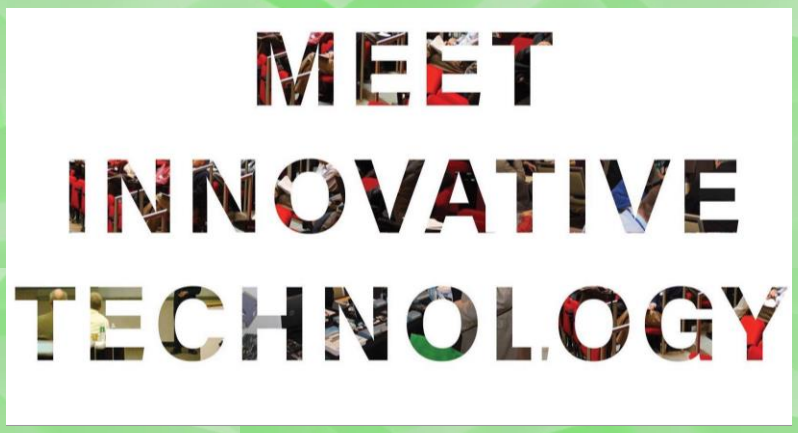
MEET INNOVATIVE TECHNOLOGY

MIT IEEE UNDERGRADUATE RESEARCH TECHNOLOGY CONFERENCE

MIT URTC 2016

Conference Program

Organized and sponsored by IEEE Boston and MIT IEEE Student Branch



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Welcome Messages from Conference Chairs

Alice Zhan
Conference General Chair
tzhan@mit.edu

Hello everyone! On behalf of the entire steering committee, I would like to warmly welcome you to the 2016 IEEE MIT Undergraduate Research Technology Conference. It is our pleasure to provide a hub where all of you, as academic and industry leaders from around the globe, can come together for a weekend to discuss the latest technological innovations. We have an exciting two days lined up, filled with technical research presentations, keynote speeches, workshops, and networking opportunities. We hope you take full advantage of this event to not only showcase your work, but also to foster creative new ideas with people just as passionate as you to advance technology for humanity. We are all eager to discover what everyone has to share, and look forward to spending these next two days with you.
Enjoy the conference!

Best regards,
Alice Zhan
Conference Chair

Soon Wan
Region 1 Liaison
gimsoon@ieee.org

On behalf of the Program Committee and IEEE Boston Section, we welcome you to the second IEEE MIT Undergraduate Research Technology Conference (URTC). We are excited about this new conference that initiated by the MIT IEEE Student Branch. I strongly believe it will meet the IEEE's core purpose to foster technological innovation and excellence for the benefit of humanity.

The conference is packed with two days of oral presentation sessions, poster sessions, and lightning talks organized into four technical tracks, plus plenary keynotes, exhibitions, workshops, and contests. There should be something for everyone in attendance. So, please use this opportunity to enhance your personal and professional growth, network with friends and colleagues, and meet new ones. Enjoy the conference!

Sincerely,
Soon Wan ☺
IEEE Region 1 Membership Development Chair

Organizing Committee

Conference General Chair
Alice Zhan, MIT

Conference Vice-Chair
Helen Zhou, MIT

Region 1 Liaison
Soon Wan, Vicor Corporation

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Menguyan Sun, MIT

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Jisoo Min, MIT

Paper/ Posters Chair
Joseph Torres, MIT

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Technical Program Chair
Quentin Wellens, MIT

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MIT IEEE Student Branch Advisor
Anne Hunter, MIT

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TWO SIGMA

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Carnegie Mellon University
Information Networking Institute

MIT

IEEE

BOSTON SECTION

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EDUCATION SOCIETY

General Information

Badges

Badges must be worn at all times and are necessary for entrance into all the conference sessions and foods.

Tours (meet at west end of Stata, around 32-123)

Tour #1: Friday, 4 November, 1:30pm-3:00pm

Tour #2: Friday, 4 November, 4:00pm-5:30pm

Welcome Reception

On Friday, 4 November, 6:30pm. At MIT Building 34-401 Grier Room

All conference registrants are cordinally invited to the Welcome Reception (included with the conference registration fee). Enjoy dinner, meet other attendees, and hear an engaging talk by MIT instructor Katrina LaCurts.

