

ABM Musa

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RESEARCH INTERESTS

Localization, tracking, mapping, video analytics, mobile sensing, networked systems, wireless networks, applied machine learning.

EDUCATION

PhD in Computer Science Aug 2009 – Aug 2017

University of Illinois at Chicago (UIC)

Dissertation: Advanced Techniques for Mobile Localization and Tracking

(https://www.cs.uic.edu/~amusa/docs/thesis_musa.pdf)

BS in Computer Science and Engineering

Feb 2003 – Nov 2007

Bangladesh University of Engineering and Technology (BUET)

RELEVANT EXPERIENCE

Applied Scientist

Nov 2018 – Present

Amazon, Seattle, WA

Working on localization and mapping problems with computer vision and sensor fusion.

Research Assistant

Aug 2010 – Aug 2017

BITS Networked Systems Laboratory (<http://cs.uic.edu/Bits>)

Developed a video-based near real-time localization system with sub-meter accuracy for smartphones using the reconstructed 3D model of the environment and combination of efficient feature matching, optical flow tracking and prioritized 2D-3D correspondences. Developed an online GPS tracking system that provides a unified relation between tracking error, uplink data usage, and timeliness of location reporting. Developed a system to track unmodified smartphones using Wi-Fi monitors, which can enable applications such as monitoring street traffic flow and crowd flow in public areas. Developed a mobile system consisting of multiple Wi-Fi monitors, a GPS receiver, and a spectrum analyzer that can be used to analyze city-wide Wi-Fi characteristics, which was used to analyze the Wi-Fi characteristics in downtown Chicago.

Research Consultant

Nov 2014

ReadMe Systems, Milpitas, CA

Worked on the design and implementation of crowd monitoring in stores and shopping malls using Wi-Fi tracking based on our previous work [5, 6] for this early-stage start-up.

Research Intern

May 2013 – Aug 2013

Wireless and IT Convergence Group

IBM TJ Watson Research Center, Yorktown Heights, NY

Mentor: Theodoros Salonidis

Designed and implemented a framework [11] for distributing the data and computation of mobile applications in a hierarchical network (mobile-edge-cloud) to achieve improved application performance and optimal system resource utilization.

Research Intern

Jun 2012 – Sep 2012

Mobility and Networking Research Group

Microsoft Research, Redmond, WA

Mentor: David Chu and Victor Bahl

Designed and implemented an app-centric and context-based mobile socialization platform [12], including a developer API and efficient cloud-based data processing.

PUBLICATIONS

1. *ABM Musa* and Jakob Eriksson, “Feasibility of Video-based Sub-meter Localization on Resource-constrained Platforms”, arXiv, <https://arxiv.org/abs/2002.08039>, 2020.
2. *ABM Musa*, James Biagioni and Jakob Eriksson, “Online location trajectory compression,” in 1st ACM SIGSPATIAL International Workshop on Spatial Gems (**SpatialGems 2019**), ACM, 2019.
3. *A.B.M. Musa*, James Biagioni and Jakob Eriksson, “Trading Off Accuracy, Timeliness, and Uplink Usage in Online GPS Tracking,” in IEEE Transactions on Mobile Computing (**TMC**), vol. 15, no. 8, pp. 2124-2136, Aug. 1 2016.
4. James Biagioni, *A.B.M. Musa*, and Jakob Eriksson, “Thrifty Tracking: Online GPS Tracking with Low Data Uplink Usage”, In Proceedings of the 21st ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (**SIGSPATIAL’13**). ACM, New York, NY, USA, 496-499.
5. *A.B.M. Musa* and Jakob Eriksson. “Tracking unmodified smartphones using Wi-Fi monitors”, In Proceedings of the 10th ACM Conference on Embedded Network Sensor Systems (**SenSys ’12**). ACM, New York, NY, USA, 281-294.
6. *A.B.M. Musa*, Jakob Eriksson, “Demo: WiFlow: Real-time Travel Time Estimation using Wi-Fi Monitors”, In Proceedings of the 9th ACM Conference on Embedded Networked Sensor Systems (**SenSys ’11**). ACM, New York, NY, USA, 429-430.
7. *A.B.M. Musa*, Jakob Eriksson, “On-Demand, Deploy-Anywhere Wi-Fi Diagnostics”, Demo In Proceedings of the sixteenth annual international conference on Mobile computing and networking (**MobiCom ’10**), ACM, New York, NY, USA.

TECHNICAL REPORTS

8. *A.B.M. Musa*, “Map Object Localization Using 3D Reconstruction”, Amazon Computer Vision Conference (ACVC), 2020.
9. *A.B.M. Musa*, “Enhanced Localization with GPS and Inertial Sensor Fusion”, Amazon Machine Learning Conference (AMLC), 2019.
10. *A.B.M. Musa*, “Efficient feature matching and 3D reconstruction from mobile video”, Amazon Computer Vision Conference (ACVC), 2019.

PATENTS

11. *ABM Musa*, Object Localization for Mapping Applications using Geometric Computer Vision Techniques, Amazon, 16/934,591 (2020)
12. Theodoros Salonidis, *A.B.M. Musa*, Seraphin B. Calo, Murtaza Jafar, Executing Data Stream Processing Applications in Dynamic Network Environments, International Business Machines Corporation, US20160156514 (2016).
13. Lenin Ravindranath, Victor Bahl, *A.B.M. Musa*, and David Chu, Application-centric Socialization, Microsoft Corporation, US20140280443 (2014).

TEACHING EXPERIENCE

Teaching Assistant

2009 – 2012

UIC Department of Computer Science

Assisted in teaching Computer Networks (Fall ’12, ’11, ’10), Computer Architecture I (Spring ’10, Fall ’09) and Introduction to Programming (Spring ’10). Developed automated grading scripts for the assignments in the Computer Networks course to provide early feedback to students and accelerated grading.

WORK EXPERIENCE

System Integration Engineer

Jan 2008 – Aug 2009

Core Networks, Network Deployment and Integration

LM Ericsson Bangladesh Ltd.

Worked on MPBN (Mobile Packet Backbone Network) - IP backbone of Mobile Operators Worked on MPLS, MP-BGP, ISIS, OSPF, RSVP-TE, LDP, and VRRP protocols, L2 and L3 VLAN, policy-based routing, QoS using Diffserv and ACL for MPBN.

AWARDS

Third place in UIC research forum competition among Engineering and Physical Science (2011).
Dean's List for excellent academic performance in BUET (2004 – 2007).
University Merit Scholarship at BUET (2003).
3rd in the order of merit, nationwide HSC exam in Bangladesh (2002).
9th in the order of merit, nationwide SSC exam in Bangladesh (2000).
Award from Chief of Army Staff, Bangladesh for SSC result (2000).

SERVICE

Reviewer for Winter Conference on Applications of Computer Vision (WACV) (2019 – Present)
Reviewer for IEEE Transactions on Mobile Computing (2018 – Present)
Reviewer for IEEE Transactions on Intelligent Transportation Systems (2016 – Present).
Reviewer for International Journal for Geographical Information Science (2017 – Present).
Treasurer at UIC Computer Science Graduate Student Association (2012 – 2013).

REFERENCES

Available on request