

# Stanford

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## Silvio Savarese

Associate Professor of Computer Science

### CONTACT INFORMATION

- **Administrator**

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### Bio

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### ACADEMIC APPOINTMENTS

- Associate Professor, Computer Science

### Teaching

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#### COURSES

##### 2017-18

- Computer Vision: From 3D Reconstruction to Recognition: CS 231A (Win)
- Representation Learning in Computer Vision: CS 331B (Aut)

##### 2016-17

- Computer Vision: From 3D Reconstruction to Recognition: CS 231A (Spr)
- Representation Learning in Computer Vision: CS 331B (Aut)

##### 2015-16

- Computer Vision: From 3D Reconstruction to Recognition: CS 231A (Spr)

##### 2014-15

- Computer Vision: From 3D Reconstruction to Recognition: CS 231A (Win)
- Mobile Computer Vision: CS 231M (Spr)

#### STANFORD ADVISEES

##### Doctoral Dissertation Reader (AC)

Li Yi

##### Postdoctoral Faculty Sponsor

Amir Roshan Zamir, Marynel Vazquez Ugarte

##### Master's Program Advisor

Richard Diehl Martinez, Bora Erden, Xiuye Gu, Jason Liu, Viraj Mehta, Bokui Shen

##### Doctoral (Program)

Junyoung Gwak

## Publications

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### PUBLICATIONS

- **Beyond PASCAL: A Benchmark for 3D Object Detection in the Wild**  
Xiang, Y., Mottaghi, R., Savarese, S.  
2014
- **Layout Estimation of Highly Cluttered Indoor Scenes using Geometric and Semantic Cues**  
Chao, Y. -W., Choi, W., Pantofaru, C., Savarese, S.  
2013
- **Accurate Localization of 3D Objects from RGB-D Data using Segmentation Hypotheses**  
Kim, B., Xu, S., Savarese, S.  
2013
- **Breaking the chain: liberation from the temporal Markov assumption for tracking human poses**  
Tokola, R., Choi, W., Savarese, S.  
2013
- **Dense Object Reconstruction Using Semantic Priors**  
Bao, Y., Chandraker, M., Lin, Y., Savarese, S.  
2013
- **Free your Camera: 3D Indoor Scene Understanding from Arbitrary Camera Motion**  
Furlan, A., Miller, S., Sorrenti, D., G., Fei-Fei, L., Savarese, S.  
2013
- **Learning Hierarchical Linguistic Descriptions of Visual Datasets** *NAACL-HLT Workshop on Vision and Language*  
Mittelman, R., Sun, M., Kuipers, B., Savarese, S.  
2013
- **Find the Best Path: an Efficient and Accurate Classifier for Image Hierarchies**  
Sun, M., Huang, W., Savarese, S.  
2013
- **Understanding Indoor Scenes using 3D Geometric Phrases**  
Choi, W., Chao, Y. -W., Pantofaru, C., Savarese, S.  
2013
- **Weakly Supervised Learning of Mid-Level Features with Beta-Bernoulli Process Restricted Boltzmann Machines**  
Mittelman, R., Lee, H., Kuipers, B., Savarese, S.  
2013
- **Recognizing Complex Human Activities via Crowd Context** *Augmented Vision and Reality*  
Choi, W., Savarese, S.  
Springer.2013: 1
- **Object Detection by 3D Aspectlets and Occlusion Reasoning** *in the 4th International IEEE Workshop on 3D Representation and Recognition (3dRR)*  
Xiang, Y., Savarese, S.  
2013
- **Label Transfer Exploiting Three-dimensional Structure for Semantic Segmentation**  
Garro, V., Fusiello, A., Savarese, S.  
2013
- **3D Scene Understanding by Voxel-CRF**  
Kim, B., Kohli, P., Savarese, S.  
2013