Registration Hours (MIT Stata Center)

The registration will take place at the Stata Center 1st floor entrance. The conference information desk is adjacaent to the registration area. All attendees and accompanying guests must register and receive a conference badge in order to participate in conference activities.

Registration and Information Desk Hours

Saturday, 5 November: 7:30am – 5:00pm

Sunday, 6 November: 7:30am – 12:00noon

Exhibition Hours (MIT Stata Center – Student Vest Street)

Saturday, 5 November: 10:00am – 6:00pm

Sunday, 6 November: 9:30am – 3:30pm

Language

All Conference Sessions and Publication will be in English.

November 5, 2016 (Saturday)

Program Summary

8:30am – 8:30pm MIT Stata Center (Rm. 32-123)

7:30am

Registration (MIT Stata Center - Entrance)
Breakfast (MIT Stata Center - Student Vest Street)

8:30am – 10:00am

Opening Plenary (MIT Stata Center 32-123)

Opening Remarks

Matteo Riondateo , Two Sigma
"Algorithmic Data Science = Theory + Practice"

Ali Abedi, University of Maine
"Wireless Ultrasonic Leak Detection for International Space Station"

10:30am – 12:30pm

Technical Paper Oral Presentation

- Machine Learning and Cloud Computing #1 (MIT Stata Center 32-123)
- Biological and Biomedical Engineering and Technology (MIT Stata Center 32-141)
- Communication and Security (MIT Stata Center 32-155)

12:30pm – 1:30pm

Lunch (MIT Stata Center - Student Vest Street)

1:30am – 3:30pm

Technical Paper Oral Presentation

- Machine Learning and Cloud Computing (MIT Stata Center 32-123)
- Wearable Technology (MIT Stata Center 32-141)
- Robotics and Automation Technology (MIT Stata Center 32-155)

4:00pm – 6:00pm

MIT EECSplore (MIT Stata Center 34-401)

- Social icebreaker and team design competition (Rob Vice)
- Booths demoing projects by MIT groups and labs
- Liquid Nitrogen Ice Cream

6:30pm – 8:30pm

Social and Dinner (MIT Stata Center 32-123)
George Giakos, Manhattan College

"Agile Manned Vehicles (Drones) and Bio-inspired Vision Sensors

Announcement of Best Paper Award

November 5, 2016 (Saturday)

Opening Plenary

8:30am – 10:0am MIT Stata Center (Rm. 32-123)

"Algorithmic Data Science = Theory + Practice"
Matteo Riondato, Two Sigma

Obtaining actionable insights from large datasets requires the use methods that must be, at once, fast, scalable, and statistically sound. This is the field of study of algorithmic data science, a discipline at the border of computer science and statistics. In this talk I outline the fundamental questions that motivate research in this area, present a general framework to formulate many problems in this field, introduce the challenges in balancing theoretical and statistical correctness with practical efficiency, and I show how sampling-based algorithms are extremely effective at striking the correct balance in many situations, giving examples from social network analysis and pattern mining. I will conclude with some research directions and areas for future explorations.

Matteo Riondato is a Research Scientist at Two Sigma Investments in New York City, and a Visiting Assistant Professor in Computer Science at Brown University. His research focuses on algorithmic data science: he develops theoretical and applied methods to extract the most information from large datasets, as fast as possible and in a statistically sound way. The problems he studies include pattern extraction, graph mining, and time series analysis. His results have been published in the main venues in data and web mining, databases, and machine learning. Among the awards he received are the Best Student Paper Award at ACM KDD and the Best Student Poster award at SIAM SDM.

