficacy of stem-cell therapy in neonatal hypoxic ischemia*, conducted in Loma Linda University (LLU), California, USA and funded by National Institute of Health (NIH), USA. (2008 - 2013)
- Co-investigators in 5-year research project (PI: Dr. Stephen Ashwal) on *multimodality clinical data analysis for a clinical paediatric traumatic brain injury* study, conducted in LLU, USA and funded by NIH, USA. (2008 – 2013)
- Principle investigator in “*Penumbra and Core Objective Computation (PeaCOC)*” study on clinical adult stroke MRI data (75,000 US\$), funded by and conducted in Loma Linda University (LLU), California, USA (2013 – 2014).
- Finance Chair, 2016 IEEE International Conference on Systems in Medicine and Biology (ICSMB), IIT Kharagpur (January 4-7, 2016)
- Joint Coordinator (and invited speaker), “Machine Vision and Learning Spring School 2016”, at Department of Electrical Engineering, IIT Kharagpur (March 5-6, 2016)

PUBLICATION:

Book Chapter:

1. N. Ghosh, Y. Sun, C. Turenius, B. Bhanu, A. Obenaus, S. Ashwal: “Computational Analysis: A Bridge to Translational Stroke Treatment”: in “Translational Stroke Research”, Editors: P.A. Lapchak & J.H. Zhang: Springer Publications, 2012, pp 881-909. [*Citation: 5*]
2. N. Ghosh, S. Ashwal, A. Obenaus: “Automated Identification of Injury Dynamics after Neonatal Hypoxia-ischemia”: in “Video Bioinformatics”, Editors: B. Bhanu & P. Talbot: Computational Biology Series, Springer Publications, Switzerland, 2015. Vol (22) pp 77-97.
3. N. Ghosh: “Video Bioinformatics Methods for Analyzing Cell Dynamics: A Survey”: in “Video Bioinformatics”, Editors: B. Bhanu & P. Talbot: Computational Biology Series, Springer Publications, Switzerland, 2015. Vol (22) pp 13-56.

Journal Publications:

1. {N. Ghosh, X. Yuan}, B. McFadden, B. Tone, D.L. Bellinger, A. Obenaus, S. Ashwal: “Hypothermia Modulates Cytokine Responses after Neonatal Rat Hypoxic-Ischemic Injury and Reduces Brain Damage”: ASN Neuro. Vol 6(6), Nov 2014, pp 1-15. [*Impact factor: 4.436*] [*Citation: 1*]
2. E.M. Titova, N. Ghosh, Z.G. Valadez, J.H. Zhang, D.L. Bellinger, A. Obenaus: “The Late Phase of Post-Stroke Neurorepair in Aged Rats is Reflected by MRI-based Measures”: Neuroscience. Vol. 283, Dec 2014, pp 231-244. [*Impact factor: 3.458*] [*Citation: 2*]
3. N. Ghosh, Y. Sun, B. Bhanu, S. Ashwal, A. Obenaus: “Automated Detection of Brain Abnormalities in Neonatal Hypoxia Ischemic Injury from MR Images”: Medical Image Analysis (MedIA). Vol. 18(7), May 2014, pp 1059-1069. [*Impact factor: 4.777*] [*Citation: 5*]
4. S. Ashwal, K.A. Tong, N. Ghosh, B. Bartnik, B.A. Holshouser: “Application of Advanced Neuroimaging Modalities in Pediatric Traumatic Brain Injury”: J of Child Neurology. Vol. 29(12), Dec 2014, pp 1704-1717. [*Impact factor: 1.6666*] [*Citation: 3*]
5. N. Ghosh and B. Bhanu: “Evolving Bayesian Graph for 3D Vehicle Model Building from Video”: IEEE Trans. on Intelligent Transportation Systems (TITS). Vol. 15(2), April 2014, pp 563-578. [*Impact factor: 2.472*] [*Citation: 5*]

