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Ph.D., University of Bonn, Germany

Honorary Ph.D., Technical University of Delft, The Netherlands

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EDUCATION

- 1995 Dr. rer.-nat. (Ph.D.) in computer science and statistics, University of Bonn, Germany, summa cum laude.
- 1993 Diplom in computer science and statistics, University of Bonn, Germany.
- 1988 Vordiplom in computer science, economics, and medicine, University of Hildesheim, Germany.

ACADEMIC POSITIONS

- 2016– Adjunct professor (EE, CS), Stanford University
- 2013–2016 Research professor of computer science, Stanford University.
- 2011–2014 Google Fellow.
- 2007–2013 Professor (tenured) of computer science and electrical engineering, Stanford University.
- 2003–2007 Associate professor (tenured) of computer science and (since 2006) electrical engineering, Stanford University. Since 2004 director of the Stanford Artificial Intelligence Laboratory (SAIL).
- 1998–2003 Assistant professor and (since 2001) associate professor of computer science, robotics, and automated learning and discovery, Carnegie Mellon University.
- 1995–1998 Research Computer Scientist, Carnegie Mellon University.

INDUSTRIAL POSITIONS

- 2016– Founder and CEO, Kitty Hawk Corporation
- 2012– Founder and CEO (until 2019), Udacity
- 2007–2014 Google Fellow and Vice President, Google

SIGNIFICANT PROJECTS

Self-Driving Cars. Winner, DARPA Grand Challenge. Founder and project lead, Google Chauffeur Project (now known as Waymo).

Google Glass. Project lead, Google Glass.

Google X. Co-founder and original director, Google X. Google X is Google's innovation unit. Under Thrun's leadership, X engaged

in Project Iris (glucose-sensing contact lenses), Wing (drones for food delivery), Loon (stratospheric balloons for telecommunication), Google Brain (deep learning for most Google services), Chauffeur, and Glass.

Udacity. Co-founder and CEO, Udacity. Udacity is an ed-tech platform that brings tech education to the world. Udacity reached “unicorn status” in 2015. Udacity’s mission is to democratize education.

Kitty Hawk. Co-founder and CEO, Kitty Hawk Corporation. Kitty Hawk develops eVTOL solutions (quiet electric vertical take-off-and-landing vehicles). Kitty Hawk’s mission is to free the world from traffic.

HONORS AND AWARDS	2020	Aachen Engineering Award (the highest honor of the City of Aachen in Germany)
	2019	Honorary Doctorate, University of Hildesheim, Germany Liberty Science Center inaugural Genius of New Jersey Best Distributed/Online Program Award (for the Georgia Tech OM-SCS) by Reimagine Education Awards
	2018	CNBC Disrupter #8 for Udacity, CNBC Global Leadership Award, World Affair Council
	2017	#24 Smartest Companies in 2017, MIT Technology Review CNBC Disrupter #10 for Udacity, CNBC 2017 ICAPS Influential Paper Award (Anytime Dynamic A*: An Anytime, Replanning Algorithm), International Conference on Acoustics, Speech, and Signal Processing (ICASP) AAAI Classic Paper Award (Monte Carlo Localization: Efficient Position Estimation for Mobile Robots), Association for the Advancement of Artificial Intelligence (AAAI) AAAI/EAAI Outstanding Educator Award, Association for the Advancement of Artificial Intelligence (AAAI)
	2016	UPCEA South Region Conference “Program of Excellence” Award, with Georgia Tech and AT&T, for Online Master of Computer Science Honorary Doctorate, National Polytechnic Institute, Mexico Honorary Doctorate, Technical University of Delft, The Netherlands The Hottest Startups of 2015, #37, Forbes
	2015	Global Impact Award, World Affairs Council James Smithson Bicentennial Medal from the Smithsonian Institute TiE50 Top Startup Award
	2014	#17 Influential Educator, by Noodle The Guardian’s Open 20: fighters for internet freedom GABA Award of Excellence
	2013	ALVA Award by 99U, 2013

