REFERENCES

- J. M. Gandarias, J. M. Gómez-de Gabriel, and A. J. García-Cerezo, "Tactile sensing and machine learning for human and object recognition in disaster scenarios," in *Iberian Robotics conference*. Springer, 2017, pp. 165–175.
- [2] Y. Al-Handarish, O. M. Omisore, T. Igbe, S. Han, H. Li, W. Du, J. Zhang, and L. Wang, "A Survey of Tactile-Sensing Systems and Their Applications in Biomedical Engineering," *Advances in Materials Science and Engineering*, vol. 2020, 2020.
- [3] H. Liu, D. Guo, F. Sun, W. Yang, S. Furber, and T. Sun, "Embodied tactile perception and learning," *Brain Science Advances*, vol. 6, no. 2, pp. 132–158, 2020.
- [4] Y. Zhu, Y. Liu, Y. Sun, Y. Zhang, and G. Ding, "Recent advances in resistive sensor technology for tactile perception: A review," *IEEE Sensors Journal*, 2022.
- [5] S. Chitta, J. Sturm, M. Piccoli, and W. Burgard, "Tactile sensing for mobile manipulation," *IEEE Transactions on Robotics*, vol. 27, no. 3, pp. 558–568, 2011.
- [6] L. Natale and G. Cannata, "Tactile sensing," *arXiv preprint arXiv:2105.05089*, 2021.
- [7] Z. Kappassov, J.-A. Corrales, and V. Perdereau, "Tactile sensing in dexterous robot hands," *Robotics and Autonomous Systems*, vol. 74, pp. 195–220, 2015.
- [8] F. Pastor, J. García-González, J. M. Gandarias, D. Medina, P. Closas, A. J. García-Cerezo, and J. M. Gómez-de Gabriel, "Bayesian and neural inference on lstmbased object recognition from tactile and kinesthetic information," *IEEE Robotics and Automation Letters*, vol. 6, no. 1, pp. 231–238, 2020.
- [9] P. Ribeiro, S. Cardoso, A. Bernardino, and L. Jamone, "Fruit quality control by surface analysis using a bio-inspired soft tactile sensor," in 2020 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS). IEEE, 2020, pp. 8875–8881.
- [10] N. Navarro-Guerrero, S. Toprak, J. Josifovski, and L. Jamone, "Visuo-haptic object perception for robots: an overview," *Autonomous Robots*, pp. 1–27, 2023.

- [11] Q. Li, O. Kroemer, Z. Su, F. F. Veiga, M. Kaboli, and H. J. Ritter, "A review of tactile information: Perception and action through touch," *IEEE Transactions on Robotics*, vol. 36, no. 6, pp. 1619–1634, 2020.
- [12] E. Sariyildiz, R. Oboe, and K. Ohnishi, "Disturbance observer-based robust control and its applications: 35th anniversary overview," *IEEE Transactions on Industrial Electronics*, vol. 67, no. 3, pp. 2042–2053, 2019.
- [13] X. Liu, G. Zuo, J. Zhang, and J. Wang, "Sensorless force estimation of end-effect upper limb rehabilitation robot system with friction compensation," *International Journal of Advanced Robotic Systems*, vol. 16, no. 4, p. 1729881419856132, 2019.
- [14] S. Liu, L. Wang, and X. V. Wang, "Sensorless force estimation for industrial robots using disturbance observer and neural learning of friction approximation," *Robotics and Computer-Integrated Manufacturing*, vol. 71, p. 102168, 2021.
- [15] L. Han, W. Xu, B. Li, and P. Kang, "Collision detection and coordinated compliance control for a dual-arm robot without force/torque sensing based on momentum observer," *IEEE/ASME Transactions on Mechatronics*, vol. 24, no. 5, pp. 2261–2272, 2019.
- [16] G. Garofalo, N. Mansfeld, J. Jankowski, and C. Ott, "Sliding mode momentum observers for estimation of external torques and joint acceleration," in 2019 International Conference on Robotics and Automation (ICRA). IEEE, 2019, pp. 6117–6123.
- [17] L. Han, J. Mao, P. Cao, Y. Gan, and S. Li, "Toward sensorless interaction force estimation for industrial robots using high-order finite-time observers," *IEEE Transactions on Industrial Electronics*, vol. 69, no. 7, pp. 7275–7284, 2021.
- [18] A. H. S. Abeykoon, W. Wijewardhana, E. H. Senevirathne, and K. Jayawardhana, "Vibration suppression of force controllers using disturbance observers," in *Vibration Control and Actuation of Large-Scale Systems*. Elsevier, 2020, pp. 57–89.
- [19] R. Herguedas, G. López-Nicolás, R. Aragüés, and C. Sagüés, "Survey on multirobot manipulation of deformable objects," in 2019 24th IEEE International Conference on Emerging Technologies and Factory Automation (ETFA). IEEE, 2019, pp. 977–984.