6. S. Ashwal, N. Ghosh, C.I. Turenius, M. Dulcich, C.M. Denham, B. Tone, R. Hartman, E.Y. Snyder, A. Obenaus: "The Reparative Effects of Neural Stem Cells in Neonatal Hypoxic Ischemic Injury are Not Influenced by Host Gender": *Pediatric Research*. Vol. 75(5), May 2014, pp 603-611. [*Impact factor: 2.840*] [*Citation: 5*]
7. N. Ghosh, X. Yuan, C.I. Turenius, B. Tone, K. Ambadipudi, E.Y. Snyder, A. Obenaus, S. Ashwal: "Automated Core-Penumbra Quantification in Neonatal Ischemic Brain Injury": *J of Cerebral Blood Flow and Metabolism (JCBFM)*, Vol. 33(12), December 2012, pp 2161-2170. [*Impact factor: 5.339*] [*Citation: 10*]
8. N. Ghosh, R. Recker, A. Shah, B. Bhanu, S. Ashwal, A. Obenaus: "Automated Ischemic Lesion Detection in a Neonatal Model of Hypoxic Ischemic Injury": *J of Magnetic Resonance Imaging*. Vol. 33, April 2011, pp 772-781. [*Impact factor: 2.788*] [*Citation: 11*]
9. E. Titova, R. Ostrowski, A. Adami, J. Badaut, S. Lalas, N. Ghosh, R. Vlkolinsky, J.H. Zhang, A. Obenaus: "Brain Irradiation Improves Focal Cerebral Ischemia in Aged Rats": *J of Neurological Science*. Vol. 306, June 2011, pp 143-153. [*Impact factor: 2.379*] [*Citation: 6*]
10. N. Ghosh and B. Bhanu: "Incremental Unsupervised 3-D Vehicle Model Learning from Video": *IEEE Trans. on Intelligent Transportation Systems (TITS)*, Vol. 11(2), June 2010, pp 423-440. [*Impact factor: 2.472*] [*Citation: 13*]
11. N. Ghosh, Y.B. Ravi, A. Patra, S. Mukhopadhyay, S. Paul, A.R. Mohanty, A.B. Chattopadhyay: "Estimation of Tool-Wear in a CNC Milling Machine using Neural-network based Sensor Fusion": *Intl. J. of Mechanical Systems and Signal Processing*, Vol. 21(1), Jan, 2007, pp 466-479. [*Impact factor: 2.903*] [*Citation: 153*]
12. R. Hartman, A. Obenaus, N. Ghosh, A. Plaia, A. Yusof, B. Tone, M.S. Dulcich, E.Y. Snyder, S. Ashwal: "Human Neural Stem Cells Reduce Penumbra Volume and Improve Motor and Cognitive Outcomes in Neonatal Hypoxic Ischemic Cerebral Injury": Submitted to *Neuroscience*, June 2016.

Refereed Conference Publications:

1. B. Holshouser, J. Pivonka-Jones, K. Tong, U. Oyoyo, N. Ghosh, S. Ashwal. "Early NAA reductions predict neuropsychological outcomes after pediatric TBI". *Intl. Child Neurology Conference (ICNC) 2016*. Amsterdam, Netherland. 1-5 May, 2016.
2. M. Baghchechi, A. Obenaus, S. Ashwal, M. Hamer, A. Plaia, N. Ghosh: "Hierarchical Region Splitting Detects Iron-Oxide Labeled Neuronal Stem Cells in Susceptibility Weighted Magnetic Resonance Imaging". Presented at *IEEE International Conference on Systems in Medicine and Biology (ICSMB)*, Kharagpur, India, Jan 4-7, 2016.
3. S. Ashwal, R.E. Hartman, N. Ghosh, A. Plaia, A. Yusof, B. Tone, M. Dulcich, E. Snyder, A. Obenaus. "Human neural stem cells reduce penumbra volume and improve motor and cognitive outcomes in neonatal hypoxic ischemic cerebral injury". Presented in *11th European Paediatric Neurology Society Congress 2015*, Vienna, Austria. May 27-30, 2015. *European J of Paediatric Neurology*. May 2015. Vol. 19, Supl. 1, Page S95.
4. S. Ashwal, R. Hartman, N. Ghosh, B. Tone, E. Snyder, A. Obenaus. "Human neural stem cells improve water maze learning after rat pup moderate ischemic injury without affecting injury volume". Presented at *11th European Paediatric Neurology Society Congress 2015*, Vienna, Austria. May 27-30, 2015. *European J of Paediatric Neurology*. May 2015. Vol. 19, Supl. 1, Page S36.
5. S. Ashwal, J. Pivonka-Jones, K. Tong, N. Ghosh, M. Rundquist, B. Holshouser. "Early MRI findings and 1-year outcomes in pediatric complicated mild TBI". Presented at *11th European Paediatric Neurology Society Congress*, Vienna, Austria. May 27-30, 2015. *European J of Paediatric Neurology*. May 2015. Vol. 19, Supl. 1, Page S70.
6. K. Tong, R. Al-Ramadhani, J. Pivonka-Jones, B. Holshouser, N. Ghosh, M. Rundquist, S. Ashwal: "Acute Susceptibility-Weighted MRI of Hemorrhagic Brain Lesions and One-Year Neuropsychologic Outcomes after Pediatric TBI", Presented at the *32nd Annual National Neurotrauma Symposium (NNS)*, San Francisco, California, June 29-July 2, 2014 and at the *43rd Annual Meeting of the Child Neurology Society (CNS)*, Columbus, Ohio, October 22-25, 2014. *Journal of Neurotrauma* June 2014. Vol. 31(12). Pp A26. *Ann Neurology* Dec 2014. Vol. 76 (Supplement S18). Pp S240.
7. K. Tong, R. Al-Ramadhani, B. Holshouser, N. Ghosh, M. Rundquist, S. Ashwal: "Acute and 1 Year Follow-up MRI of Traumatic Hemorrhagic Brain Lesions after Moderate/Severe Pediatric TBI", Presented at the *32nd Annual National Neurotrauma Symposium (NNS)*, San Francisco, California, June 29-July 2, 2014 and at the *43rd Annual Meeting of the Child Neurology Society*, Columbus, Ohio, October 22-25, 2014. *Journal of Neurotrauma* June 2014. Vol. 31(12). Pp A25-A26. *Ann Neurology* Dec 2014. Vol. 76 (Supplement S18). Pp S219.