- 2012 Global Thinker #4 by Foreign Policy
 Most Creative Tech Personality #7 by SiliconIndia News
 Smithsonian Ingenuity Award
 The Next Establishment by Vanity Fair
 Initiative of the year Award, by Chip
 Top 100 Scientists on Twitter
 Best Vision Paper finalist, IEEE International Conference on Robotics and Automation (paper by David Held, Jesse Levinson, Sebastian Thrun: Precision Tracking with Sparse 3D and Dense Color 2D Data)
- 2011 Huffington Post Best of TED 2011
 Fast Company: Fifth most creative person.
 Inaugural AAAI Ed Feigenbaum Prize.
 Max Planck Research Award, 2011.
 Crunchy, Best Technology Achievement, 2010.
- 2010 Time Magazine, The 50 Best Inventions of 2010.
 IEEE ITSS Distinguished Researcher Award.
 Fortune Magazine: 50 Smartest People in Tech, Academic Runner-Up.
- 2008 PC World list *Best 100 Products of 2008* (for Google Street View)
- 2007 Braunschweig Research Prize.
 Member, National Academy of Engineering.
 Member, Deutsche Akademie der Naturforscher Leopoldina (German Academy of Sciences).
- 2006 Scientific American 50.
 World Technology Network Award (category: Information Technology) and WTN Fellow.
 AAAI Fellow (American Association of Artificial Intelligence).
 ECCAI Fellow (European Coordinating Committee for Artificial Intelligence).
 Vance D. and Arlene C. Coffman Scholar II, Stanford School of Engineering.
 Wired Magazine *best robot of all times*.
 Forbes Magazine E-Gang.
- 2005 Leader of the Stanford Racing Team that won the DARPA Grand Challenge.
 Popular Science Brilliant Ten.
- 2004 Honorable mention, 2004 IJCAI-JAIR best paper prize.
- 2003–2006 Reid and Polly Anderson Scholar and (until 2004) David Filo and Jerry Yang Faculty Scholar, Stanford School of Engineering.
- 2003 Best conference paper, International Conference of Field and Service Robotics (FSR).

- Best conference paper, IEEE International Conference on Robotics and Automation (ICRA).
- Best student conference paper, International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS).
- 2002 Finmeccanica endowed faculty chair, School of Computer Science, Carnegie Mellon University.
- 2001 Olympus award, German society for pattern recognition (DAGM).
- 2000 Best conference paper, IEEE International Conference on Robotics and Automation (ICRA).
- 1999 Best conference paper, German Conference of the German society for pattern recognition (DAGM).
- 1999–2003 NSF CAREER.
- 1998 Best conference paper, National Conference on Artificial Intelligence (AAAI).
- 1996 First place, AAAI autonomous mobile robot competition.
- 1994 Second place, AAAI autonomous mobile robot competition.

FIELD SERVICE

- 2013 Conference Chair, IJCAI Conference.
- 2013– Treasurer, Robotics Science and Systems Foundation.
- 2009–2013 President and Founder, Robotics Science and Systems Foundation.
- 2005–2008 AAAI Councilor.
- 2005 Founding conference chair, Robotics Science and Systems conference (RSS), Boston.
Co-chair, International Symposium on Robotics Research (ISRR), San Francisco.
- 2003–2009 Vice President for Development, NIPS Foundation.
- 2003 Program co-chair, International Conference on Field and Service Robotics (FSR), Japan.
- 2002–2003 Program chair (2002) and general chair (2003), Neural Information Processing Systems conference (NIPS), Vancouver.
- 1998 Conference chair, Conference on Automated Learning and Discovery (CONALD).
- 1990– Member of numerous editorial boards and organizing committees.