"Wireless Ultrasonic Leak Detection for International Space Station"

Ali Abedi, University of Maine
Professor Tadayoshi Kohno , University of Washington

Air leaks in pressurized structures such as space vehicles or habitats due to micrometeorite impacts or structural aging and failure are inevitable. Due to the large pressure differential between interior of the module and space outside, the escaping air emits an ultrasonic wave inside the module that may be detected using ultrasonic sensors. This presentation describes hardware, software, and algorithmic challenges for localizing leaks using an array of ultrasonic sensors. A major challenge with leak localization is inaccuracy due to reflections and noise. With the use of Kalman filtering, tree-search algorithm, and a hyperbolic angle of arrival algorithm, we can eliminate many of these inaccuracies. Design considerations for a standalone device with its own battery power source, on-board processing, crew interfaces, signal- conditioning circuitry, and a custom 3-D printed box are discussed in this presentation. Three devices were built, flight certified and scheduled to deploy to the ISS for data collection during the Fall of 2016. This project was funded through a three year NASA EPSCoR grant in collaboration with the Office of ISS Technology Demonstration Programs.

Professor Ali Abedi received his Ph.D in Electrical and Computer Engineering, from University of Waterloo in 2004. He joined the University of Maine, Orono in 2005, where he is currently Professor of Electrical and Computer Engineering and Director of Center for Undergraduate Research (CUGR) at the office of the VP Research.

He was a faculty fellow at NASA MSFC during summer of 2016, visiting Associate Professor at the University of Maryland, College Park, MD and Guest Researcher at NIST in 2012 and adjunct Professor at Queen's University, Kingston, Canada in 2004. Dr. Abedi served as Principal Investigator on several NASA, Army, and NSF funded projects including Wireless Sensing of Lunar Habitat and Leak Detection for International Space Station, which are featured on Phys.org and NSF Science360.

Dr. Abedi has received a number of awards and recognitions from Natural Sciences and Engineering Research Council of Canada (NSERC), Japan Society for the Promotion of Science (JSPS), Canadian Space Agency (CSA), NASA, and IEEE. He has published over 80 papers in IEEE journals and conferences including several books. Dr. Abedi is a senior member of IEEE and has served on several IEEE Committees at local, regional, national, and international levels as well as organizing committee of several IEEE Int'l conferences and editorial boards of IEEE, KICS, and IET journals. He is co-founder of two startup companies and co-inventor of Wireless Sensors for Brain Injury Detection with Prof. Hayes.

November 5, 2016 (Saturday)

Technical Paper Oral Presentation #1

10:30am - 12:30pm MIT Stata Center

Paper Presentation Schedule

Machine Learning, Cloud Computing (Morning Session)

10:30am	Zheyuan Shi	Strategic Reporting in Exponential Family Prediction Markets
10:50am	Christina Tsangouri	An Interactive Facial-Expression Training Platform for Individuals with Autism Spectrum Disorder
11:10am	George G. Boateng	StressAware: An App for Real-Time Stress Monitoring on the Amulet Wearable Platform
11:30am	Monica Kumaran	Lightweight Malware Detection based on Machine Learning Algorithms and the Android Manifest File
11:50am	Renee Meinhold	Efficiently Computing Piecewise Flat Embeddings for Data Clustering and Image Segmentation
12:10pm	Anisha Nakagawa	Hurricane Evacuation Traffic Model

Biological and Biomedical Engineering and Technology

10:30am	Sarah Agnalt	Vein Detection using Vein Transillumination and Contrast Differentiation for Practitioner Aid
10:50am	Suma Anand	Drive field filter design for Magnetic Particle Imaging (MPI) apparatus
11:10am	Katarina Stevanovic	Synchrotron Imaging of Intact Honeybees Affected by Nosema
11:30am	Daniel Caraballo	Affordable Photolithography with Biomedical Applications
11:50am	Holly Nguyen	Personalizing a Sleep Health App for College Students Using Personality Traits and Chronotype
12:10pm	Joseph Majeski, Kevin Lynch	Lung Cancer Tissue Samples Discrimination through Statistical Analysis of Polarimetric Angular-Resolved Diffuse Measurements

Communications and Security

10:30am	Somtochukwu Okwuosah	Multi-Communication Type Debugging Probe
10:50am	Yilan Zhu	Simulation Model on Chaotic Asynchronous Transmitter and Receiver
11:10am	Maxwell Yun	Thermal Energy Harvesting for Self-Powered Smart Home Sensors
11:30am	Khai Phan	Security Assessment of Audience Response Systems Using Software Defined Radios
11:50am	Blake Hewgill	Performance of a Highly Configurable Channel Emulator
12:10pm	Sarah Lam	Wireless Infrastructure Enhances On Body Health Monitoring Systems