8. B. Holshouser, J. Pivonka-Jones, K. Tong, N. Ghosh, M. Rundquist, S. Ashwal: "Early MRI Findings and 1-Year Outcomes in Pediatric Complicated Mild TBI", Presented at the 32nd Annual National Neurotrauma Symposium (NNS), San Francisco, California, June 29-July 2, 2014 and at the 43rd Annual Meeting of the Child Neurology Society, Columbus, Ohio, October 22-25, 2014. Journal of Neurotrauma June 2014. Vol. 31(12). Pp A30. Ann Neurology Dec 2014. Vol. 76 (Supplement S18). Pp S218.
9. B. Holshouser, N. Ghosh, K. Tong, J. Pivonka-Jones, M. Rundquist, S. Ashwal: "Report of Longitudinal MRS and DTI After Moderate/Severe Pediatric TBI", Presented at the 32nd Annual National Neurotrauma Symposium (NNS), San Francisco, California, June 29-July 2, 2014 and at the 43rd Annual Meeting of the Child Neurology Society, Columbus, Ohio, October 22-25, 2014. Journal of Neurotrauma June 2014. Vol. 31(12). Pp A15. Ann Neurology Dec 2014. Vol. 76 (Supplement S18). Pp S218.
10. S. Ashwal, R. Hartman, N. Ghosh, B. Tone, HR Tian, EY Snyder, A. Obenaus: "Human Neuronal Stem Cell Improve Water Maze Learning after Rat Pup Moderate Ischemic Injury without Affecting Injury Volume", Presented at the 43rd Annual Meeting of the Child Neurology Society, Columbus, Ohio, October 22-25, 2014. Ann Neurology Dec 2014. Vol. 76 (Supplement S18). Pp S239.
11. B. Holshouser, N. Ghosh, M. Rundquist, J. Pivonka-Jones, K. Tong, S. Ashwal: "Acute MRS and DTI Findings after Moderate/Severe Pediatric TBI", Presented at the 32nd Annual National Neurotrauma Symposium (NNS), San Francisco, California, June 29-July 2, 2014. Journal of Neurotrauma June 2014. Vol. 31(12). Pp A68-A69.
12. {N. Ghosh, X. Yuan}, B. McFadden, B. Tone, H.R. Tian, D. Bellinger, A. Obenaus, S. Ashwal: "Hypothermia after Rat Pup Hypoxia/Ischemia: Effects on Cytokines, Signaling Molecules and Core/Penumbra Volumes", Oral Presentation at 10th European Pediatric Neurology Society (EPNS) Congress, Brussels, Belgium, 25-29 Sep, 2013 and at 42nd Child Neurology Society (CNS) Annual Meeting, Austin, Texas, USA, 30 Oct – 2 Nov, 2013. European J Pediatric Neurology; 2013:17:Suppl. 1, S31, PP1.1-1847. Annals of Neurology. Dec 2013. Vol. 74 (Supplement S17). Pp S175.132.
13. N. Ghosh, A. Obenaus, S. Ashwal: "Automated Quantification of Ischemic Core and Penumbra in Neonates with Arterial Ischemic Stroke", Oral Presented at 10th European Pediatric Neurology Society (EPNS) Congress, Brussels, Belgium, 25-29 Sep, 2013 and at 42nd Child Neurology Society (CNS) Annual Meeting, Austin, Texas, USA, 30 Oct – 2 Nov, 2013. European J Pediatric Neurology; 2013:17:Suppl. 1, S143, P328-1842. Annals of Neurology. Dec 2013. Vol. 74 (Supplement S17). Pp S176.133.