BOOKS (MONOGRAPHS)

- [1] M. Montemerlo and S. Thrun. *The FastSLAM Algorithm for Simultaneous Localization and Mapping*. Springer Tracts in Advanced Robotics, 2007. ISBN 978-3-540-46402-0.
- [2] S. Thrun, W. Burgard, and D. Fox. *Probabilistic Robotics*. MIT Press, Cambridge, MA, 2005.
- [3] H. Choset, K. Lynch, S. Hutchinson, G. Kantor, W. Burgard, L. Kavraki, and S. Thrun. *Principles of Robotic Motion: Theory, Algorithms, and Implementation*. MIT Press, Cambridge, MA, 2004.
- [4] S. Thrun. *Explanation-Based Neural Network Learning: A Lifelong Learning Approach*. Kluwer Academic Publishers, Boston, MA, 1996.

BOOKS (EDITED VOLUMES)

- [5] D. Slama, T. Rückert, S. Thrun, U. Homann, and H. Lasi, editors. *The Digital Playbook: A Practitioners Guide to Smart, Connected Products and Solutions with AIoT*. Springer, Berlin, Germany, 2022.
- [6] S. Thrun, R.A. Brooks, and H. Durrant-Whyte, editors. *Robotics Research: Results of the 12th International Symposium ISRR*. Springer Tracts in Advanced Robotics, Berlin, Germany, 2007.
- [7] S. Yuta, H. Asama, S. Thrun, E. Prassler, and T. Tsubouchi, editors. *Field and Service Robotics: Recent Advances in Research and Applications*. Springer Tracts in Advanced Robotics, Berlin, 2006.
- [8] S. Thrun, G. Sukhatme, S. Schaal, and O. Brock, editors. *Robotics Science and Systems I*. MIT Press, Cambridge, CA, 2005.
- [9] S. Thrun, L. Saul, and K. Obermayer, editors. *Advances in Neural Information Processing Systems 16*. MIT Press, Cambridge, MA, 2004.
- [10] S. Becker, S. Thrun, and K. Obermayer, editors. *Advances in Neural Information Processing Systems 15*. MIT Press, Cambridge, MA, 2003.
- [11] S. Thrun and L.Y. Pratt, editors. *Learning To Learn*. Kluwer Academic Publishers, Boston, MA, 1998.
- [12] J. Franklin, T. Mitchell, and S. Thrun, editors. *Recent Advances in Robot Learning*. Kluwer Academic Publishers, Boston, MA, 1996.

CHAPTERS IN BOOK

- [13] C. Theobalt, E. de Aguiar, C. Stoll, H.-P. Seidel, and S. Thrun. Performance capture from multi-view video. In R. Ronfard and G. Taubin, editors, *Image and Geometry Processing for 3-D Cinematography*. Springer, Berlin, Germany, 2010.
- [14] S. Thrun. Simultaneous localization and mapping. In M.E. Jefferies and W.-K. Yeap, editors, *Spatial Mapping Approaches in Robotic and Natural Mapping Systems*. Springer Tracts in Advanced Robotics, Berlin, 2006.
- [15] A. Lookingbill, D. Lieb, and S. Thrun. Optical flow approaches for self-supervised learning in autonomous mobile robot navigation. In C. Laugier and R. Chatila, editors, *Navigation in Open and Dynamic Environments*. Springer, Berlin, Germany, 2006.
- [16] D. Margaritis, S. Thrun, and C. Faloutsos. Netcube: Fast approximate database queries using bayesian networks. In A. Mittal, A. Kassim, and T. Tan, editors, *Bayesian Network Technologies: Applications and Graphical Models*. IIT India, 2006.
- [17] S. Thrun. Robotics. In *Chapter 25 of "Artificial Intelligence: A Modern Approach (second edition)" by S. Russell and P. Norvig*. Prentice Hall, Englewood Cliffs, NJ, 2002.
- [18] S. Thrun. Robotic mapping: A survey. In G. Lakemeyer and B. Nebel, editors, *Exploring Artificial Intelligence in the New Millennium*. Morgan Kaufmann, 2002.
- [19] D. Fox, S. Thrun, W. Burgard, and F. Dellaert. Particle filters for mobile robot localization. In A. Doucet, N. de Freitas, and N. Gordon, editors, *Sequential Monte Carlo Methods in Practice*, pages 499–516. Springer Verlag, 2001.
- [20] D. Fox, W. Burgard, and S. Thrun. Markov localization for reliable robot navigation and people detection. In *Modeling and Planning for Sensor-Based Intelligent Robot Systems*. Springer Verlag, Berlin, 1999.
- [21] S. Thrun, A. Bücken, W. Burgard, D. Fox, T. Fröhlinghaus, D. Henning, T. Hofmann, M. Krell, and T. Schmidt. Map learning and high-speed navigation in RHINO. In D. Kortenkamp, R.P. Bonasso, and R. Murphy, editors, *AI-based Mobile Robots: Case Studies of Successful Robot Systems*, pages 21–52. MIT Press, Cambridge, MA, 1998.
- [22] S. Thrun and J. O’Sullivan. Clustering learning tasks and the selective cross-task transfer of knowledge. In S. Thrun and L.Y. Pratt, editors, *Learning To Learn*. Kluwer Academic Publishers, 1998.
- [23] S. Thrun. Lifelong learning algorithms. In S. Thrun and L.Y. Pratt, editors, *Learning To Learn*. Kluwer Academic Publishers, 1998.
- [24] S. Thrun and L.Y. Pratt. Learning to learn: Introduction and overview. In S. Thrun and L.Y. Pratt, editors, *Learning To Learn*. Kluwer Academic Publishers, 1998.

