Ahmed Tashrif Kamal

Email: tashrifahmed@gmail.com
Home page: http://www.tashrif.com
Phone: 951 801 1977

Education

Ph.D. in Electrical Engineering (Aug 2013),
University of California, Riverside.
Advisor: Dr. Amit K. Roy-Chowdhury
Co-advisor: Dr. Jay A. Farrell

M.Sc. in Electrical Engineering (March 2010),
University of California, Riverside.

B.Sc. in Electrical & Electronic Engineering (Jan 2008),
Bangladesh University of Engineering & Technology.

Skills

- Languages & libraries: C/C++, Matlab, Python, OpenCV, Latex.
- Tools: Visual Studio, SVN, Git, CMake.
- Computer Vision + Machine Learning: Passive and active stereo vision systems, Gesture recognition, 3D reconstruction, Dynamic camera recalibration, Segmentation, Object detection and tracking, Multi-sensor Multi-target Distributed Tracking (PhD Thesis).
- Other: ACM contest programming experience.

Projects

- Graduate project: Distributed Dynamic Scene Analysis in a Self-Conguring Multimodal Sensor Network - funded by Office of Naval Research (ONR). [Link: Video Summary]
- Undergraduate project: Universal Adapting Battery Charger - competition organized by International Future Energy Challenge, IEEE.
- Undergraduate project: Development of a vision-based robot, capable of finding and relocating specific objects in the scene.

Work Experience

- **Computer Vision R&D Engineer** at Aquifi Inc., Palo Alto, California. (Sep'13-Present). Worked on projects involving:
  ⇒Passive and active stereo vision systems.
  ⇒Gesture recognition.
  ⇒3D reconstruction.
  ⇒Dynamic camera recalibration.
  ⇒Segmentation.
- **Research Intern** at Kitware Inc. Clifton Park, New York. (Jul'11-Sep'11)
  ⇒Tracklet association using appearance features and discriminative models.
  ⇒Design of a new appearance feature for nadir-view vehicle recognition.
  ⇒Thorough experimental comparison between different appearance features and discriminative models for vehicular tracklet association.
- **Research Assistant** at UC, Riverside. (Jan'09-Current).
  ⇒Collection of UCR Videoweb data, a multi-camera multi-target action dataset.
  ⇒Distributed multi-camera action recognition.
  ⇒Distributed multi-camera multi-target tracking and data association.

- **Teaching Assistant** at UC, Riverside.
  ⇒(Graduate) Stochastic Processes (Fall '12)
  ⇒(Graduate) State and Parameter Estimation Theory (Winter '12)
  ⇒Linear Methods for Engineering Analysis and Design Using Matlab (Spring '10)
  ⇒Signals and Systems (Fall '08)
- **Engineer** at Mango Teleservices Limited, Dhaka, Bangladesh. (Apr'08-Jul'08).
  ⇒Supervised installation of the International Internet Gateway (IIG)
- **System Engineer** at Grameenphone Limited, Dhaka, Bangladesh. (Dec'07-Mar'08).
  ⇒Management of Network Management Systems.

Graduate Courses

Stochastic Processes, Information Theory, State & Parameter Estimation Theory, Probabilistic Models: Artificial Intelligence, Current Topics in Computer Vision & Pattern Recognition, Computer Visualization, Advanced Digital Image Processing, Advanced Computer Vision, Advanced Digital Signal Processing.

Research Interest

Computer Vision, **Signal Processing**, **Machine Learning**, **Robotics**.

Research Experience

My doctoral research has been focused on *the development of efficient theoretical frameworks for distributed state estimation (DSE) in a sensor network addressing the issue that* ***neighboring nodes may not be observing the same set of targets.*** In truly distributed algorithms, there is no central fusion unit; the network agents cooperate amongst themselves through communication with their neighbors. Existing DSE frameworks do not account for the fact that cameras are usually directional sensors, and thus, neighbors may have very different observations. The hallmark of my work is the development of two novel distributed estimation algorithms, the Information weighted Consensus Filter (ICF) (single target DSE framework) and Multi Target Information Consensus (MTIC) (multi-target DSE framework capable of performing data association and state estimation in an integrated manner) that can specifically address these shortcomings. Those algorithms are theoretically guaranteed to achieve certain optimality conditions. I have also shown experimentally that these algorithms significantly outperform existing distributed tracking and data association approaches.

