LIST OF PUBLICATIONS

Articles Accepted/Submitted in Refereed International Conferences

Conference Papers

1. **R. A. M. Abayasiri**, A. G. B. P. Jayasekara, R. A. R. C. Gopura and Kazuo Kiguchi "Manipulation of EMG signals for tasks on the intelligent wheelchair", 3rd International Conference on Electrical Engineering 2021

Journal Papers

1. **R. A. M. Abayasiri**, K. S. Priyanayana, M. M. S. N. Edirisinghe, A. G. B. P. Jayasekara, R. A. R. C. Gopura and Kazuo Kiguchi "A Human Study to Understand the Preferences of Wheelchair Users in Arranging Objects on Wheelchair Tray", (Unpublished)

REFERENCES

[1] T. Nakamura, M. Suzuki, M. Ueda, Y. Harada, M. Hirayama, and M. Katsuno, "Impact of orthostatic hypotension on wheelchair use in patients with parkinson's disease," *Journal of Neural Transmission*, vol. 127, no. 3, pp. 379–383, 2020.

[2] E. M. Smith, B. M. Sakakibara, and W. C. Miller, "A review of factors influencing participation in social and community activities for wheelchair users," *Disability and Rehabilitation: Assistive Technology*, vol. 11, no. 5, pp. 361–374, 2016.

[3] A. Soto-Rubio, M. Perez-Marin, J. Tomas Miguel, and P. Barreto Martin, "Emotional distress of patients at end-of-life and their caregivers: interrelation and predictors," *Frontiers in psychology*, vol. 9, p. 2199, 2018.

[4] R. H. Krishnan and S. Pugazhenthi, "Concept development and design of self-transfer devices for wheelchair users," *International Journal of Automation and Smart Technology*, vol. 9, no. 1, pp. 1–11, 2019.

[5] R. Patel, R. A. Parikh, and M. M. Patel, "Wheelchair control by eyes movement and voice recognition," 2020.

[6] P. Viswanathan, E. P. Zambalde, G. Foley, J. L. Graham, R. H. Wang, B. Adhikari, A. K. Mackworth, A. Mihailidis, W. C. Miller, and I. M. Mitchell, "Intelligent wheelchair control strategies for older adults with cognitive impairment: User attitudes, needs, and preferences," *Autonomous Robots*, vol. 41, no. 3, pp. 539–554, 2017.

[7] M. K. Islam, J. M. Akanto, A. Hakim, and K. Shikder, “Transport riding wheelchair,” in *2020 International Conference on Intelligent Engineering and Management (ICIEM)*, pp. 515–518, IEEE, 2020.

[8] M. Yukselir, K. Scarrow, P. Wilson, and T. Cowan, “The brains behind the electric wheelchair one of canada’s ‘great artifacts’,” *Globe Mail*, 2012.

[9] H. A. Yanco, “Integrating robotic research: A survey of robotic wheelchair development,” in *AAAI Spring Symposium on Integrating Robotic Research*, pp. 136–141, Citeseer, 1998.

[10] H. A. Yanco, A. Hazel, A. Peacock, S. Smith, and H. Wintermute, “Initial report on wheelesley: a robotic wheelchair system,” in *Proceedings of the Workshop on Developing AI Applications for the Disabled*, held at the International Joint Conference on Artificial Intelligence . . . , 1995.

[11] T. Gomi and A. Griffith, “Developing intelligent wheelchairs for the handicapped,” in *Assistive Technology and Artificial Intelligence*, pp. 150–178, Springer, 1998.

[12] S. Udupa, V. R. Kamat, and C. C. Menassa, “Shared autonomy in assistive mobile robots: a review,” *Disability and Rehabilitation: Assistive Technology*, pp. 1–22, 2021.

[13] L. F. Manta, D. Cojocaru, I. C. Vladu, A. Dragomir, and A. M. Mariniuc, “Wheelchair control by head motion using a noncontact method in relation to the pacient,” in *2019 20th International Carpathian Control Conference (ICCC)*, pp. 1–6, IEEE, 2019.

[14] D. P. Miller and M. G. Slack, “Increasing access with a low-cost robotic wheelchair,” in *Proceedings of IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS’94)*, vol. 3, pp. 1663–1667, IEEE, 1994.