- [25] J. O’Sullivan, T. Mitchell, and S. Thrun. Explanation-based neural network learning for mobile robot perception. In K. Ikeuchi and M. Veloso, editors, *Symbolic Visual Learning*. Oxford University Press, 1997.
- [26] T. Mitchell and S. Thrun. Learning analytically and inductively. In D. Steier and T. Mitchell, editors, *Mind Matters: A Tribute to Allen Newell*. Lawrence Erlbaum Associates Publishers, 1996.
- [27] S. Thrun. Exploration in active learning. In M. Arbib, editor, *Handbook of Brain and Cognitive Science*. MIT Press, 1995.
- [28] S. Thrun. A lifelong learning perspective for mobile robot control. In V. Graefe, editor, *Intelligent Robots and Systems*. Elsevier, 1995.
- [29] S. Thrun. The role of exploration in learning control. In D.A. White and D.A. Sofge, editors, *Handbook for Intelligent Control: Neural, Fuzzy and Adaptive Approaches*. Van Nostrand Reinhold, Florence, Kentucky 41022, 1992.

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- [30] M. Tiwari, C. Piech, M. Baitemirova, N. V. Prajna, M. Srinivasan, P. Lalitha, N. Villegas, N. Balachandar, J. T. Chua, T. Redd, T. M. Lietman, S. Thrun, and C. C. Lin. Differentiation of active corneal infections from healed scars using deep learning. *Ophthalmology*, 2021.
- [31] A. Esteva, A. Robicquet, B. Ramsundar, V. Kuleshov, M. DePristo, K. Chou, C. Cui, G. Corrado, S. Thrun, and J. Dean. A guide to deep learning in healthcare. *Nature Medicine*, 25:24–29, 2019.
- [32] A. Esteva, B. Kuprel, R.A. Novoa, S.M. Swetter, H.M. Blau, and S. Thrun. Dermatologist-level classification of skin cancer with deep neural networks. *Nature*, 542:115–118, February 2017.
- [33] David Held, Jesse Levinson, Sebastian Thrun, and Silvio Savarese. Robust real-time tracking combining 3d shape, color, and motion. *International Journal of Robotics Research*, 2015.
- [34] Alex Teichman, Jake Lussier, and Sebastian Thrun. Learning to segment and track in RGBD. *IEEE Transactions on Automation Science and Engineering*, 10(4):841–852, 2013.
- [35] Alex Teichman and Sebastian Thrun. Tracking-based semi-supervised learning. 31(7):804–818, 2012.
- [36] C. Yan, S. Schuon, D. Chan, C. Theobalt, and S. Thrun. Algorithms for 3d shape scanning with a depth camera. *Pattern Analysis and Machine Intelligence*, 2012.
- [37] A. Teichman and S. Thrun. Tracking-based semi-supervised learning. *International Journal of Robotics Research*, 2011. Accepted for publication.