- **Object detection, shape recovery, and 3D modelling by depth-encoded hough voting** *in Computer Vision and Image Understanding (CVIU)*  
Sun, M., Kumar, S., S., Bradski, G., Savarese, S.  
2013
- **Automatic targetless extrinsic calibration of a 3d lidar and camera by maximizing mutual information**  
Pandey, G., McBride, J., R., Savarese, S., Eustice, R., M.  
2012
- **Mobile Object Detection through Client-Server based Vote Transfer**  
Kumar, S., Sun, M., Savarese, S.  
2012
- **Multimodality video indexing and retrieval using directed information** *IEEE Transactions on Multimedia*  
Chen, X., Hero, A., Savarese, S.  
2012; 14 (1)
- **Object Detection using Geometrical Context Feedback** *International Journal of Computer Vision*  
Sun, M., Bao, S., Ying-Ze, Savarese, S.  
2012; 2
- **An Efficient Branch-and-Bound Algorithm for Optimal Human Pose Estimation**  
Sun, M., Telaprolu, M., Lee, H., Savarese, S.  
2012
- **Relating Things and Stuff by High-Order Potential Modeling** *ECCV 2012 Workshop on Higher-Order Models and Global Constraints in Computer Vision (HiPot)*.  
Bao, Y., Xiang, Y., Savarese, S.  
2012
- **Estimating the Aspect Layout of Object Categories**  
Xiang, Y., Savarese, S.  
2012
- **Structure From Motion with Points, Objects, and Regions**  
Bao, Y., Bagra, M., Chao, Y. -W., Savarese, S.  
2012
- **Toward Mutual Information based Automatic Registration of 3D Point Clouds**  
Pandey, G., McBride, J., Savarese, S., Eustice, R.  
2012
- **A Unified Framework for Multi-Target Tracking and Collective Activity Recognition**  
Choi, W., Savarese, S.  
2012
- **Model-based object recognition** *Encyclopedia of Computer Vision*  
Sun, M., Savarese, S.  
Springer.2012: 1
- **Object Co-detection**  
Bao, Y., Xiang, Y., Savarese, S.  
2012
- **3D Shape from Specular Reflections** *Encyclopedia of Computer Vision*  
Savarese, S.  
Springer.2012: 1
- **MVSS: Michigan Visual Sonification System**  
Clemons, J., Bao, Y., Sharma, V., Savarese, S., Austin, T.  
2012

- **Scene Understanding for the Visually Impaired Using Visual Sonification by Visual Feature Analysis and Auditory Signature**  
Clemons, J., Bao, Y., Bagra, M., Austin, T., Savarese, S.  
2012
- **Efficient and Exact MAP Inference using Branch and Bound**  
Sun, M., Telaprolu, M., Lee, H., Savarese, S.  
2012
- **Toward coherent object detection and scene layout understanding** *Image and Vision Computing*  
Bao, S., Yingze, Sun, M., Savarese, S.  
2011; 9
- **Visually Bootstrapped generalized ICP**  
Pandey, G., McBride, James, R., Savarese, S., Eustice, Ryan, M.  
2011
- **EFFEX: An Embedded Processor for Computer Vision Based Feature Extraction**  
Clemons, J., Savarese, S., Austin, T.  
2011
- **Deformable Part Models Revisited: A Performance Evaluation for Object Category Pose Estimation** *IEEE Workshop on Challenges and Opportunities in Robot Perception (in conjunction with ICCV-11)*.  
Lopez, R., Tuytelaars, T., Savarese, S.  
2011
- **Monitoring Changes of 3D Building Elements from Unordered Photo Collections** *IEEE workshop on Computer Vision for Remote Sensing of the Environment (in conjunction with ICCV-11)*.  
Golparvar-Fard, M., Pena-Mora, F., Savarese, S.  
2011
- **Learning Context for Collective Activity Recognition**  
Choi, W., Shahid, K., Savarese, S.  
2011
- **Semantic Structure from Motion**  
Bao, S., Yingze, Savarese, S.  
2011
- **MEVBench: A Mobile Computer Vision Benchmarking Suite**  
Clemons, J., Zhu, H., Savarese, S., Austin, T.  
2011
- **Visualization of Construction Progress Monitoring using Unordered Construction Photo Collections and 4D Building Information Models** in *"Augmented Reality"*, ISBN 978-953-307-631-7  
Golparvar-Fard, M., Pena-Mora, F., Savarese, S.  
2011: 1
- **Toward Automatic 3D Generic Object Modeling from One Single Image** *3DIM-PVT*  
Sun, M., Kumar, S.  
2011
- **Semantic Structure From Motion with Object and Point Interactions** *IEEE Workshop on Challenges and Opportunities in Robot Perception (in conjunction with ICCV-11)*.  
Bao, S., Yingze, Bagra, M., Savarese, S.  
2011
- **Hierarchical Classification of Images by Sparse Approximation**  
Kim, B., Park, J., Gilbert, A., Savarese, S.  
2011

