

University of Massachusetts Lowell Team Contact

Please feel free to contact Jennifer Capistano or faculty advisor Dr. Yuanchang Xie if you have any questions.

List of Team Members

Name	Age	Degree Pursued	Major	Email
Jennifer Capistano		BS+MS*	Civil Eng.	Jennifer_Capistano@student.uml.edu
Qilei Chen	33	PhD	Computer Science	Qilei_Chen@student.uml.edu
Shania Ruiz	22	BS+MS*	Civil Eng.	Shania_Ruiz@student.uml.edu
Xinzi Sun	30	PhD	Computer Science	Xinzi_Sun@student.uml.edu
Zubin Bhuyan	32	PhD	Computer Science	Zubin_Bhuyan@student.uml.edu

**Jennifer and Shania are in our accelerated 5-year BS+MS Transportation Eng program*

Resumes

See attachments at the end.

Problem Statement

Massachusetts DOT (MassDOT) has deployed hundreds of traffic cameras on major highways. The videos from these traffic cameras are reviewed manually often to verify incidents. It would be helpful to develop algorithms to automatically analyze such videos (i.e., identify abnormal scenarios, extract traffic flow parameters) and generate alerts, turning these existing traffic cameras into smart and cost-effective traffic sensors.

MassDOT Mentor Contact Information

Corey O'Connor, P.E.
Traffic Operations Engineer
MassDOT Highway Division
Phone: (978) 852-0617; Email: corey.oconnor@state.ma.us

Faculty Advisors

Yuanchang Xie, PhD, PE
Associate Professor
Dept. of Civil & Environmental Eng.
University of Massachusetts Lowell
Email: yuanchang_xie@uml.edu

Benyuan Liu, PhD
Professor
Dept. of Computer Science
University of Massachusetts Lowell
Email: bliu@cs.uml.edu

Signed Waiver Forms

See attachments at the end.

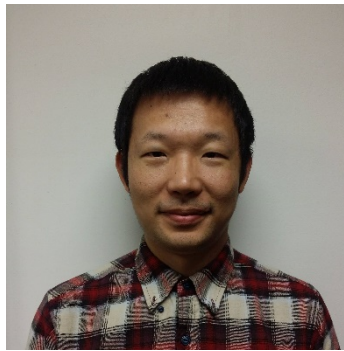
Statement of Team Dynamics and Methodologies

The team plans to meet once a week. Additional meetings will be arranged if needed. The two Civil Engineering students will take the training and will brief the rest of the team during team meetings. The three Computer Science students will focus on developing the algorithms, while the Civil Engineering students will focus on product design (e.g., functions that should be included in the product, implementation details that can make the system more feasible and successful). The interdisciplinary collaboration will help the Civil Engineering students understand how technology advancements in computer vision and deep learning can bring new opportunities to enhance existing traffic cameras. It will also help the Computer Science students understand tremendous opportunities in Intelligent Transportation Systems and the practical needs of traffic systems management and operations.

Headshots



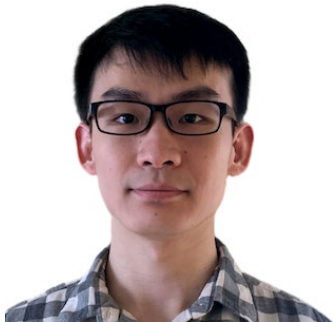
Jennifer Capistano



Qilei Chen



Zubin Bhuyan



Xinzi Sun



Shania Ruiz

Jennifer Capistano | (617) 501-4483 | Lowell, MA 01850

Jennifer.Capistano@student.uml.edu | www.linkedin.com/in/jennifercapistano

EDUCATION

University of Massachusetts Lowell, Lowell, MA
Bachelor of Science in Civil Engineering

Anticipated May 2021
GPA: 3.81 | Dean's List

University of Massachusetts Lowell, Lowell, MA
Master of Science in Civil Engineering
Transportation Engineering Option

Anticipated May 2022

Related Course Work: Surveying I/Lab, Geomatics/Lab, Transportation Engineering, Advanced Highway Geometric Design, Structural Analysis, Reinforced Concrete, Steel Design, Civil Engineering Systems.

Project: Transportation Research Project to integrate data from surveying, data collection, and simulation using VISSIM and VISTRO to find feasible solutions to parking lot congestion issues at the University of Massachusetts Lowell.