- [38] K. Loewke, D. Camarillo, W. Piyawattanametha, M. Mandella, C. Contag, S. Thrun, and K. Salisbury. In vivo micro-image mosaicing. *Transaction on Biomedical Engineering*, 2010. In Press.
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- [43] S. Park, F. Pfenning, and S. Thrun. A probabilistic language based upon sampling functions. *ACM Transactions on Programming Languages and Systems (TOPLAS)*, 2008. in press.
- [44] M. Likhachev, D. Ferguson, G. Gordon, A. Stentz, , and S. Thrun. Anytime search in dynamic graphs. *Artificial Intelligence*, 172(14):1613–1643d, 2008.
- [45] M. Matsuoka, A. Chen, S. Singh, A.Y. Ng, and S. Thrun. Autonomous helicopter tracking and localization using a self-surveying camera array. *International Journal of Robotics Research*, Forthcoming.
- [46] S. Thrun, M. Montemerlo, H. Dahlkamp, D. Stavens, A. Aron, J. Diebel, P. Fong, J. Gale, M. Halpenny, G. Hoffmann, K. Lau, C. Oakley, M. Palatucci, V. Pratt, P. Stang, S. Strohband, C. Dupont, L.-E. Jendrossek, C. Koelen, C. Markey, C. Rummel, J. van Niekerk, E. Jensen, P. Alessandrini, G. Bradski, B. Davies, S. Ettinger, A. Kaehler, A. Nefian, and P. Mahoney. Stanley, the robot that won the DARPA Grand Challenge. *Journal of Field Robotics*, 23(9):661–692, 2006.
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- [48] D. Lookingbill, J. Rogers, J. Curry, D. Lieb, and S. Thrun. Reverse optical flow for self-supervised adaptive autonomous robot navigation. *International Journal on Computer Vision (IJCV)*, 2006. Forthcoming.

- [49] J. Diebel, S. Thrun, and M. Brünig. A bayesian method for probable surface reconstruction and decimation. *ACM Transactions on Graphics*, 25(1), 2006.
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- [51] S. Thrun and M. Montemerlo. The GraphSLAM algorithm with applications to large-scale mapping of urban structures. *International Journal on Robotics Research*, 25(5/6):403–430, 2005.
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- [53] N. Roy, G. Gordon, and S. Thrun. Finding approximate POMDP solutions through belief compression. *Journal of Artificial Intelligence Research*, 23:1–40, 2005.
- [54] M. Bennewitz, W. Burgard, G. Cielniak, and S. Thrun. Learning motion patterns of people for compliant motion. *International Journal of Robotics Research*, 24(1), 2005.
- [55] S. Thrun, C. Martin, Y. Liu, D. Hähnel, R. Emery-Montemerlo, D. Chakrabarti, and W. Burgard. A real-time expectation maximization algorithm for acquiring multi-planar maps of indoor environments with mobile robots. *IEEE Transactions on Robotics*, 20(3):433–443, 2004.
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- [59] S. Thrun. Learning occupancy grids with forward sensor models. *Autonomous Robots*, 15:111–127, 2003.
- [60] D. Hähnel, W. Burgard, and S. Thrun. Learning compact 3D models of indoor and outdoor environments with a mobile robot. *Robotics and Autonomous Systems*, 44:15–17, 2003.
- [61] M. Bennewitz, W. Burgard, and S. Thrun. Finding and optimizing solvable priority schemes for decoupled path planning techniques for teams of mobile robots. *Robotics and Autonomous Systems*, 41(2):89–99, 2002.
- [62] F. Dellaert, S.M. Seitz, C. Thorpe, and S. Thrun. EM, MCMC, and chain flipping for structure from motion with unknown correspondence. *Machine Learning*, 50(1-2):45–71, 2003.

