

RUI ZHU

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RESEARCH INTERESTS

- **3D Vision & Geometry:** Shape reconstruction and depth estimation in Visual SLAM;
- **3D Scene Understanding:** 3D tracking and detection;
- **Low-level Computer Vision:** Efficient tracking and alignment;
- **Deep Learning:** Unsupervised learning, 3D geometry modeling and inference.

EDUCATION

Master of Science in Robotics, Carnegie Mellon University Pittsburgh, PA, USA *Aug.2015 - Aug.2017*

- **Overall GPA:** 4.0/4.0
- **Selected Courses:** Computer Vision, Visual Learning and Recognition, Computer Graphics, Machine Learning, Convex Optimization, Mechanics of Manipulation, Deep Reinforcement Learning and Control

B.E. in Information Engineering, Southeast University Nanjing, Jiangsu, P.R.China *Aug.2011 - Jun.2015*

- **Overall GPA:** 3.82/4.0 (90.11/100)

PUBLICATIONS

1. **Rethinking Reprojection: Closing the Loop for Pose-aware Shape Reconstruction from a Single Image**
Rui Zhu, Hamed Kiani, Chaoyang Wang, Simon Lucey
International Conference on Computer Vision (ICCV), 2017 (**Spotlight**)
2. **Object-Centric Photometric Bundle Adjustment with Deep Shape Prior**
Rui Zhu, Chaoyang Wang, Chen-Hsuan Lin, Simon Lucey
IEEE Winter Conference on Applications of Computer Vision (WACV), 2018
3. **Semantic Photometric Bundle Adjustment on Natural Sequences**
Rui Zhu, Chaoyang Wang, Ziyang Wang, Chen-Hsuan Lin, Simon Lucey
In submission to *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, arXiv preprint, 2017
4. **Learning Depth from Monocular Videos using Direct Methods**
Chaoyang Wang, Jose Miguel Buenaposada, Rui Zhu, Simon Lucey
In submission to *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, arXiv preprint, 2017
5. **The Conditional Lucas & Kanade Algorithm**
Chen-Hsuan Lin, Rui Zhu, Simon Lucey
European Conference on Computer Vision (ECCV), 2016
6. **Structure from Category: A Generic and Prior-less Approach**
Chen Kong, Rui Zhu, Hamed Kiani, Simon Lucey
International Conference on 3D Vision (3DV), 2016

RESEARCH & INDUSTRY EXPERIENCE

- **Argo AI**, Pittsburgh, PA, USA *Nov. 2017 - present*
3D Object Detection from Front-view LiDAR data
Research Engineer in Computer Vision - Prof. Deva Ramanan & Prof. Simon Lucey

- Detection and tracking in RGB-D data;
- Deep learning on point sets.

- **Carnegie Mellon University**, Pittsburgh, PA, USA *Mar. 2017 - Nov. 2017*
Semantic Photometric Bundle Adjustment with Shape Prior [2][3]
 Research Associate in CI2CV Lab; Advisor - Prof. Simon Lucey

- The first approach for semantic object-centric PBA on natural sequences which gives the global 6DoF camera poses of each frame and the dense 3D shape, with PBA-like accuracy but denser depth maps;
- Introduce the learned shape prior from deep learning into the Visual SLAM (PBA) pipeline.

- **Carnegie Mellon University**, Pittsburgh, PA, USA *Sep. 2017 - Nov. 2017*
Learning Single Image Depth Predictor from Monocular Sequences [4]
 Research Associate in CI2CV Lab; Advisor - Prof. Simon Lucey & Prof. Jose Miguel Buenaposada

- We show that the depth CNN predictor can be learned without a pose CNN predictor, by incorporation of a differentiable implementation of DVO, along with a novel depth normalization strategy
- Substantially improves performance over state of the art that use monocular videos for training, and even comparable to binocular methods.

- **Carnegie Mellon University**, Pittsburgh, PA, USA *Sep. 2015 - Mar. 2017*
Shape Reconstruction from a Single Image [1][6]
 Graduate Research Assistant; Advisors - Prof. Simon Lucey

- Shape reconstruction from a single image (1) in non-rigid case with compressive shape prior (2) with deep learning with reprojection error for domain adaptation.

- **Carnegie Mellon University**, Pittsburgh, PA, USA *Sep. 2015 - Mar. 2017*
The Conditional Lucas & Kanade Algorithm [5]
 Graduate Research Assistant; Advisors - Prof. Simon Lucey

- Efficient tracking and alignment with connection to Supervised Descent Method and Lucas & Kanade Algorithm;

- **Southeast University**, Nanjing, P.R.China *May 2013 - May 2015*
 Undergraduate Research Assistant; Advisors - Prof. Lu Tang & Prof. Qiao Wang

- Facial landmarks registration with Supervised Descent Method (SDM), and gaze detection;
- Facial expression classification system based on Action Units;
- A robotic arm and hand control system with gesture recognition.

TALKS & PRESENTATIONS

- **Rethinking Reprojection: Closing the Loop for Pose-aware Shape Reconstruction from a Single Image**
International Conference on Computer Vision (ICCV), Venice, Italy, Oct. 2017
- **Shape Prior Meets Geometry in Single and Multi-view Shape Reconstruction**
Master Thesis, Carnegie Mellon University, Pittsburgh, USA, Aug. 2017

HONORS & AWARDS

- National Scholarship of China (3/281 or Top 2%) *Sep. 2014*
- President Scholarship of Southeast University (Top 1%) *Sep. 2013*
- Southeast University ISE Department – Zhengbao Corporation Fellowship (Top 1%) *Jun. 2013*
- Award for Merit Student of Southeast University (Top 5%) *Sep. 2013*

SKILLS

- **Programming Language:** MATLAB, C++, JAVA, Python, Objective-C
- **Software and Platforms:** TensorFlow, PyTorch, OpenCV