EXPERIENCE

Co-op Rail - Fall/Winter 2020

HNTB

September 2020 – Current

Track Design Intern Engineer | Chelmsford, MA

- Quality Control Review
- Horizontal & Vertical Alignments
- Certificate Packages Review

Highway Design Summer Internship

Massachusetts Department of Transportation (MassDOT) - District 4

Civil Engineering Intern | Arlington, MA

June 2020 – September 2020

- Traffic Operations & Engineering Sections
 - Speed Distribution Calculations
 - Sign Inspection
 - Road Safety Audit
- Traffic Management Plans (TMPs)
 - 25%, 75%, 100%, & PS&E Design Review Comments for Temporary Traffic Control Plans Projects, Pavements Marking and Signs, and Special Provisions.
 - Permit Reviews using the State Highway Access Permit System (SHAPS). For example, Responsible for reviewing permits for Utility Work to ensure all temporary traffic control plans were appropriate for the proposed work.

Transportation MIRE Intersection Project

UMass Lowell and Massachusetts GeoDOT

December 2019 – Current

Research Assistant | Lowell, MA

- In charge of coding intersections using ArcGIS tools. While collaborate with coworkers to solve challenging intersections and contribute to feasible solutions.

MEMBERSHIPS & AWARDS

International Institute of Transportation Engineers (ITE), American Society of Civil Engineers (ASCE), 2018 Maurice O'Shea Excellence Academic Award, Phi Theta Kappa Honor Society – Alpha Kappa Mu, and Commonwealth Honors Society.

SKILLS

Laboratory: Land Surveying, Materials Testing, Compaction Testing, Sieve Analysis, and Water Quality Testing.

Software: MicroStation, Bluebeam, ArcGIS, AutoCAD, Civil 3D, GTStrudl, VISTRO, VISSIM, and Microsoft Office Suite.

Languages: Fluent in Portuguese and proficient in Spanish.



QILEI CHEN

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Department of Computer Science
University of Massachusetts, Lowell
198 Riverside St.
Lowell, Massachusetts 01854, USA

EDUCATION

Ph.D. in Computer Science

University of Massachusetts, Lowell

Aug. 2016 – Now

Lowell, the USA

WORK EXPERIENCE

Teaching&Research Assistant

Umass Lowell

Sep. 2016 – Now

Lowell, the USA

- Software Engineering, Computing II, III (Teaching)
- Motion Estimation, Object Detection, Medical Image Analysis (Research)

A.I. Algorithm Engineer Intern

Intellifai Technologies Co., Ltd

Oct. 2017 – Jan. 2018

Hangzhou, China

- Image Classification, Object Detection, Medical Image Analysis

Software Engineer

MediaTek Co., Ltd

July 2015 – July 2016

Shenzhen, China

- Android System Optimization and Android Framework Customization

RESEARCH PUBLICATIONS

- [1] Marlon F Alcantara, Yu Cao, Chang Liu, Benyuan Liu, Maria Brunette, Ning Zhang, Tong Sun, Peifeng Zhang, Qilei Chen, Ying Li, et al. Improving tuberculosis diagnostics using deep learning and mobile health technologies among resource-poor communities in perú. *Smart Health*, 1:66–76, 2017.
- [2] Qilei Chen, Ping Liu, Jing Ni, Yu Cao, Benyuan Liu, and Honggang Zhang. Pseudo-labeling for small lesion detection on diabetic retinopathy images. In *2020 International Joint Conference on Neural Networks (IJCNN)*, pages 1–8. IEEE, 2020.
- [3] Qilei Chen, Xinzi Sun, Ning Zhang, Yu Cao, and Benyuan Liu. Mini lesions detection on diabetic retinopathy images via large scale cnn features. In *2019 IEEE 31st International Conference on Tools with Artificial Intelligence (ICTAI)*, pages 348–352. IEEE, 2019.
- [4] Alexander Ding, Qilei Chen, Yu Cao, and Benyuan Liu. Retinopathy of prematurity stage diagnosis using object segmentation and convolutional neural networks. In *2020 International Joint Conference on Neural Networks (IJCNN)*, pages 1–6. IEEE, 2020.
- [5] Jing Ni, Qilei Chen, Chang Liu, Honghao Wang, Yu Cao, and Benyuan Liu. An effective cnn approach for diabetic retinopathy stage classification with dual inputs and selective data sampling. In *2019 18th IEEE International Conference On Machine Learning And Applications (ICMLA)*, pages 1578–1584. IEEE, 2019.
- [6] Xinzi Sun, Ning Zhang, Qilei Chen, Yu Cao, and Benyuan Liu. People re-identification by multi-branch cnn with multi-scale features. In *2019 IEEE International Conference on Image Processing (ICIP)*, pages 2269–2273. IEEE, 2019.
- [7] Degui Xiao, Qilei Chen, and Shanshan Li. A multi-scale cascaded hierarchical model for image labeling. *International Journal of Pattern Recognition and Artificial Intelligence*, 30(09):1660005, 2016.
- [8] Degui XIAO, Huan ZHU, Luxin LIU, and Qilei CHEN. Vision information fusion algorithm for road detection based on ds evidence theory. *Journal of Computational Information Systems*, 9(21):8531–8540, 2013.