14. S. Ashwal, N. Ghosh, C.I. Turenius, M. Dulcich, C.M. Denham, B. Tone, R. Hartman, E.Y. Snyder, A. Obenaus: "The Reparative Effects of Neural Stem Cells in Neonatal Hypoxic Ischemic Injury are Not Influenced by Host Gender", Oral Presentation at the 10th European Pediatric Neurology Society (EPNS) Congress, Brussels, Belgium, 25-29 Sep, 2013. European J Pediatric Neurology; 2013:17:Suppl. 1, S31, PP1.0-1848.
15. B. Holshouser, N. Ghosh, K.A. Tong, J. Pivonka-Jones, M. Rundquist, S. Ashwal: "Pediatric TBI: Acute and 1-year MRS/DTI Findings", Oral Presentation at the 10th European Pediatric Neurology Society (EPNS) Congress, Brussels, Belgium, 25-29 Sep, 2013 and at 42nd Child Neurology Society (CNS) Annual Meeting, Austin, Texas, USA, 30 Oct – 2 Nov, 2013. European J Pediatric Neurology; 2013:17:Suppl. 1, S42, PP5.1-1846. Annals of Neurology. Dec 2013. Vol. 74 (Supplement S17). Pp S178.140. [Citation: 1]
16. B. Holshouser, N. Ghosh, R. Sun, K. Tong, J.P. Jones, M. Rundquist, S. Ashwal: "Acute and 1 year MRS/DTI Findings after Pediatric TBI: Combined Data may be more Sensitive in Predicting Chronic Injury", Presented at National Neurotrauma Symposium (NNS), Phoenix, AZ, USA, 22-25 July, 2012. Abstract C25. Journal of Neurotrauma. July 2012. Vol. 29:A139.
17. S.-W. Sun, N. Ghosh, K. Tong, B. Holshouser, S. Ashwal: "Heterogeneity of Human White Matter Development: Diffusivity Parameters Decreases Fastest in the Center of White Matter Tracts, from 5-19 years of age", Proc. 20th Annual Meeting of Intl. Soc. for Magnetic Resonance in Medicine (ISMRM), Melbourne, Australia, 5-11 May, 2012. Pg 3163.
18. P.H. Pham, S. Somers, N. Ghosh, H. Yoshioka: "Orientation and Thickness Dependent T2 Mapping Analysis of Early Knee Cartilage Degeneration using Data from the Osteoarthritis Initiative", Proc. 20th Annual Meeting of Intl. Soc. for Magnetic Resonance in Medicine (ISMRM), Melbourne, Australia, 5-11 May, 2012. Pg 1386.
19. S. Somers, P.H. Pham, N. Ghosh, H. Yoshioka: "A Novel T2 Mapping Approach that can Evaluate Magic Angle Effect and T2 Relaxation Time in Normal Knee Cartilage of Patients from the Osteoarthritis Initiative", Proc. 20th Annual Meeting of Intl. Soc. for Magnetic Resonance in Medicine (ISMRM), Melbourne, Australia, 5-11 May, 2012. Pg 1387.

