

Menglong Zhu

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EDUCATION **University of Pennsylvania**, Philadelphia PA, 2011-2015(Expected)
Candidate for PhD in Computer and Information Science

University of Pennsylvania, Philadelphia PA, 2010-2012
Master of Science in Engineering in Robotics

Fudan University, Shanghai, China, 2006-2010
Bachelor of Science in Computer Science and Technology, 2010

RESEARCH INTERESTS Computer Vision, Robotics and Machine Learning. Special interests in object recognition, 3D pose and shape estimation; human pose and action recognition; visual (semantic) SLAM and natural image text recognition.

SKILL SETS Languages: C++, Matlab, Python, Java, Javascript, PHP
Frameworks: Caffe, ROS, OpenCV, PCL, CUDA, Android, iOS

PUBLICATIONS **M. Zhu***, X. Zhou*, K. Daniilidis, **Single Image Pop-Up from Discriminatively Learned Parts**, *International Conference on Computer Vision (ICCV)*, December 2015. *Equal Contribution

X. Zhou, **M. Zhu**, K. Daniilidis, **Multi-Image Matching via Fast Alternating Minimization**, *International Conference on Computer Vision (ICCV)*, December 2015.

N. Atanasov, **M. Zhu**, G. Pappas, K. Daniilidis, **Localization from Semantic Observations via the Matrix Permanent**, *International Journal of Robotics Research (IJRR)*, 2015.

M. Zhu, N. Atanasov, G. J. Pappas, K. Daniilidis, **Active Deformable Part Models Inference**, European Conference on Computer Vision (ECCV), September 2014.

N. Atanasov, **M. Zhu**, G. Pappas, K. Daniilidis, **Semantic Localization Via the Matrix Permanent**, *Robotics Science and System (RSS)*, July 2014.

M. Zhu, K. Derpanis, Y. Yang, S. M. Brahmbhatt, M. Zhang, C. Phillips, M. Lecce, K. Daniilidis, **Single Image 3D Object Detection and Pose Estimation for Grasping**, *International Conference on Robotics and Automation (ICRA)*, May 2014.

W. Zhang, **M. Zhu**, K. Derpanis, **From Actemes to Action: A Strongly-supervised Representation for Detailed Action Understanding**. *International Conference on Computer Vision (ICCV)*, December 2013.

M. Zhu, S. Ramalingam, Y. Taguchi and T. Garass, **Monocular Visual Odometry and Dense 3D Reconstruction for On-Road Vehicles**. *European Conference on Computer Vision (ECCV) CVVT workshop*, October 2012. (oral presentation)

TECHNICAL
REPORTS

X Zhou, M. Zhu, S Leonardos, K Daniilidis, **Sparse Representation for 3D Shape Estimation: A Convex Relaxation Approach**, arXiv preprint arXiv:1509.04309

M. Zhu, X. Zhou, K. Daniilidis, **Pose and Shape Estimation with Discriminatively Learned Parts**, arXiv:1502.00192 [cs.CV], 2015.

J. Oh, M. Zhu, S. Park et. al., **Integrated Intelligence for Human-Robot Teams**.

M. Zhu, N. Atanasov, G. J. Pappas, K. Daniilidis, **Active Deformable Part Models**, Technical Report, arXiv:1404.0334, 2014.

M. Zhu, K. Derpanis, K. Daniilidis, **Literate PR2: Text detection and recognition for indoor environment**, Robotics Operating System(ROS) Stack.

PATENTS

M. Zhu, S. Ramalingam, Y. Taguchi and T. Garass, **Method and System for Determining Poses of Vehicle-Mounted Cameras for In-Road Obstacle Detection**, US 20140037136 A1.