Selected Publications

Journals

- **"Distributed Multi-target Tracking and Data Association in Vision Networks,"**, A. T. Kamal, J. H. Bappy, J. A. Farrell, A. K. Roy-Chowdhury, IEEE Transactions on Pattern Analysis and Machine Intelligence, 2016.
- **"Information Weighted Consensus Filters and their Application in Distributed Camera Networks"**, A. T. Kamal, J. A. Farrell, A. K. Roy-Chowdhury, IEEE Transactions on Automatic Control, Dec 2013.
- **"Distributed Camera Networks: Integrated Sensing and Analysis for Wide Area Scene Understanding"**, B. Song, C. Ding, A. T. Kamal, J. A. Farrell, A. K. Roy-Chowdhury, Signal Processing Magazine, May 2011.

- **"Tracking and Activity Recognition Through Consensus in Distributed Camera Networks"**, B. Song, A. T. Kamal, C. Soto, C. Ding, J. A. Farrell, A. K. Roy-Chowdhury, IEEE Trans. on Image Processing, 2010.

Conference Papers

- **"Information Consensus for Distributed Multi-Target Tracking"**, A. T. Kamal, J. A. Farrell, A. K. Roy-Chowdhury, IEEE Conf. on Computer Vision and Pattern Recognition, 2013.
- **"Information Weighted Consensus"**, A. T. Kamal, J. A. Farrell, A. K. Roy-Chowdhury, Controls and Decision Conference, 2012.
- **"Consensus-Based Distributed Estimation in Camera Networks"**, A. T. Kamal, J. A. Farrell, A. K. Roy-Chowdhury, IEEE International Conference on Image Processing, 2012.
- **"A Generalized Kalman Consensus Filter for Wide Area Video Networks"**, A. T. Kamal, C. Ding, B. Song, J. A. Farrell, A. K. Roy-Chowdhury, Controls and Decision Conference, 2011.
- **"Belief Consensus for Distributed Action Recognition"**, A. T. Kamal, B. Song, A. K. Roy-Chowdhury, IEEE International Conference on Image Processing 2011.
- **"Vector Field Analysis for Motion Pattern Identification in Video"**, N. Nayak, A. T. Kamal, A. K. Roy-Chowdhury, IEEE International Conference on Image Processing 2011.

Book Chapter

- **"An Overview of Distributed Tracking and Control in Camera Networks"**, A. T. Kamal, C. Ding, A. A. Morye, J. A. Farrell, A. K. Roy-Chowdhury, Springer, 2013.

Oral/Poster Presentations

- **Information Consensus for Distributed Multi-Target Tracking**, IEEE Conf. on Computer Vision and Pattern Recognition, 2013. Portland, Oregon
- **Information Weighted Consensus**, Controls and Decision Conference 2012, Maui, Hawaii
- **Consensus-Based Distributed Estimation in Camera Networks**, International Conference on Image Processing 2012, Orlando, Florida
- **Belief Consensus for Distributed Action Recognition**, International Conference on Image Processing 2011, Brussels, Belgium
- **Universal Adapting Battery Charger**, IEEE International Future Energy Challenge 2007, Texas Instruments, Dallas, TX (Undergraduate Project).

Review Jobs

- **Journal**: TIP, MVAP, TAC, TPAMI.
- **Conference**: CVPR, ICIP, CDC, ICASSP, WACV, NCVPRIPG

Awards and Honors

- Presented undergraduate project at Texas Instruments, Dallas, TX and won $2500 award as a team on an IEEE International Project Competition (IFEC 2007) by developing a 'Universal Adapting Battery Charger' and becoming one of the finalists of 7 universities around the world.