- [20] T. Shimono, S. Katsura, and K. Ohnishi, "Abstraction and reproduction of force sensation from real environment by bilateral control," *IEEE Transactions on Industrial Electronics*, vol. 54, no. 2, pp. 907–918, 2007.
- [21] I. Zubrycki and G. Granosik, "Novel haptic device using jamming principle for providing kinaesthetic feedback in glove-based control interface," *Journal of Intelligent & Robotic Systems*, vol. 85, no. 3, pp. 413–429, 2017.
- [22] H. Yin, A. Varava, and D. Kragic, "Modeling, learning, perception, and control methods for deformable object manipulation," *Science Robotics*, vol. 6, no. 54, p. eabd8803, 2021.
- [23] R. Ruwanthika and A. H. S. Abeykoon, "3d environmental force: Position impedance variation for different motion parameters," in 2015 Moratuwa Engineering Research Conference (MERCon). IEEE, 2015, pp. 112–117.
- [24] Y. Wang, D. Held, and Z. Erickson, "Visual haptic reasoning: Estimating contact forces by observing deformable object interactions," *IEEE Robotics and Automation Letters*, vol. 7, no. 4, pp. 11426–11433, 2022.
- [25] J. Kreuziger, "Application of machine learning to robotics-an analysis," in In Proceedings of the Second International Conference on Automation, Robotics, and Computer Vision (ICARCV'92. Citeseer, 1992.
- [26] A. Mosavi and A. Varkonyi, "Learning in robotics," *International Journal of Computer Applications*, vol. 157, no. 1, pp. 8–11, 2017.
- [27] W. Wang and K. Siau, "Artificial intelligence, machine learning, automation, robotics, future of work and future of humanity: A review and research agenda," *Journal of Database Management (JDM)*, vol. 30, no. 1, pp. 61–79, 2019.
- [28] K. Siau and W. Wang, "Building trust in artificial intelligence, machine learning, and robotics," *Cutter business technology journal*, vol. 31, no. 2, pp. 47–53, 2018.
- [29] Q. Bai, S. Li, J. Yang, Q. Song, Z. Li, and X. Zhang, "Object detection recognition and robot grasping based on machine learning: A survey," *IEEE Access*, vol. 8, pp. 181 855–181 879, 2020.
- [30] H. Liu, Y. Wu, F. Sun, and D. Guo, "Recent progress on tactile object recognition," *International Journal of Advanced Robotic Systems*, vol. 14, no. 4, p. 1729881417717056, 2017.