RESEARCH
PROJECTS

Object Detection and Pose Estimation

Robotics Collaborative Technology Alliance (RCTA) (2012 - present)

- DARPA funded research project, 9.8M / 5yr UPenn budget
- UPenn project lead, main vision software developer
- Collaborate with GD, CMU, JPL, etc.
- Outdoor object detection for semantically guided navigation
- Indoor object detection and pose estimation for searching & manipulation
- Fully deployed on ClearPath Husky & QinetiQ Dragon Runner

3D Pose and Shape Estimation (CVPR 2015 in submission)

- Discriminatively trained parts for 2D appearance
- Sparse shape space for 3D deformation
- Simultaneously solve for hypotheses selection, pose and shape estimation

Fast Object Detection (ECCV 2014)

- Fast active inference for Deformable Part Models
- Solve part inference ordering as scheduling problem
- Achieve more than 3x speedup than cascade-DPM

Object Detection and Pose Estimation (ICRA 2014)

- Discriminatively trained models from synthesized views of object CAD models
- Verification via shape matching between segmentation and detection mask
- Iterative 6-DOF pose refinement by 2D-3D contour matching
- Demonstrated PR2 robot grasping different objects in cluttered scene

Robot Localization

Semantic Localization (RSS 2014, IJRR 2015 in submission)

- Localize the robot based on object detections
- Data association modeled as Matrix Permanent computation
- Successful simulations and real experiments carried out on a ground robot

Monocular Localization and Dense 3D (ECCV 2012)

- Proposed 2 point algorithm for localization of planar motion
- Dense 3D reconstruction via plane sweeping
- US patent issued, 2 applications filed in Japan and China

Video Analysis

Action Recognition (ICCV 2013)

- Web interface & back-end for human joint annotation on AMT
- Volumetric representation for action detection and classification
- Parameter learning for image sequences alignment

Content-based Video Copy Detection

- Evaluated and implemented LSH(locality sensitive hash)
- Compared low level feature detectors and descriptors including SIFT, PCA-SIFT, Harris, SURF, FAST

Text Recognition & Deep Learning

Literate PR2, text recognition

- Text detection and recognition system on robot platform (PR2)
- Released open source ROS package
- [Demo video] viewed over 13,000 times on YouTube, various press releases

Car Plate Recognition

- Text detection and recognition system sold 10K USD to a Taiwan company
- Efficient and robust detection in natural images

Analysis of Deep Learning and Application

- Analysis and application of Deep Belief Network
- Top Undergraduate Senior Thesis

COURSE
PROJECTS

Machine Learning & Computer Vision & Robotics

Age and Gender Prediction on Human face

- Won the first prize in course project competition(among about 80 students)
- Designed various features and learning with SVM

Path planning via Quad-tree Decomposition

- Implemented quad-tree decomposition of 2D environment [code]
- Efficient A* path planning in quad-tree structure, 10x faster than planar grid
- Planning and navigation with differential drive robot in Gazebo simulation

Computer Vision course projects

- Canny edge detection, Image morphing
- Multiple images stitching, Automatic logo replacement

Texture Synthesis and Transfer

- Implemented Image Quilting for Texture Synthesis and Transfer
- Introduced multi-threading & working window to improve performance

Distributed Systems & Compiler

Distributed Search Engine

- Implemented Chord distributed hash table on NS3 codebase(C++)
- Distributed Search engine on top of Chord

Distributed Chat System

- Implemented group chat system from scratch in C++
- Featuring central sequencer, failure detection and master re-election

End to End Compiler

- Designed an procedural Language like PASCAL
- Built the compiler from scratch with Java, (lex, parser and interpreter)
- Implemented an interpreter to execute the intermediate code

Linear Hash index for Database

- Implemented Linear extensible hash index for large data set using C++

INTERNSHIP

MERL, Cambridge, MA

Research Assistant

May. 2011 to Aug. 2011

- Realtime localization and obstacle detection system for car navigation.
- ECCV 2012, oral presentation. US patent filed.

eBaoTech, Shanghai, China

Software Developer

Jul. 2009 to Oct. 2009

- Developed business modules of GroupLife System for **ACE Group**

Honeywell, Shanghai, China

Software Developer

Jul. 2008 to Aug. 2008

- Developer of Picaso™ planning system

SERVICE

Teaching Assistant

- Advanced Robotics (2015 Spring)
- Machine Perception (2013 Spring)
- Machine Learning (2012 Fall)
- Introduction to Computer Programming (2012 Spring)
- Programming Languages & Techniques III (2011 Spring & Fall)

GRASP Lab System Admin

- Maintain a 10 Linux machines cluster configured with NFS