SHANIA RUIZ

Quincy, MA 02169 | 617-990-2922

shania_ruiz@student.uml.edu | linkedin.com/in/shaniaruiz

EDUCATION

Bachelor of Science, Civil Engineering

Expected May 2021

Minor: Business Administration

University of Massachusetts Lowell, Lowell, MA

GPA: 3.98 (Dean's List)

Associate of Science, Engineering Transfer Option

2016 – 2018

Bunker Hill Community College, Boston, MA

GPA: 4.0 (Highest Honors)

COURSEWORK

Transportation Engineering, Traffic Engineering, Traffic Management and Control, Geomatics, Surveying, Construction Management, Water Resources, Environmental Engineering, Fluid Mechanics, Foundation and Soil Engineering, Steel Design, Soil Mechanics, Structural Analysis

SKILLS

- Software: AutoCAD, Civil3d, and GTSTRUDL; proficient with Microsoft Office
- Laboratory: Pipetting, titration, surveying equipment, and compression testing machine
- Languages: Fluent in both English and Filipino

ACADEMIC PROJECTS

Foundation and Soil Engineering

- Learned how to read and interpret boring logs and test results to procure soil profiles

Surveying Lab

- Learned to set up and operate a total station to measure angles and distances of points
- Gathered data used for traversing, remote point determination, leveling, and topographic survey

Structural Analysis

- Learned how to read and interpret GTSTRUDL output files to analyze trusses, beams, and frames

RELEVANT EXPERIENCE

Traffic Engineering Co-Op, MassDOT Traffic & Safety

(Jul 2020 – Present)

- Assists with Road Safety Audits by redacting crash data, preparing meeting materials, attending the meetings, and reviewing and commenting on the reports
- Works with the Crash Data System, which includes querying and geocoding crashes
- Analyzes crash information, prepares crash summaries & diagrams, and identify key crash factors
- Assists Traffic Engineering and Safety Section with General Assistance

Transportation Analyst, Umass Lowell and Massachusetts GeoDOT

(Dec 2019 – Jul 2020)

- Coded intersections using ArcGIS
- Provided intersection features and update intersection inventory

ADDITIONAL EXPERIENCE

Sales Associate, Follett Corporation, Lowell, MA

(Jul 2019 – Mar 2020)

- Operated cash register transactions and processed employee or faculty discounts as appropriate
- Provided friendly and attentive customer service and assistance

Xinzi Sun

E-mail: xinzi_sun@student.uml.edu Mobile: 1-8572729665

Education

Ph.D. **University of Massachusetts Lowell**, Lowell, MA, USA *Sept 2016 - Present*
Department of Computer Science *GPA 3.92/4.0*
M.S. **University of Massachusetts Lowell**, Lowell, MA, USA *Sept 2014 - May 2016*
Department of Computer Science *GPA 3.85/4.0*
B.S. **Beijing Information Science & Technology University**, Beijing, China *Sept 2010 - July 2014*
Major: Intelligent Science & Technology *GPA: 88.9/100; Ranked 3 out of 83*

Relevant Course

Graduate Course: Machine Learning, Data Mining, Algorithms, Big Data System Design,
Natural Language Processing, Algorithms

Undergraduate Course: Artificial Intelligence, Artificial Neural Networks, Pattern Recognition

Teaching Assistant Experience

Machine Learning (undergraduate and graduate) *S 2017, F 2017, S 2018, F2018, S 2019, S 2020*
Artificial Intelligence (undergraduate and graduate) *F 2020*
Analysis of Algorithms (undergraduate) *S 2021*
Database I, II (undergraduate and graduate) *F 2016, S 2017*

Research Experience

My Research Interests mainly focus on **Machine Learning, Deep Learning, and Medical Image Processing**. Main Research Projects are listed below:

Pathology Prediction for Colorectal Polyp *Oct 2020 - Present*
Collecting a polyp dataset with mask and pathology annotation and training CNN model for instance-level polyp segmentation and pathology prediction.