- **Articulated Part-based Model for Joint Object Detection and Pose Estimation**  
Sun, M., Savarese, S.  
2011
- **Integrated Sequential As-Built and As-Planned Representation with D4AR Tools in Support of Decision-Making Tasks in the AEC/FM Industry** *ASCE Journal of Construction Engineering and Management*  
Golparvar-Fard, M., Pena-Mora, F., Savarese, S.  
2011
- **Robust Object Pose Estimation via Statistical Manifold Modeling**  
Mei, L., Liu, J., Hero, A., Savarese, S.  
2011
- **Representations and Techniques for 3D Object Recognition and Scene Interpretation** *Synthesis lecture on Artificial Intelligence and Machine Learning*  
Hoiem, D., Savarese, S.  
Morgan Claypool Publishers.2011: 1
- **Recognizing Human Actions by Attributes**  
Liu, J., Kuipers, B., Savarese, S.  
2011
- **Cross-View Action Recognition via View Knowledge Transfer**  
Liu, J., Shah, M., Kuipers, B., Savarese, S.  
2011
- **Detecting and Tracking People using an RGB-D Camera via Multiple Detector Fusion** *Workshop on Challenges and Opportunities in Robot Perception (in conjunction with ICCV-11)*.  
Choi, W., Pantofaru, C., Savarese, S.  
2011
- **A computer analysis of the mirror in Hans Memling's Virgin and Child and Maarten van Nieuwenhove** *Digital Imaging for Cultural Heritage Preservation*  
Savarese, S., Stork, D., G., DelPozo, A., Spronk, R.  
CRC Press.2011: 1
- **Multi-view Object Categorization and Pose Estimation** *Computer Vision: Detection, Recognition and Reconstruction (Studies in Computational Intelligence)*  
Savarese, S., Fei-Fei, L.  
Springer.2010: 1
- **Remote assessment of pre and post-disaster critical physical infrastructures using segway mobile workstation chariot and D4AR 4D augmented reality models.**  
Golparvar-Fard, M., Pena-Mora, F., Savarese, S.  
2010
- **Automated model component-based recognition of progress using daily construction photographs and 4D IFC-based models.**  
Golparvar-Fard, M., Pena-Mora, F., Savarese, S.  
2010
- **D4AR 4 Dimensional augmented reality - tools for automated remote progress tracking and support of decision-enabling tasks in the AEC/FM industry**  
Golparvar-Fard, M., Pena-Mora, F., Savarese, S.  
2010
- **Depth-Encoded Hough Voting for Joint Object Detection and Shape Recovery**  
Sun, M., Bradsky, G., Xu, B., Savarese, S.  
2010
- **CEC: Research in Visualization Techniques for Field Construction**  
Kamat, V., Martinez, J., Fischer, M., Golparvar-Fard, M., Pena-Mora, F., Savarese, S.  
2010
- **D4AR - 4 DIMENSIONAL AUGMENTED REALITY - MODELS FOR AUTOMATION AND INTERACTIVE VISUALIZATION OF CONSTRUCTION PROGRESS MONITORING**