- [31] Z. Abderrahmane, G. Ganesh, A. Crosnier, and A. Cherubini, "A deep learning framework for tactile recognition of known as well as novel objects," *IEEE Transactions on Industrial Informatics*, vol. 16, no. 1, pp. 423–432, 2019.
- [32] H. Ismail Fawaz, G. Forestier, J. Weber, L. Idoumghar, and P.-A. Muller, "Deep learning for time series classification: a review," *Data mining and knowledge discovery*, vol. 33, no. 4, pp. 917–963, 2019.
- [33] B. Lim and S. Zohren, "Time-series forecasting with deep learning: a survey," *Philosophical Transactions of the Royal Society A*, vol. 379, no. 2194, p. 20200209, 2021.
- [34] M. Löning, A. Bagnall, S. Ganesh, V. Kazakov, J. Lines, and F. J. Király, "sktime: A unified interface for machine learning with time series," *arXiv preprint arXiv*:1909.07872, 2019.
- [35] J. M. Gandarias, A. J. Garcia-Cerezo, and J. M. Gomez-de Gabriel, "Cnn-based methods for object recognition with high-resolution tactile sensors," *IEEE Sensors Journal*, vol. 19, no. 16, pp. 6872–6882, 2019.
- [36] M. Madry, L. Bo, D. Kragic, and D. Fox, "St-hmp: Unsupervised spatio-temporal feature learning for tactile data," in 2014 IEEE International Conference on Robotics and Automation (ICRA). IEEE, 2014, pp. 2262–2269.
- [37] F. Pastor, J. M. Gandarias, A. J. García-Cerezo, and J. M. Gómez-de Gabriel, "Using 3d convolutional neural networks for tactile object recognition with robotic palpation," *Sensors*, vol. 19, no. 24, p. 5356, 2019.
- [38] J. M. Gandarias, F. Pastor, A. J. García-Cerezo, and J. M. Gómez-de Gabriel, "Active tactile recognition of deformable objects with 3d convolutional neural networks," in 2019 IEEE World Haptics Conference (WHC). IEEE, 2019, pp. 551–555.
- [39] H. Orii, S. Tsuji, T. Kouda, and T. Kohama, "Tactile texture recognition using convolutional neural networks for time-series data of pressure and 6-axis acceleration sensor," in 2017 IEEE International Conference on Industrial Technology (ICIT). IEEE, 2017, pp. 1076–1080.
- [40] K. Hirota and T. Kaneko, "Haptic representation of elastic objects," Presence: Teleoperators & Virtual Environments, vol. 10, no. 5, pp. 525–536, 2001.

- [41] Y. Zhuang and J. Canny, "Haptic interaction with global deformations," in Proceedings 2000 ICRA. Millennium Conference. IEEE International Conference on Robotics and Automation. Symposia Proceedings (Cat. No. 00CH37065), vol. 3. IEEE, 2000, pp. 2428–2433.
- [42] S. Burion, F. Conti, A. Petrovskaya, C. Baur, and O. Khatib, "Identifying physical properties of deformable objects by using particle filters," in 2008 Ieee International Conference On Robotics And Automation. IEEE, 2008, pp. 1112–1117.
- [43] L. Scimeca, P. Maiolino, D. Cardin-Catalan, A. P. del Pobil, A. Morales, and F. Iida, "Non-destructive robotic assessment of mango ripeness via multi-point soft haptics," in 2019 International Conference on Robotics and Automation (ICRA). IEEE, 2019, pp. 1821–1826.
- [44] U. Koçak, K. L. Palmerius, and M. Cooper, "Dynamic deformation using adaptable, linked asynchronous fem regions," in *Proceedings of the 25th Spring Conference on Computer Graphics*, 2009, pp. 197–204.
- [45] C. Duriez, F. Dubois, A. Kheddar, and C. Andriot, "Realistic haptic rendering of interacting deformable objects in virtual environments," *IEEE transactions on visualization and computer graphics*, vol. 12, no. 1, pp. 36–47, 2005.
- [46] H. Sun and G. Martius, "Machine learning for haptics: inferring multi-contact stimulation from sparse sensor configuration," *Frontiers in neurorobotics*, vol. 13, p. 51, 2019.
- [47] H. Soh and Y. Demiris, "Incrementally learning objects by touch: Online discriminative and generative models for tactile-based recognition," *IEEE transactions* on haptics, vol. 7, no. 4, pp. 512–525, 2014.
- [48] B. Siciliano and O. Khatib, Springer handbook of robotics. Springer, 2016.
- [49] D. Wang, K. Ohnishi, and W. Xu, "Multimodal haptic display for virtual reality: A survey," *IEEE Transactions on Industrial Electronics*, vol. 67, no. 1, pp. 610– 623, 2019.
- [50] S. Luo, J. Bimbo, R. Dahiya, and H. Liu, "Robotic tactile perception of object properties: A review," *Mechatronics*, vol. 48, pp. 54–67, 2017.