November 5, 2016 (Saturday)

Technical Paper Oral Presentation #2

1:30pm - 3:30pm MIT Stata Center

Machine Learning, Cloud Computing (Afternoon Session)

1:30pm	Christopher Liao	Workload Characterization of the Shared/Buy-in Computing Cluster at Boston University
1:50pm	Khaled K. Saab	Estimation of Cluster Centroids in Presence of Noisy Observations
2:10pm	Avi Cooper, Poojit Hedge	An Indoor Positioning System Facilitated by Computer Vision
2:30pm	Connor Sell	Some Exact Solutions to Non-Negative Matrix Factorization
2:50pm	Nick Anthony	Limited Precision Deep Neural Networks

Wearable Technology

1:30pm	GuiHui Liu	Smartphone Enabled Telerehabilitative Wearable Glove for Stroke Patients
1:50pm	Dan Lin	A Test Bed for Detecting and Mimicking Finger Joint Bending
2:10pm	Lauren Plant	Smart E-Textile Gloves for Quantified Measurements in Movement Disorders
2:30pm	Matthew Constant	Smartwatch-driven Multisensory Recorder
2:50pm	Brian Goldwyn	HealthVisor: A Look into Data-rich Bio-monitoring
3:10pm	Rabeeh Majidi	Smart Adaptive Boot for Ankle Instability Treatment

Robotics and Automation Technology

1:30pm	Yeeho Song	Compliant Leg Designs for Attenuating Impact of Airdrop Landing of Quadruped Robots
1:50pm	Alberto Rivera	A Generalized Solution to The Coverage Problem in Swarm Robotics
2:10pm	Wesley Caruso	Development of Low Cost Device for In-Situ Algae Monitoring
2:30pm	Charles Thangaraj	A Scalable Modular Heterogeneous System for Home and Office Automation
2:50pm	Mingchen Li	Experimental Validation of Diffusion Coefficient Identification Using a Multi-Robot System

November 5, 2016 (Saturday)

MIT EECSplore

4:00pm - 6:00pm MIT Stata Center 32-401

(Session chair: Quentin Wellens, Design competition leader: Rob Vice)

In this interactive and social event, meet and bond with other students by combining common interests into new technological concepts. Top teams will get to present their ideas at the dinner to follow for a chance to win the #1 prize!

Need inspiration?

Groups and labs from MIT will be around to show you some of their cutting-edge technology and give you a sense of what "hands-on learning" really means.

And what would an icebreaker be without ice (cream)? Come taste some delicious ice cream, homemade with liquid nitrogen right on the spot!

November 5, 2016 (Saturday)

Social Event and Dinner

6:30pm - 8:30pm MIT Stata Center

Agile Unmanned Vehicles (Drones) and Bioinspired Vision Sensors

Professor George Giakos

The goal of this presentation is to introduce the technical challenges associated with the design and operational capabilities of autonomous navigation vision systems, then introduce sensing principles and techniques, borrowed from biological sensory response systems, overcoming these challenges. Computer vision is central to unmanned aerial vehicles, for a number of tasks like s-localization, navigation, target recognition, & tracking. A major challenge in the design of autonomous navigation systems is processing of the visual information. As a result, the operation of such systems in urban settings is limited by their competing design requirements leading to reduced agility. The above challenges can be mitigated by means of bioinspired vision principles. Bioinspired computer vision is promising towards building adaptive computer vision systems with enhanced agility. Invertebrates, such as insects, as well as some crustaceans, such as the mantis shrimp, have compound eyes. The advantages of the compound eyes consist on their superb wide viewing angle and the fast movement tracking due to the large amount of photoreceptor units that do not have to individually move to track, and the ability to detect polarized light. In addition, certain animals, exhibit unique navigation capabilities, because of their homing behaviors, i.e., their ability to return home by using visual ques. The enhanced polarization vision capabilities of certain animals, combined with a wide field-of- view, fast tracking, multi-functional eye structure, and homing, add agility to the design of drones, while providing enhanced structural, localization, navigation, and tracking capabilities. As result, bioinspired vision principles can be applied not only towards the design of autonomous navigation systems, but also to the design of efficient biomedical systems for early diagnosis of cancer, and enhanced detection and identification of tissue pathologies, because of their polarization sensitivity.

