Tarek Omar El-Gaaly

Rutgers, The State University of New Jersey
Website: www.cs.rutgers.edu/~tgaaly
LinkedIn Profile: www.linkedin.com/pub/tarek-el-gaaly/1a/68b/6bb

Mailing Address: 1340 Madison Dr.
North Brunswick, NJ, 08902
Tel: +1 732-500-2065
Email: tgaaly@gmail.com

Profile

Expertise and hands-on experience in Computer Vision, Robotics and Machine Learning
More than four years of industry experience as a Software Engineer and Research Intern
Extensive problem-solving skills and multidisciplinary work

Education

Ph.D. in Computer Science, Rutgers University, USA 2009 – Dec. 2014 expected
Research Specialization: Computer Vision and Robotics
Advisor: Ahmed Elgammal

M.Sc. in Computer Science, American University in Cairo, 2006 – 2010
Thesis: *Measuring Atmospheric Scattering from Digital Image Sequences*
Advisor: Joshua Gluckman
Thesis document: www.arxiv.org/abs/1407.3540

B.Sc. in Computer Science and Minor in Electronics, American University in Cairo, 2001 - 2005
GPA: 3.54 (*Cum Laude*)
Thesis: *Fine tuning the Linux kernel to achieve better performance for use on personal digital Assistants (PDAs)*
Source Forge Documentation: www.sourceforge.net/projects/pdtux

Research and Relevant Projects

- **2014: Nonlinear Supervised Classification for Object Recognition**
  RGBD object recognition using nonlinear supervised classification over a Manifold Analysis framework to recognize objects and pose.
- **2013: NASA Centennial Challenge – Sample Return Robot**
  Member of WPI/Rutgers team. Worked on object recognition to detect/localize/identify objects, tree/fence detection.
- **2013: Autonomous Micro-aerial Vehicle (MAV) Localization and Mapping from Satellite Maps**
  Work in progress to build an autonomous team of robots, including MAVs and a ground robot, to perform collaborative 3D vision algorithms. Work done on using semantic features to perform localization for MAVs using satellite maps has been published in ICPR 2014. Progress can be found at the following URL: www.bitbucket.org/tsenlet/robotts.
- **2012: Multi-Modal Object Recognition**
  Category, instance and pose recognition using visual and depth fusion (RGBD) captured by Microsoft Xbox Kinect. This work achieved better than state-of-the-art results in pose recognition. This work was also used to build a near real-time object recognition system (video demo: youtu.be/IzaWJTiGmww).
- **2012: Autonomous Obstacle Avoidance of Multiple Robotic Airboats using an Android Smartphone**
  Used optical flow, trajectory clustering and reflection detection for reactive obstacle avoidance of autonomous airboats. Conducted at the Robotics Institute at Carnegie Mellon University (video demo: youtu.be/sVeYu3NA8KM).
- **2011: Autonomous Robot Navigation using Xbox Kinect**
  Used a Pioneer robot (P3DX) equipped with an Xbox Kinect to explore an indoor office environment.
- **2011: Object Feature Localization using label propagation over a spatially and visually consistent space**
  Built a novel approach to classify image feature points into foreground and background (object localization). Published in ICPR 2014.
- **2010 M.Sc. Thesis: Measuring Atmospheric Scattering from Digital Image Sequences**
  This research project focused on visually extracting particulate matter (PM) pollution from a sequence of images captured with a polarizer filter. Developed two novel algorithms for image dehazing and measuring atmospheric scattering.
- **2007: EduCare - Education for Students with Special Needs**
  Researched, designed and developed EduCare (winning software solution in the Egyptian local finals of Microsoft Imagine Cup 2007 competition). EduCare is a comprehensive educational solution to help students with special needs. Gave a demo to Bill Gates and Microsoft Executives at Microsoft headquarters in Seattle.
- **2005 B.Sc. Thesis: Enhancing the Linux kernel for real-time operation**
  Researched/designed an improved process scheduler queue. Researched/designed an enhanced shared memory architecture. Took part in the research, design and testing of a more efficient semaphore subsystem. Team leader of project.