- Golparvar-Fard, M., Pena-Mora, F., Savarese, S.  
2010
- **Extrinsic calibration of a 3d laser scanner and an omnidirectional camera.**  
Pandey, G., McBride, J., Savarese, S., Eustice, R.  
2010
  - **Toward automated generation of parametric BIMs based on hybrid video and laser scanning data.** *In Journal of Advanced Engineering Informatics*  
Brilakis, I., Lourakis, M., Sacks, R., Savarese, S., Christodoulou, S., Teizer, J.  
2010; 4 (24): 456-465
  - **Model-based detection of progress using D4AR - A 4 Dimensional augmented reality- models generated by daily site photologs and building information models**  
Golparvar-Fard, M., Pena-Mora, F., Savarese, S.  
2010
  - **Toward Coherent Object Detection And Scene Layout Understanding**  
Bao, S., Yingze, Sun, M., Savarese, S.  
2010
  - **Multiple Target Tracking in World Coordinate with Single, Minimally Calibrated Camera**  
Choi, W., Savarese, S.  
2010
  - **Object Detection with Geometrical Context Feedback Loop**  
Sun, M., Ying-Ze, S., Savarese, S.  
2010
  - **Interactive Visual Construction Progress Monitoring with 4D Augmented Reality Model**  
Golparvar-Fard, M., Savarese, S., Pena-Mora, F.  
2009
  - **A Multi-View Probabilistic Model for 3D Object Classes.**  
Sun, M., Su, H., Savarese, S., Fei-Fei, L.  
2009
  - **Monitoring of Construction Performance Using Daily Progress Photograph Logs and 4D As-Planned Models**  
Golparvar-Fard, M., Pena-Mora, F., Savarese, S.  
2009
  - **What are they doing? : Collective Activity Classification Using Spatio-Temporal Relationship Among People**  
Choi, W., Shahid, K., Savarese, S.  
2009
  - **D4AR- A 4-Dimensional Augmented Reality Model for Automating Construction Progress Data Collection**  
Golparvar-Fard, M., Pena-Mora, F.  
2009
  - **Unsupervised Object Pose Classification from Short Video Sequences**  
Mei, L., Sun, M., Carter, K., M., Hero III, A., O., Savarese, S.  
2009
  - **Sparse Reconstruction and Geo-Registration of Daily Site Photographs for Representation of As-Built Construction Scene and Automatic Construction Progress Data Collection**  
Golparvar-Fard, M., Pena-Mora, F., Savarese, S.  
2009
  - **Scene Categorization from Low Definition Video**  
Gupta, P., Arrabolu, S., Brown, M., Savarese, S.  
2009

- **View synthesis for recognizing unseen poses of object classes.**  
Savarese, S., Fei-Fei, L.  
2008
- **Why do we see some surfaces as reflective?**  
Poza, A., Del, Savarese, S., Baker, D., Simons, D., J.  
2008
- **When are reflections useful in perceiving the shape of shiny surfaces?**  
Savarese, S., Poza, A., Del, Baker, D., Simons, D., J.  
2008
- **Spatial-Temporal Correlations for Unsupervised Action Classification**  
Savarese, S., Poza, A., Del, Niebles, J. C., Fei-Fei, L.  
2008
- **Reflections on praxis and facture in a devotional portrait diptych: A computer analysis of the mirror in Hans Memling's Virgin and Child and Maarten van Nieuwenhove**  
Savarese, S., Spronk, R., Stork, D., G., DelPozo, A.  
2008
- **Interactive Visual Construction Progress Monitoring with 4D Augmented Reality Model *CCBE-XI***  
Fard, M., Golparvar, Savarese, S., Pena-Mora, F.  
2008
- **Detecting Specular Surfaces on Natural Images**  
DelPozo, A., Savarese, S.  
2007
- **Carving from ray-tracing constraints: IRT-carving**  
Andreetto, M., Savarese, S., Perona, P.  
2006
- **Discriminative Object Class Models of Appearance and Shape by Correlatons**  
Savarese, S., Winn, J., Criminisi, A.  
2006
- **3D Reconstruction by Shadow Carving: Theory and Practical Evaluation *International Journal of Computer Vision (IJCV)***  
Savarese, S., Andreetto, M., Rushmeier, H.  
2006; 3 (71): 305-336
- **Local Shape from Mirror Reflections *International Journal of Computer Vision (IJCV)***  
Savarese, S., Chen, M., Perona, P.  
2005; 1 (64): 31-67
- **What do reflections tell us about the shape of a mirror? *in Applied Perception in Graphics and Visualization [sponsored by ACM SIGGRAPH]***  
Savarese, S., Fei-Fei, L., Perona, P.  
2004: 115-118
- **Recovering local shape of a mirror surface from reflection of a regular gridI**  
Savarese, S., Chen, M., Perona, P.  
2004
- **Can We See the Shape of a Mirror?**  
Savarese, S., Fei-Fei, L., Perona, P.  
2003
- **Implementation of a Shadow Carving System for Shape Capture**  
Savarese, S., Rushmeier, H., Bernardini, F., Perona, P.  
2002

- **Local Analysis for 3D Reconstruction of Specular Surfaces -- part II**  
Savarese, S., Perona, P.  
2002
- **Second Order Local Analysis for 3D Reconstruction of Specular Surfaces**  
Savarese, S., Chen, M., Perona, P.  
2002
- **Local Analysis for 3D Reconstruction of Specular Surfaces**  
Savarese, S., Perona, P.  
2001
- **Shadow Carving**  
Savarese, S., Rushmeier, H., Bernardini, F., Perona, P.  
2001