George C. Giakos is Professor and Chair of the Department of Electrical and Computer Engineering at Manhattan College, NY. He is the Director of the Graduate Program. Prior joining Manhattan College, he has been a Professor of Electrical, Computer, and Biomedical Engineering, for the last 20 years, at the University of Akron, OH, USA. While at the University of Akron, he directed the design and development of the US AFRL Multifunctional Imaging Surveillance platform, designed under an AFRL research contract. Dr. Giakos has been recognized for "his leadership efforts in advancing the professional goals of IEEE" by receiving the 2014 IEEE-USA Professional Achievement Award, "in recognition of his efforts in strengthening links between industry, government and academia". He has been elected an IEEE Fellow based on his "Contributions to Efficient Imaging Devices, Systems and Techniques". He is a Distinguished Faculty fellow for the Office of Naval Research.

In addition, he served for several years as faculty Fellow at NASA and Air Force Research Laboratories (AFRL). He received his Laurea in Physics from the University of Turin (Italy), a Post Graduate Diploma in Nuclear Instrumentation from the University of Edinburgh (Scotland), an MS Degree in Physics from Ohio University. He received his Ph.D in Electrical & Computer Eng. from Marquette University, following Post- Doctoral Training in Medical Imaging in the Department of Biomedical Engineering, University of Tennessee.

His research group was the first in the US to pioneer the characterization of the detection and imaging characteristics of Cadmium Zinc Telluride semiconductor substrates for flat-panel digital radiography applications.

November 6, 2016 (Sunday)

Program Summary

8:30am – 4:30pm MIT Stata Center 32-123

7:30am

Registration (MIT Stata Center - Entrance)
Breakfast (MIT Stata Center - Student Vest Street)

8:30am – 10:00am

Poster Session #1 (MIT Stata Center - Student Vest Street)

Machine Learning, Cloud Computing
Robotics and Automation Technology

10:30pm – 12:30pm

Sponsors Presentation (MIT Stata Center 32-123)
"Career Opportunity"

Lightning Talks (MIT Stata Center 32-123)

12:30pm – 1:30pm

Lunch (MIT Stata Center - Student Vest Street)

Poster Session #2 (MIT Stata Center - Student Vest Street)

Biological and Biomedical Engineering and Technology
Comunications and Security

Wearable Technology
Innovative Technologies X-Track

4:00pm – 4:30pm

Closing Plenary (MIT Stata Center 32-123)

Announcement of Top Paper and Poster Presentations

Prize Raffle for those who voted for top presenters – two $50 Amazon Gift Cards

November 6, 2016 (Sunday)

Lightning Talks

8:30am - 10:00am MIT Stata Center 32-123

Haptic Feedback in Virtual Reality Environments for Rehabilitation Therapy

Perri Lomberg (Northeastern University)

Virtual reality systems in which users use body movements to interact with objects in a virtual environment is a promising rehabilitation treatment option. Low-cost, commercially-available VR systems and games lack haptic feedback - a sense of touch - and this decreases the realism of the interaction and could have important effects on transfer of skills from a virtual to a real-life environment. In order to enhance the immersive experience of users in VR we have designed a tactile exoskeleton that can simulate different textures. The exoskeleton monitors the position and muscle activation of the limb and responds by activating muscle antagonists opposite the direction of movement, giving the sensation that the user is moving underwater or in slow motion. We demonstrate this technology by intersecting enhanced haptic feedback with visually stimulating virtual reality environments.