Conference Publications, Posters and Paper Reviews

- T. Senlet, **T. El-Gaaly** and A. Elgammal, **"Hierarchical Semantic Hashing: Visual Localization from Buildings on Maps",** ICPR 2014.
- **T. El-Gaaly**, M. Torki and A. Elgammal, **"Spatial-Visual Label Propagation for Local Feature Classification", oral** paper at ICPR 2014.
- H. Zhang, **T. El-Gaaly** and A. Elgammal, "**Joint Object and Pose Recognition using Homeomorphic Manifold Analysis",** AAAI 2013.
- **T. El-Gaaly** et. al., **"Visual Obstacle Avoidance for Autonomous Watercraft using Smartphones",** AAMAS workshop on Autonomous Robots and Multirobot Systems, ARMS 2013.
- **T. El-Gaaly**, M. Torki, A. Elgammal, M. Singh, **"RGBD Object Pose Recognition using Local-Global Multi-Kernel Regression",** ICPR 2012.
- **T. El-Gaaly**, H. Zhang, M. Torki, A. Elgammal and M. Singh, **"Multi-Modal RGBD Sensors for Object Recognition",** Special Session on RGBD Applications at ACCV 2012.
- **T. El-Gaaly**, M. Torki, A. Elgammal and M. Singh, **"Multi-Modal RGBD Sensors for Object Grasping and Manipulation",** Workshop: "Beyond Grasping: Modern Approaches for Dexterous Manipulation", IROS 2012.
- **T. El-Gaaly**, B. McMahan, A. Elqursh, **"Multi-Segment Zeppelin-Aided Robotic Rover for Ground-Based and Atmospheric Exploration",** Concepts and Approaches for Mars Exploration 2012. Published on The Smithsonian/NASA Astrophysics Data System: www.adsabs.harvard.edu/abs/2012LPICo1679.4278E
- B. Falchuk, C. Wu, **T. El-Gaaly** and A. Vashist, **"Skimming Video Action Using Annotated 3D Surfaces",** Eurographics 2011.
- **T. El-Gaaly** and J. Gluckman, **"Measuring Atmospheric Scattering from Digital Image Sequences",** VISAPP 2010.
- **Multi-Modal RGBD Sensors for Object Grasping and Manipulation,** poster @ Northeast Robotics Colloquium (NERC) @ MIT 2012.
- **RGBD Object Pose Recognition**, poster @ 2nd Multimedia and Vision Meeting in the Greater New York Area, June 15th, 2012.
- **RGBD Object Pose Recognition,** poster @ 6th IGERT Annual Perceptual Science Forum, May 7th, 2012
- **Back to the Future: 3D Object Recognition-by-parts Revisited,** poster @ 8th IGERT Annual Perceptual Science Forum, May 5th, 2014.
- **Paper reviews:** CVPR 2011/2012, ICRA 2013, IROS 2013, ICPR 2013/2014, Pattern Recognition Journal 2013.

Work Experience

Research Internship, Mitsubishi Electric Research Labs – Summer 2013

Research Internship, Carnegie Mellon University – Robotics Institute – Field Robotics Center, Summer 2012

- Visual navigation using smartphones on multi-agent robotic airboats for disaster mitigation and environmental monitoring

Research Internship, Siemens Corporate Research, Princeton, NJ, June – Summer 2011 and continued collaboration

- Autonomous robot navigation using Xbox Kinect for indoor 3D modeling

Research Internship, Telcordia, Applied Research – Summer 2010

- Research in activity detection and recognition for video surveillance.

Teaching Assistant, Rutgers University, September 2009 – May 2012

- Discrete Structures, Intro to Multimedia, Intro to Artificial Intelligence, Introduction to Computers and Applications

Software Engineer, Emerge Technology, July 2007 – February 2009

Emerge Technology is a media authoring and development company and is a subsidiary of Radius 60 Studios, Los Angeles, CA, USA

- BD player image memory research to understand the process of image loading, garbage collection and overheads.
- Designed, developed and tested an image compositing tool for use by BD menu/game authors and Java developers, JMAT (Java Menu Authoring Tool and SDK) to automate the process of BD movie/game menu authoring.

Software Engineer, IBM Egypt, August 2005 – June 2007

- Requirement analysis, design and development of government enterprise systems.
- Certifications: IBM SOA (Service-Oriented Architecture) Solution Designer, Sun Certified Java Programmer (SCJP)

Relevant Coursework

- Advanced AI, Computer Vision, Pattern Recognition, Software Engineering, Neural Networks & Genetic, Algorithms, Contemporary Computer Architecture, Algorithms and Complexity Theory, Linear Programming, Distributed Systems

Technical Skills

- C/C++, Java, C#, OpenCV, OpenGL, Robotic OS (ROS), Matlab, UML, Linux, Point Cloud Library (PCL), Android Programming

Honors and Awards

2014 HackRU 2014: Winner of Rutgers University Hackathon for the Party Photobot invention (video demo: youtu.be/FekYA-uFAW4)
2008 Certificate of Appreciation from the Ministry of Environment in Egypt for an innovative technological eco-solution
2007 Team Winner of Egypt - Microsoft Imagine Cup 2007. Presented project to Bill Gates at Microsoft HQ.

Extracurricular Activities

- **Axe Apollo Space Academy Competition 2013 Finalist:** Ranked 1st in stage I and selected among 3 Egyptian finalists.
- **Private Pilot-in-training:** Started private pilot license training during the summer of 2013.
- **Tedx Rutgers 2010, 2011 & 2012 (Independent TED Talks)**: www.tedxrutgers.com, organizing committee and event photographer
- Built a small tele-presence robotic car using an Arduino, surveillance camera and Xbee modules
- Amateur astronomer, space enthusiast and snowboarding