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October 05, 2025

Search Committee
Department of Computer Science
Texas A&M University-Corpus Christi
Corpus Christi, TX

Dear Members of the Search Committee,

I am writing to apply for the position of **Assistant Professor of Computer Science at Texas A&M University–Corpus Christi (TAMU-CC)**. I hold a Ph.D. in Computer Science from Purdue University, and my research focuses on computer vision, deep learning, and intelligent systems, with applications to autonomous driving and edge computing. With a strong publication record, a strategic plan for developing externally funded research, and extensive teaching experience, I am eager to contribute to TAMU-CC's mission as a R2 Doctoral Research Institution advancing both research and education.

My **research** addresses trustworthy AI perception and decision-making in safety-critical domains. I have published 7 IEEE conference papers and 3 IEEE journal articles on topics such as semantic segmentation, motion-based detection, and vision transformers. My SE3 framework enables low-latency segmentation on edge devices, combining algorithmic innovation with real-world deployability. Looking ahead, I plan to expand this research toward robust AI under adversarial settings and secure sensor fusion, aligning closely with TAMU-CC's strengths in cybersecurity, AI, robotics, and cloud/edge computing. I aim to establish a lab that attracts external funding from NSF (including CAREER), DoD, and industry partners, while engaging undergraduate and graduate students in cutting-edge projects.

In **teaching**, I bring a student-centered approach with a strong mentoring record. I have taught and assisted in courses such as Multimedia Information Systems, Image Processing and Computer Vision, and Intelligent Systems. At TAMU-CC, I look forward to teaching core courses in Computer Science (e.g., Data Structures, AI, Machine Learning) and developing advanced electives in Computer Vision, Deep Learning, and Edge AI, while actively involving students in research through capstone projects and lab activities.

TAMU-CC's vibrant research ecosystem, including the MANTIS Lab, Pegasus Lab, and cybersecurity initiatives, provides an ideal environment for interdisciplinary collaboration. I am excited by the university's dual emphasis on excellence in research and impactful teaching, and I am confident my background will contribute to both.

Enclosed please find my CV, research statement, teaching statement, transcripts, and references. I would be honored to join TAMU-CC and help advance its research and educational goals in AI and Computer Science.

Sincerely,
Guo Cheng, Ph.D.
Purdue University, 2022

Guo Cheng

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Other Websites: *IEEE* | *ResearchGate* | *DBLP* | *Semantic Scholar*

Education

Purdue University, **Ph.D.** in **Computer Science** 08/2016 - 12/2022

- Advisor: Professor Jiangyu Zheng
- Committee: Profs. Mihran Tuceryan, Snehasis Mukhopadhyay, George Mohler, Gavriil Tsechpenakis
- Dissertation: Sequential Semantic Segmentation of Streaming Scenes for Autonomous Driving

Stony Brook University, **M.S.** in **Statistics** 08/2013 - 05/2015

- Coursework: Data Analysis, Categorical Data Analysis, Mathematical Analysis, Regression Theory, Probability, Design of Experiments, Statistical Computing

Wuhan Textile University, **B.S.** in **Information and Computer Science** 09/2009 - 06/2013

Work Experiences

- **Software Engineer** at **Bloomberg**, New York, NY 10/2022 - 04/2025
  - Led feature development for post-trade monitoring and fee-charging systems, collaborating with distributed databases and QA teams.
  - Designed and implemented compliance reporting modules for FINRA, NYSE, and NASDAQ, ensuring daily filings across millions of trades.
  - Led initiatives applying large language models (LLMs) for legal-document understanding, fine-tuning pre-trained models for downstream tasks and deploying them on AWS SageMaker. Monitoring models via detecting model and data drift; Updating models via reinforcement learning based on reviews across functional teams.
- **Data Scientist** Intern at **ClearObject**, Indianapolis, IN 05/2021 - 08/2021
  - Developed encoder–decoder models (TensorFlow v1 & v2) for automated defect detection. Models were adopted in partner manufacturing pipelines, demonstrating real-world impact.
  - Shipped end-to-end ML models to the cloud with ongoing MLOps maintenance.
- **Research Quant** Intern at **FinAnalytica**, New York, NY 09/2015 - 12/2015
  - Mined financial time-series to model portfolio risk.