- [63] S. Thrun. A probabilistic online mapping algorithm for teams of mobile robots. *International Journal of Robotics Research*, 20(5):335–363, 2001.
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- [67] D. Fox, W. Burgard, H. Kruppa, and S. Thrun. A probabilistic approach to collaborative multi-robot localization. *Autonomous Robots*, 8(3), 2000.
- [68] D. Fox, W. Burgard, and S. Thrun. Markov localization for mobile robots in dynamic environments. *Journal of Artificial Intelligence Research*, 11:391–427, 1999.
- [69] W. Burgard, A.B. Cremers, D. Fox, D. Hähnel, G. Lakemeyer, D. Schulz, W. Steiner, and S. Thrun. Experiences with an interactive museum tour-guide robot. *Artificial Intelligence*, 114(1-2):3–55, 1999.
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- [74] D. Fox, W. Burgard, and S. Thrun. Active Markov localization for mobile robots. *Robotics and Autonomous Systems*, 25(3-4):195–207, 1998.
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MAGAZINE AND UNREFEREED JOURNAL ARTICLES

- [79] S. Thrun. Towards robotic cars. *Communications of the ACM*, April 2010.
- [80] S. Thrun. Why we compete in DARPA’s urban challenge autonomous robot race. *Communications of the ACM*, 50(10):29–31, 2007.
- [81] S. Thrun. A personal account on the development of stanley, the robot that won the darpa grand challenge. *AI Magazine*, 27(4):69–82, 2006.
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- [83] V. Verma, R. Simmons, G. Gordon, and S. Thrun. Real-time fault diagnosis. *IEEE Robotics and Automation Magazine*, 11(2):56–66, 2004.
- [84] S. Thrun. Probabilistic robotics. *Communications of the ACM*, 45(3):52–57, 2002.
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- [87] S. Thrun and M. Littman. Book review: Reinforcement Learning by R. Sutton and A. Barto. *AI Magazine*, 21(1):103–105, 2000.
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- [91] S. Thrun. To know or not to know: On the utility of models in mobile robotics. *AI Magazine*, 18(1):47–54, 1997.
- [92] A.B. Cremers, J. Buhmann, and S. Thrun. Komplexe lernende Systeme: Der mobile Roboter RHINO. *Künstliche Intelligenz*, 2, 1995. In German.

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- [95] M. Tiwari, M.J. Zhang, J. Mayclin, S. Thrun, C. Piech, and I. Shomorony. Bandit-PAM: Almost linear time k-medoids clustering via multi-armed bandits. In *Advances in Neural Information Processing Systems (NeurIPS)*, 2020.
- [96] Da. Held, S. Thrun, and S. Saravese. Learning to track at 100 FPS with deep regression networks. In *Proceedings of the European Conference on Computer Vision (ECCV) 2016*, 2016.
- [97] David Held, , Sebastian Thrun, and Silvio Savarese. Real-time 3d segmentation with temporal and semantic cues. In *In submission*, 2016.
- [98] David Held, , Sebastian Thrun, and Silvio Savarese. Learning to track with LSTMs. In *In submission*, 2016.
- [99] David Held, Sebastian Thrun, and Silvio Savarese. Deep learning for single-view instance recognition. In *ArXiv preprint arXiv:1507.08286, ICCV*, 2015.
- [100] Jake T. Lussier and Sebastian Thrun. Automatic calibration of RGBD and thermal cameras. In *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems*, pages 451–458, Chicago, IL, USA, 2014.
- [101] David Held, Jesse Levinson, Sebastian Thrun, and Silvio Savarese. Combining 3d shape, color, and motion for robust anytime tracking. In *Proceesings of Robotics: Science and Systems*, Berkeley, CA, 2014.
- [102] D. Held, J. Levinson, and S. Thrun. Precision tracking with sparse 3d and dense color 2d data. In R. Dillman, editor, *Proceedings of the International Conference on Robotics and Automation (ICRA)*, Karlsruhe, Germany, 2013. IEEE, IEEE.
- [103] Alex Teichman and Sebastian Thrun. Group induction. In *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2013.
- [104] Stephen Miller, Alex Teichman, and Sebastian Thrun. Unsupervised extrinsic calibration of depth sensors in dynamic scenes. In *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2013.

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