20. N. Ghosh, A. Obenaus, C. Turenius, B. Tone, S. Ashwal: “Automated Core-Penumbra Detection from MRI of Neonatal Hypoxic Ischemic Injury”, Poster presentation at the 9th European Pediatric Neurology Society (EPNS) Congress, Cavtat, Croatia, 10-14 May, 2011. *European J Pediatric Neurology*, 2011:15, Suppl. 1, p S113.
21. J. Kroh, N. Ghosh, E. Snyder, A. Obenaus, S. Ashwal: “Human Neural Stem Cells (hNSC) Implantation to Ameliorate Neonatal Hypoxic-Ischemic Brain Injury (HII) in Rats”, Poster Presentation at Stroke Symposium at Society for Neuroscience’s (SFN) Annual Meeting, Chicago, Illinois, USA, 12-16 Nov, 2009. Abstract 117.6.
22. A.Obenaus, N. Ghosh, S. Ashwal: “MRI of Stem Cells and Computational Approaches”, Advanced Bioimaging Technologies Conference, Banff, Alberta, Canada, 16-18 Sep, 2009.
23. N. Ghosh, B. Bhanu, and G. Denina: “Continuous Evolvable Bayesian Nets for Human Action Analysis in Videos”, Proc. 3rd ACM/IEEE Intl. Conf. Distrib. Smart Cameras (ICDSC), Como, Italy, 30 Aug – 2 Sep, 2009, pp 194-201. [Citation: 1]
24. N. Ghosh, S. Ashwal, and A. Obenaus: “Automated Computational Analysis of Neonatal Hypoxic Injury and Implanted Therapeutic Neuronal Stem Cells”, Oral Presentation at 17th Scientific Meeting of International Society for Magnetic Resonance in Medicine (ISMRM), Honolulu, Hawaii, USA, 18-24 April, 2009, Abstract 5876.
25. N. Ghosh and B. Bhanu: “How Current BNs Fail to Represent Evolvable Pattern Recognition Problems and a Proposed Solution”, Proc. of 19th IEEE Intl. Conf. on Pattern Recognition (ICPR), Tampa, Florida, USA, 8-11 Dec, 2008, pp 3618-3621. [Citation: 1]
26. N. Ghosh and B. Bhanu: “Bayesian Based 3D Shape Reconstruction from Video”, Proc. of 15th IEEE Intl. Conf. on Image Processing (ICIP), San Diego, California, USA, 12-15 Oct, 2008, pp 1152-1155. [Citation: 1]
27. B. Parvin, N. Ghosh, L. Heiser, M. Knapp, C. Talcott, K. Laderoute, J. Gray, and P. Spellman: “Spectral Decomposition of Signaling Networks”, Proc. of 2007 IEEE Symposium on Computational Intelligence in Bioinformatics and Computational Biology (CIBCB 2007), Honolulu, Hawaii, USA, 1-5 April, 2007, pp 76-81. [Citation: 1]
28. N. Ghosh and B. Bhanu: “A Psychological Adaptive Model for Video Analysis”, Proc. of 18th IEEE Intl. Conf. of Pattern Recognition (ICPR), Hong Kong, China, 20-24 Aug, 2006, Vol. 4, pp 346-349. [Citation: 1]
29. N. Ghosh and B. Bhanu: “Incremental Vehicle 3-D Modeling from Video”, Proc. of 18th IEEE Intl. Conf. on Pattern Recognition (ICPR), Hong Kong, China, 20-24 Aug, 2006, Vol. 3, pp 272-275. [Citation: 8]
30. N. Ghosh, Y.B. Ravi, S. Mukhopadhyay, A. Patra, S. Paul, A.R. Mohanty, A.B. Chattopadhyay, and A. K. Chattopadhyay: “Few strategies to improve sensor fusion”, Proc. of IEEE Intl. Conf. on Industrial Technology (ICIT), Mumbai, India, 15-17 Dec, 2006, pp 1361-1366.
31. N. Ghosh and B. Bhanu: “Unsupervised Learning for Incremental 3-D Modeling”, Proc. of AAAI Workshop on Learning in Computer Vision, Pittsburgh, Pennsylvania, USA, 9-13 July, 2005, pp 16-20.

PATENTS:

1. Patent (US 8,731,261 B2, 2014). N. Ghosh, S. Ashwal, A. Obenaus, B. Bhanu. “Method of Analyzing a Medical Image” granted in the USA (May 20, 2014) and currently pending in Europe.
2. Patent (US 8,965,089 B2, 2015). N. Ghosh, S. Ashwal, A. Obenaus, B. Bhanu. “Methods of Analyzing a Medical Image”: from LLU work. Granted in the USA on February 24, 2015. Few related USA patent applications are pending.