Interactive Robotic Mannequin

Aryuna Dashidorzhina (New York College of Technology)

Life size robotic mannequins designed for the fashion and retail industry are rare and expensive. Even though the New York City fashion industry is eager to adopt technology to enhance and improve their business, the extremely high cost and specialized nature of robotic mannequins as compared to normal static life size mannequins has prevented their adoption by the fashion industry.The goal of this project is to design, build and install a human like robot while minimizing power requirements and material; and at the same time maximize the functional purposes, such as interacting with humans. A life size interactive robotic mannequin prototype was designed and developed using low cost open source hardware and software, with an emphasis on using readily available, off the shelf construction material and hardware devices. A real life 3D body profile was created by using an innovative cardboard slice construction technique with the help of human body imaging and 3D CAD tools. Two computer engineering technology undergraduate students worked on this project under the guidance of faculty advisers, during the summer of 2016. The robotic mannequin prototype interacts with the customer by using a combination of low cost proximity and image sensors to detect its environment. The mannequin also features synthesized speech as well as head and arm movements to get customers attention and strikes various poses to show clothing styles. Additional enhancements are planned to allow the customers to interact with the mannequin through a web based user interface by using their smart phones wireless connectivity. It will also exhibit RGB LED based eye color change and LED bar graph lips synced with its speech. The mannequins design and development utilizes many different software tools for physical, electrical, computer hardware, software and network communication subsystems. Therefore, it can also be used for teaching those topics in several computer engineering technology program courses.

Determining Honey Bee Colony Health Using RF and Radar Techniques

Berkay Payal (University of Maine)

The sudden disappearance of honey bees, commonly referred to as Colony Collapse Disorder (CDD), is a problem that threatens agriculture, as up to 80% of the nation's crops are pollinated by honey bees. In CCD, worker bees suddenly disappear and do not come back to their hives, leaving behind the queen and immature bees. A remote sensing instrument is being developed as a tool to assist researchers and beekeepers to monitor bee hives. This instrument is based on a 5.8 GHz ISM band

radar. The unit can be used to remotely detect vibrations in the bee hive due to bee activity, without opening the hive and thus disturbing the colony. When pointed to the bee hive entrance, the Doppler shift due to the ï¬‚ight of individual bees can be detected, as well as the wing beat of bees. An automated data acquisition system based on the Arduino Nano board was designed to operate with the radar instrument. The audio data was recorded at a 8Ks/s rate. The system was deployed in the field for a four week period during the summer of 2016. The collected data was processed in MATLAB. The frequency vs. time histogram was used to identify and quantify bee activities and the results are correlated with visual observations of bee researchers. Radar data shows that flying bees beat their wings between 200 to 250 beats-per-second. A vibration signature detected in the 100 to 150 Hz range was attributed to bees fanning the hive for cooling during the day and heating during the night through visual inspection.

MATCHMAKERS: A game for crowdsourcing solutions to an NP-hard problem
Christina Chung (University of Toronto)

The n-way matching problem considers finding correspondences between elements of multiple inputs. The problem has practical importance in software engineering, yet finding its optimal solution is NP-hard. Existing approximation algorithms are heuristic in nature and do not guarantee high quality matches. We report on a year-long effort of designing MATCHMAKERS, a game that uses collective human intelligence to solve the n-way matching problem. In the game, each input element is visually represented by a character. The player's goal is to form groups of friends between those that are similar, which corresponds to finding matches between input elements. In a short period of time, the game was played by 491 players. Game players were able to outperform automated solutions in one of three case studies, and came very close in the other two. Our work thus provides evidence towards the effectiveness of using human intelligence for solving complex computational problems. In this talk, we describe the game, discuss its results, and present a demo. Please attend our poster session for more details on the game's conceptual design and development process.

Multiple Robot Multiple Task Allocation
Tahiya Salam (University of Virginia)

Applications of mobile robots are expanding. Uses of theses robots are being seen in nearly all facets of society, including automated cleaning (e.g. the Roomba), self-driving cars, medical services, and military surveillance. While these robots are capable of performing tasks autonomously, fleets of these heterogeneous robots may be used to accomplish sets of tasks with time-extended assignment. Coordination amongst robots would be essentially in maximizing the efficiency of the robot by allowing favorable task distribution over groups of heterogeneous vehicles. Unlike single robot, single task, instantaneous assignment that can be solved in polynomial time, the problems of both instantaneous assignment and time-extended assignment for multiple robot multiple task allocation are much harder problems in combinatorial optimization. Multiple robot multiple task allocation explores heuristic approaches to optimizing time and energy expenditure over a heterogeneous fleet of robots.