Selected Publications

- **Peer-reviewed Journal Papers**

2022 [J1] **G. Cheng**, J. Zheng. *Sequential Semantic Segmentation of Road Profiles for Path and Speed Planning.* IEEE Transactions on Intelligent Transportation Systems (T-ITS)

2019 [J2] Z. Wang, **G. Cheng**, J. Zheng. *Road Edge Detection in All Weather and Illumination via Driving Video Mining.* IEEE Transactions on Intelligent Vehicles (T-IV)

2018 [J3] **G. Cheng**, Z. Wang, J. Zheng. *Modeling Weather and Illuminations in Driving Views Based on Big-Video Mining*. IEEE Transactions on Intelligent Vehicles (T-IV)

- **Peer-reviewed Conference Papers**

2022 [C1] **G. Cheng**, J. Zheng. SE3: *Sequential Semantic Segmentation of Large Images with Minimum Memory.* IEEE 26th International Conference on Pattern Recognition (ICPR)

2021 [C2] Z. Wang, **G. Cheng**, J. Zheng. *Planning Autonomous Driving with Compact Road Profiles.* IEEE International Conference on Intelligent Transportation Systems (ITSC)

2020 [C3] **G. Cheng**, J. Zheng. *Semantic Segmentation for Pedestrian Detection from Motion in Temporal Domain.* IEEE 25th International Conference on Pattern Recognition (ICPR)

2019 [C4] **G. Cheng**, J. Zheng, M. Kilicarslan. *Semantic Segmentation of Road Profiles for*

Efficient Sensing in Autonomous Driving. IEEE Intelligent Vehicles Symposium (IV)

2018 [C5] **G. Cheng**, J. Zheng, H. Murase. *Sparse Coding of Weather and Illuminations for ADAS and Autonomous Driving.* IEEE Intelligent Vehicles Symposium (IV)

2017 [C6] **G. Cheng**, Z. Wang, J. Zheng. *Big-Video Mining of Road Appearances in Full Spectrums of Weather and Illuminations.* IEEE International Conference on Intelligent Transportation Systems (ITSC)

[C7] Z. Wang, **G. Cheng**, J. Zheng. *All Weather Road Edge Identification based on Driving Video Mining.* IEEE International Conference on Intelligent Transportation Systems (ITSC)

2012 [C8] T. Chen, **G. Cheng**, S. Shi. *Straight Edge Extraction from LiDAR Images.* IEEE International Conference on Control Engineering and Communication Technology (ICCECT)

[C9] Q. Zhou, L. Wan, **G. Cheng**. *Ultimate Boundedness of Stochastic Cohen-Grossberg Neural Networks with Delays.* IEEE International Conference on Systems and Informatics (ICSAI)

- **Manuscripts & Preprints**

2022 [M1] **G. Cheng**. *Sequential Semantic Segmentation of Streaming Scenes for Autonomous Driving*. Doctoral Dissertation, Purdue University, 2022.

[M2] **G. Cheng**, J. Zheng. *Shift-Memory Network for Temporal Scene Segmentation.* arXiv:2202.08399

Research Experiences

Research Interests

- Computer Vision: image/video processing, scene understanding, semantic segmentation, 2D/3D object detection and tracking, image/video synthesis.
- Deep Learning: efficient inference, CNN/Transformer models, reinforcement learning, transfer/few-shot learning, multimodal learning, vision-language models, diffusion models.
- Autonomous Driving & Robotics: perception, sensor fusion, path and speed planning, edge deployment, robust vision under adverse conditions, vision-language-action, intelligent transportation.
- AI: domain adaptation, RAG systems, fine-tuning and evaluation for applied NLP, deploying scalable and reliable ML/AI systems in safety-critical domains.

Doctoral Research, Purdue University (Center for Visual Info Sensing & Computing) 2017 - 2022

- Advisor: Professor Jiangyu Zheng
- Research:
  - Focuses on scene understanding for perception and further planning in autonomous driving, including weather/illumination classification of driving videos, pedestrian detection via leg motion, vehicle tracking, image/video segmentation, real-time edge computing in deep learning, etc.
  - Developed efficient deep learning architectures for real-time autonomous driving, with emphasis on software scalability, memory efficiency, and deployment on embedded/edge systems.
- Collaborations:
  - Zheyuan Wang (*PhD in CS, Purdue, now @ Huawei, China*)
  - Mehmet Kilicarslan (*PhD in CS, Purdue, now AP @ Eskisehir Technical University, Turkey*)
  - Hiroshi Murase (*Professor @ Nagoya University, Japan*)
  - TASI at Purdue ECE partners (R. Tian, L. Li, K. Yang, S. Chien, Y. Chen, *et al.*)
  - mentoring 3 undergraduates on video road-profile/trajectory projects
- Outcomes:
  - Published 3 journal papers and 7 IEEE conference papers: [J1-J3], [C1-C7]. [J1-3] were supported by Toyota CSRC and U.S. DoT grants, under UTC CrIS project.

Undergraduate Research – Wuhan Textile University 2012 – 2013

- Lab: jointly between School of Math and Computer Science, WTU, China and Dept. of Computer Science, Engineering and Mathematics, University of South Carolina Aiken, US
- Advisor: Professor Tieling Chen *(University of South Carolina Aiken, US)*
- Research: Median filter and gradient operator in edge detection from airborne LiDAR images.
- Collaborations: Shuting Shi (*BS @ WTU, China; PhD @ Oklahoma State University, US)*
- Outcomes: 1 IEEE conference paper of [C8], oral presented in Shenyang, China in Dec. 2012

Teaching Experiences

Teaching Assistant

- Works include designing and grading assignments, holding weekly labs, mentoring students' capstone projects, guest lecturing, applying project-based learning and integrating research in teaching. Courses span undergraduate, graduate and professional levels.