- [51] A. C. Smith, F. Mobasser, and K. Hashtrudi-Zaad, "Neural-network-based contact force observers for haptic applications," *IEEE Transactions on Robotics*, vol. 22, no. 6, pp. 1163–1175, 2006.
- [52] K. Ohnishi and T. Mizoguchi, "Real haptics and its applications," *IEEJ Trans*actions on Electrical and Electronic Engineering, vol. 12, no. 6, pp. 803–808, 2017.
- [53] A. H. S. Abeykoon and R. M. Ruwanthika, "Remote gripping for effective bilateral teleoperation," in *Handbook of Research on Human-Computer Interfaces, Developments, and Applications.* IGI Global, 2016, pp. 99–134.
- [54] E. Sariyildiz and K. Ohnishi, "Stability and robustness of disturbance-observerbased motion control systems," *IEEE Transactions on Industrial Electronics*, vol. 62, no. 1, pp. 414–422, 2014.
- [55] A. Sabanovic and K. Ohnishi, *Motion control systems*. John Wiley & Sons, 2011.
- [56] A. H. S. Abeykoon and M. D. Chinthaka, "Position based static friction estimation for dc motors using disturbance observer," in 7th International Conference on Information and Automation for Sustainability. IEEE, 2014, pp. 1–6.
- [57] G. A. Perera, M. B. Pillai, A. Harsha, and S. Abeykoon, "Dc motor inertia estimation for robust bilateral control," in *7th International Conference on Information and Automation for Sustainability*. IEEE, 2014, pp. 1–7.
- [58] V. Chawda, O. Celik, and M. K. O'Malley, "Evaluation of velocity estimation methods based on their effect on haptic device performance," *IEEE/ASME Transactions on Mechatronics*, vol. 23, no. 2, pp. 604–613, 2018.
- [59] W.-H. Zhu and T. Lamarche, "Velocity estimation by using position and acceleration sensors," *IEEE Transactions on Industrial Electronics*, vol. 54, no. 5, pp. 2706–2715, 2007.
- [60] A. Hace and M. Čurkovič, "Accurate fpga-based velocity measurement with an incremental encoder by a fast generalized divisionless mt-type algorithm," *Sensors*, vol. 18, no. 10, p. 3250, 2018.

- [61] A. Weill-Duflos, A. Mohand-Ousaid, S. Haliyo, S. Regnier, and V. Hayward, "Optimizing transparency of haptic device through velocity estimation," in 2015 IEEE International Conference on Advanced Intelligent Mechatronics (AIM). IEEE, 2015, pp. 529–534.
- [62] A. Altmann, L. Toloşi, O. Sander, and T. Lengauer, "Permutation importance: a corrected feature importance measure," *Bioinformatics*, vol. 26, no. 10, pp. 1340– 1347, 2010.
- [63] O. O. Aremu, D. Hyland-Wood, and P. R. McAree, "A machine learning approach to circumventing the curse of dimensionality in discontinuous time series machine data," *Reliability Engineering & System Safety*, vol. 195, p. 106706, 2020.
- [64] M. Kerzel, M. Ali, H. G. Ng, and S. Wermter, "Haptic material classification with a multi-channel neural network," in 2017 International Joint Conference on Neural Networks (IJCNN). IEEE, 2017, pp. 439–446.
- [65] J. M. Gandarias, J. M. Gómez-de Gabriel, and A. J. García-Cerezo, "Enhancing perception with tactile object recognition in adaptive grippers for human–robot interaction," *Sensors*, vol. 18, no. 3, p. 692, 2018.
- [66] J. Bednarek, M. Bednarek, L. Wellhausen, M. Hutter, and K. Walas, "What am i touching? learning to classify terrain via haptic sensing," in 2019 International Conference on Robotics and Automation (ICRA). IEEE, 2019, pp. 7187–7193.