Benefits of Autonomous UAS for Urban Search and Rescue
Sage Trudeau (Rensselaer Polytechnic Institute)

Despite their intense training and incredibly rapid response times, urban search and rescue teams are often unable to identify locations of surviving victims during disaster scenarios. They rely heavily on local tips and tend to resort to overlaying a grid on the disaster area and searching square by square. Search time could be reduced, and lives saved increased, if there was a better way

to determine the location and density of survivors in disaster areas. The team proposes to use Commercial Off The Shelf (COTS) quadcopter and sensor technology in addition to open-source software to enable Unmanned Aerial Systems (UAS) to find and relay information about survivors. By integrating the capabilities of Stereoscopic Imaging, Light Detection And Ranging (LIDAR), Ultrasonic Ranging, and Thermal Imaging systems a UAS could be capable of autonomously locating entrances into a building, entering, and identifying warm bodies inside. A major challenge in the development of an autonomous UAS is fine tuning navigation and collision avoidance algorithms without risking the hardware. The UAS must be intelligent enough to avoid collisions during its search and place its own flight safety above all else. This ensures the information it gathers is able to be relayed from communication disadvantaged enclosures when a downlink is reestablished. The system would be capable of prioritizing the use of its downlink bandwidth for relaying survivor locations, while simultaneously storing mapping information for later download. The demonstration of this systems capability will show the identification of an entrance, in this case an open door, autonomous exploration into the building, identification of two people located inside, and a safe exit to report.This research directly benefits the efforts of first responders who include but are not limited to: fire fighters, police officers, paramedics, and the National Guard. First responders are often injured while on-duty, which can hinder search efforts and shorten their careers. To that end, this project has been designed to reduce the risk associated with urban search and rescue from collapsed or damaged buildings. Implementation of the UAS as a preliminary disaster surveillance device could inform first responders of feasible entrances, map building characteristics, and help avoid obstacles. With this information responders will be better equipped to handle the situation and triage appropriately. Minimizing risk and injury in disaster relief situations has the potential to increase the likelihood of victim discovery and protect the heroes in the field. This system will allow human users to optimize their search, spending more time saving lives and less time searching empty buildings.

New Technologies for Management of Core Body Temperature

Carlton Rice (University of Texas Austin)

Mammalian and avian species possess a highly optimized thermoregulatory system dependent on the ability to move heat between core and surface regions via the convection of blood. Glabrous areas of skin, primarily on the palms, soles, ears, and selected facial sites in humans, contain a dynamic and specialized vascular network with large-bore shunt vessels called arteriovenous anastomoses (AVAs). In situations requiring a conservation of core energy, AVAs tightly vasoconstrict, and in those requiring rejection of heat out of the body, they vasodilate. A primary site of this systematic control is the preoptic anterior hypothalamus (POAH). This study presents evidence of a parallel controller peripheral to the POAH lying along the spinal cord in humans, consistent with prior evidence in other mammals and avians. Thermally accessing the spinal controller simply and safely allows for POAH-independent core body temperature management. Specifically, this can be utilized to induce therapeutic hypothermia with potentially life-saving consequences for multiple medical conditions. Data demonstrates the efficacy of selective thermal stimulation (STS) to the spinal cord as a means to regulate blood flow to the AVAs on demand. STS can become a channel into a new generation of patient care.