- Purdue University, Indianapolis IN
  - CSCI 36200 Data Structures and Algorithms (Fall 2016, Spring 2017)
    Supported lectures and led coding sessions to reinforce core algorithms.
  - CSCI 43500 Multimedia Information Systems (Fall 2017/2019/2020, Spring 2022)
    Supported lectures and led lab sessions; supervised capstone projects on vehicle/road trajectory analysis using Python, OpenCV, and TensorFlow. One mentee later joined Lockheed Martin and credited this project as key preparation.
  - CSCI 34000 Discrete Computational Structures (Spring 2021)
    Held TA sessions clarifying discrete math concepts; improved student project performance by guiding applications in algorithm design.
  - CSCI 54900 Intelligent Systems (Fall 2021)
    Designed lab exercises and mentored project teams implementing machine learning pipelines. Provided one-on-one guidance on data preprocessing, model design, and evaluation.
  - CSCI 55700 Image Processing and Computer Vision (Spring 2022)
    Assisted with lectures, grading, and office hours. Topics include digital signal and image input/transportation/processing, feature detection and recognition in 2D and 3D settings.

Mentoring

- Undergraduate capstones at Purdue University
  - road profile annotations (Summer 2019)
  - vehicle trajectory analysis from driving video (Summer 2020)
  - vehicle/pedestrian detection with YOLO/Faster R-CNN (Summer 2021)
- Internship onboarding for newly joined data scientist Tim Gruenhagen at ClearObject (Summer 2021).

Teaching Interests

- Intro to Computer Science / Programming
- Data Structures & Algorithms
- Python Programming
- Artificial Intelligence
- Multimedia
- Deep Learning
- Digital Signal and Image Processing
- Computer Vision
- Natural Language Processing

Invited Talks & Presentations

Invited Talks

- Seminar at Bloomberg L.P., New York, NY (11/2022)
  - Natural Language Processing in Law Document Understanding
- Onsite oral presentation of research at Avery Dennison, Mentor, OH (07/2022)

- Sequential Semantic Segmentation of Image and Video in Temporal-to-Spatial Space

Conference Presentation

- IEEE 26th International Conference on Pattern Recognition (ICPR), Online (08/2022)
- IEEE 25th International Conference on Pattern Recognition (ICPR), Online (01/2021)
- IEEE Intelligent Vehicles Symposium (IV), Paris, France (06/2019)
- IEEE International Conference on Control Engineering and Communication Technology, Shenyang, China (12/2012)

Grants & Services

- **Grants**

2018 - 2022 Toyota CSRC and U.S. DoT grants, under UTC CrIS project

- **Conference Paper Reviewer**

2020 - 2022 IEEE International Conference on Pattern Recognition (ICPR)
2018 - 2022 IEEE Intelligent Vehicles Symposium (IV)
2018 - 2022 IEEE International Conference on Intelligent Transportation Systems (ITSC)

- **Journal Reviewer**

2025 Multimedia Tools and Applications (MTAP)
2021 IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)
2020 - 2021 IEEE Transactions on Intelligent Transportation Systems (T-ITS)
2019 - 2021 IEEE Transactions on Intelligent Vehicles (T-IV)
2019 IEEE Transactions on Vehicular Technology (TVT)

- **Professional Service**

2023 - 2025 Technical Interviewer for Bloomberg L.P. Engineering

Honors & Awards

2021 IUPUI Graduate Student Scholarship for Purdue Students, Purdue University
2019 Intel Edge AI Scholarship, Udacity
2012 University Merit Student, Wuhan Textile University
National Merit Scholarship, Wuhan Textile University

Certificates

2020 Flying Car and Autonomous Flight Engineer Nanodegree Program, Udacity
2019 Self-Driving Car Engineer Nanodegree Program, Udacity
2015 SAS Certified Advanced Programmer for SAS 9 (License No. AP014616v9)

Community & Memberships

- **Community Involvement**
  - Volunteer, Best of Bloomberg (BOB) for Bloomberg Philanthropies, New York (03/2023; 05/2024)
  - Member, Bloomberg Pan Asian Community (BPAC)
- **Professional Membership**
  - IEEE student member # 95711682, Central Indiana Section

Skills & Languages

- Programming: Python, C++, JavaScript/TypeScript, MATLAB, SQL, R
- DL/AI: TensorFlow/Keras, PyTorch, OpenCV, Hugging Face
- Software Engineering: Git, Docker, CI/CD, AWS SageMaker, Agile/Scrum
- Languages: English (fluent), Chinese (native)