Road Pavement Crack Segmentation *Sep 2020 - Feb 2021*
Adopting and enhance the DeepLabv3+ model with a novel multi-scale attention module to inspect pavement images and generate crack segmentation masks.

Colorectal Polyp Detection System Development *Jun 2019 - Aug 2020*
Labeling colonoscopy images collected from the Endoscopy Center of Xiangya Hospital of Central South University in China and proposing an integrated system that consists of a blurry detector and two CNN-based polyp detectors. Now, our polyp detection system has been deployed at the Xiangya Hospital.

Colorectal Polyp Segmentation *Feb 2019 - Aug 2019*
Using a U-Net with dilated convolution for polyp detection and segmentation during colonoscopy (recall 95.5, precision 96.7, dice coefficient 82.5).

People Re-identification *Feb 2018 - Sep 2018*
Using multi-branch CNN model to combine multi-scale features for people re-identification. We achieved state-of-the-art performance on the three most popular datasets.

Programming Language and Platform

Python, C, C++, Javascript, HTML, PHP, CSS, SQL
Pytorch, Keras, Tensorflow, scikit-learn

Publications

Sun, X., Wang, D., Zhang, C., Zhang, P., Xiong, Z., Cao, Y., ... & Chen, S. (2020, November). Colorectal Polyp Detection in Real-world Scenario: Design and Experiment Study. In *2020 IEEE 32nd International Conference on Tools with Artificial Intelligence (ICTAI)* (pp. 706-713). IEEE.

Sun, X., Zhang, P., Wang, D., Cao, Y., & Liu, B. (2019, December). Colorectal polyp segmentation by u-net with dilation convolution. In *2019 18th IEEE International Conference On Machine Learning And Applications (ICMLA)* (pp. 851-858). IEEE.

Sun, X., Zhang, N., Chen, Q., Cao, Y., & Liu, B. (2019, September). People re-identification by multi-branch cnn with multi-scale features. In *2019 IEEE International Conference on Image Processing (ICIP)* (pp. 2269-2273). IEEE.

Zubin Bhuyan

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EMAIL: zubin.bhuyan@gmail.com | zbhuyan@cs.uml.edu

LINKEDIN: [LinkedIn.com/in/zubinhbuyan](https://www.linkedin.com/in/zubinhbuyan)

Education

Jan 2018 – <i>present</i>	Ph.D. candidate Department of Computer Science, UMass Lowell. Current GPA: 3.636. Research: Hierarchical classification using deep learning techniques with specific focus on chest radiography images and vehicular traffic video.
Aug 2011 – June 2013	M.Tech. in Information Technology Tezpur University, India. Thesis: “ <i>A Framework for Dynamic Ontology Revision</i> ”. CGPA: 9.47/10 First Class with Distinction.

Publications

- **Z. Bhuyan**, Y. Cao, B. Liu. (2021). “*Exploiting Inherent Data Hierarchies for Deep Multi-label Classification of Chest X-ray images*”. IJCNN. (In review)
- **Z. Bhuyan**, S. M. Hazarika. (2016). “*FCA based Ontology Revision*”. Int. Conf. on Computing and Communication Systems. Lecture Notes in Networks and Systems, Springer. [[Link](#)]
- D. Boro, **Z. Bhuyan**. (2016). “*A Game for Shared Ontology Evolution*”. Int. Conf. on Computing and Communication Systems. Lecture Notes in Networks and Systems, Springer. [[Link](#)]
- R. Bhattacharyya, **Z. Bhuyan**, S. M. Hazarika. (2016). “*O-PrO: An Ontology for Object Affordance Reasoning*”. Intelligent HCI. LNCS No. 10127, Springer. [[Link](#)]
- **Z. Bhuyan**, S. Hazarika. (2012). “*A Fast and Inexpensive Particle Swarm Optimization for Drifting Problem-Spaces*”. In proc. Int. Conf. on Emerging Trends in Science, Engineering and Technology. IEEE. [[Link](#)]

Technical Skills & Certifications

Programming Languages:	Python, C, SQL.
Libraries & Tools:	PyTorch, Pandas, Matplotlib, PySpark, Docker, git.
Certifications:	Machine Learning and Data Analysis on Coursera. [Certificate badges] Responsible Conduct of Research, CITI Program. [Certificate]

Work Experience

Aug 2018 – <i>present</i>	Graduate Teaching Assistant, Department of Computer Science, UMass Lowell.
Aug 2013 – Dec 2017	Lecturer, Tezpur University & Nagaland University, India.
July 2010 – July 2011	Software Developer, Indigo Architects, Pune, India.