November 6, 2016 (Sunday)

Posters Session

10:30am - 12:30pm MIT Stata Center – Student Vest Street

Session 1

Machine Learning, Cloud Computing

Jinny Yan	Applying Clustering Algorithms to Determine Authorship of Chinese Twitter Messages
Shuyang Li	Exploring Rich Features for Sentiment Analysis with Various Machine Learning Models
Akanksha Atrey	Twitter Popularity Diffusion of Presidential Candidates Through Detection of Twitter Bots
Charles Lovering	INSIGHT: Interactive Time Series Analytics System
James Conley	XPilot-AI and a GPU based Neural Network Library
John Knollmeyer	DeltaSherlock: Identifying Changes in the Cloud
Vimig Socrates	Project MEFA: A Meta Extraction Framework for Text Mining of Unstructured FDA Narratives
Eiman Ahmed	The Ins and Outs of the New York City Subway System
L. McCall Saltzman	Transactors: An Actor Language for Fault Tolerant Distributed Computing

Robotics and Automation Technology

Ryan Mecham	Tele-operating collaborative robot with Virtual Reality for repair jobs in space
Grant Rudd	Intelligent Human-in-the-Loop Gesture Based Control System for 6-DOF Robotic Manipulator
Stephanie Haro	Sonar Processing Framework based on the SCAT Model of Bat Biosonar
Kevin Doherty	Bayesian Learning with Generalized Kernels for Occupancy Map Prediction
Amanda Castonguay	Adaptive Underwater Drone Propulsion Using a Collaborative Virtual Training Environment
Priya Persaud	Common Sense Knowledge, Humanoid Robots and Human Rights
Diego Rios	Eulerian vs. Lagrangian Data Assimilation
Rumana Hassin Syed	Controlling the Movements of a Robotic Mannequin through KinematicsRumana Hassin Syed, Aryuna Dashidorzhina (New York City College of Technology, CUNY)
Tahiya Salam	Multiple Robot Multiple Task Allocation
Rosemarie Day	Design and Implementation of an Interior Automated Environmental Analyzer with App
Tim Nguyen	Design and Evaluation of High Order Polyphase Induction Motor for Power Density Improvement

Session 2

Wearable Technology

Macall McQueen	Interoperability Framework for Wearable Sensing Devices
Ranine Haidous	Electrically Stimulated Sensations in Virtual Reality
Lauren Plant	Wearable E-Textiles for Clinical Assessments of Movement Disorders
Chanyeol Choi	Enhanced Quantum Electronic States and its Application in Nano-thick van der Waals Heterostructures
Angela Bertolino	Analysis of the Head Related Transfer Function and its Application to Personalized Spatial Audio
Macall McQueen	Interoperability Framework for Wearable Sensing Devices

Communications and Security

Max Robertson	Implementation of a Wideband Spectrum Sensing Algorithm using a Software Defined Radio (SDR)
Giovanni Malloy	Secure Remote Storage Using Oblivious RAM
James Lu	LaRend: Lightweight Array Radars with Energy-harvesting Noise-canceling Drones
Lianghua Xu	AMuSe - Adaptive Video Delivery in Crowded Areas through WiFi Multicast
Jeffrey Yuan	RF Spectrum Crunch: Compressive Sampling for Rapid Scanning
Dmytro Bogatov	Data MATTERS: Customizing Economic Indices to Measure State Competitiveness
Alexis Julian	Developing a Mobile App to aid First Responders After a Tornado

Biological and Biomedical Engineering and Technology

Alyssa Dayan	Accelerating Graph Sequence Alignment with Tarhio-Ukkonen string-matching algorithm Tuned for Dense Regions
George Wang	Genomic Analysis of NonBDNA motifs
Anubhuti Mathur	Improvement of CRISPR/Cas9 Editing of SNPs Modulating Gene Expression in the IRF1 Locus
Carlton Rice	Therapeutic Recruitment of Thermoregulation in Humans by Spinal Selective Thermal Stimulation
Hieu Nguyen	Predicting Left Ventricular Assist Device (LVAD) Performance With Human Circulatory System Model

Innovative Technologies X-Track

Jessica Mele	Tools for the characterization and improvement of the electron beam orbit stability for the National Synchrotron Light Source - II storage ring
Amit Kadan	MATCHMAKERS: A game for crowdsourcing solutions to an NP-hard problem
Jonathan Harvey-Buschel	Partial Hash Collisions for a Memory-Hard Proof-of-Work Function
Virginia Gresham	CamelTours: Preserving Cultural Heritage through a Mobile Web-App

Stata Center - Floor Plan