[15] D. P. Miller and M. G. Slack, “Design and testing of a low-cost robotic wheelchair prototype,” *Autonomous robots*, vol. 2, no. 1, pp. 77–88, 1995.

[16] M. Mazo, F. J. Rodriguez, J. L. Lázaro, J. Ureña, J. C. Garcia, E. Santiso, P. Revenga, and J. J. Garcia, "Wheelchair for physically disabled people with voice, ultrasonic and infrared sensor control," *Autonomous Robots*, vol. 2, no. 3, pp. 203–224, 1995.

[17] R. B. Navarro, L. B. Vázquez, and E. L. Guillén, "Eog-based wheelchair control," in *Smart Wheelchairs and Brain-Computer Interfaces*, pp. 381–403, Elsevier, 2018.

[18] Z. Das, A. Islam, D. Banerjee, M. Ghosh, and B. Neogi, "Study and design on cyber interaction processes for cerebral palsy employees," *International Journal of Nanoparticles*, vol. 10, no. 4, pp. 259–272, 2018.

[19] R. A. Solanke and A. R. Salunke, "Voice and gesture based wheelchair for physically challenged using avr and android," 2016.

[20] H. Yashoda, A. Piumal, P. Polgahapitiya, M. Mubeen, M. Muthugala, and A. Jayasekara, "Design and development of a smart wheelchair with multiple control interfaces," in *2018 Moratuwa Engineering Research Conference (MERCon)*, pp. 324–329, IEEE, 2018.

[21] M. Mazo, J. Garcia, F. Rodriguez, J. Urena, J. L. Lazaro, and F. Espinosa, "Integral system for assisted mobility," *Information sciences*, vol. 129, no. 1-4, pp. 1–15, 2000.

[22] R. A. Braga, M. Petry, A. P. Moreira, and L. P. Reis, "Intellwheels-a development platform for intelligent wheelchairs for disabled people," in *ICINCO 2008: Proceedings of The Fifth International Conference on Informatics in Control, Automation and Robotics, Vol Ra-2: Robotics and Automation, Vol 2*, 2008.

[23] M. C. T. Avelar, *Intellwheels–Controlling an Intelligent Wheelchair using a Brain Computer Interface.* PhD thesis, PhD thesis. Universidade do Porto, 2019.

[24] S. J. Abdullah and J. Shaikh Mohammed, "Modeling and simulation of two wheelchair accessories for pushing doors," *Assistive Technology*, vol. 30, no. 4, pp. 165–175, 2018.

[25] F. Leishman, O. Horn, and G. Bourhis, "Smart wheelchair control through a deictic approach," *Robotics and Autonomous Systems*, vol. 58, no. 10, pp. 1149–1158, 2010.

[26] C. Jayawardena, N. Baghaei, K. Ganeshan, and A. Sarrafzadeh, "Designing a socially assistive companion robotic wheel chair: Robochair," in *2013 6th IEEE Conference on Robotics, Automation and Mechatronics (RAM)*, pp. 231–236, IEEE, 2013.

[27] K. Mitsugi, K. Matsuo, and L. Barolli, "A comparison study of control devices for an omnidirectional wheelchair," in *Workshops of the International Conference on Advanced Information Networking and Applications*, pp. 651–661, Springer, 2020.

[28] M. Özçeliköрs, A. Çoşkun, M. G. Say, A. Yazici, U. Yayan, and M. Akçakoca, "Kinect based intelligent wheelchair navigation with potential fields," in *2014 IEEE International Symposium on Innovations in Intelligent Systems and Applications (INISTA) Proceedings*, pp. 330–337, IEEE, 2014.

[29] E. Uğur, "A simulation study on autonomous wheelchair control with visual feedback for following straight lines," Master's thesis, Fen Bilimleri Enstitüsü, 2018.

[30] Action Trackchair, "Action trackchair - the first all terrain power chair of it's kind." [Online]. Available: http://actiontrackchair.com/. [Accessed on 22-Nov-2019].

[31] J. C. Garcia, M. Marron, J. Ureña, and D. Gualda, "Intelligent wheelchairs: Filling the gap between labs and people," *Assistive Technology: From Research to Practice: AAATE*, vol. 33, no. 2013, p. 202, 2013.

[32] J. Leaman and H. M. La, "A comprehensive review of smart wheelchairs: past, present, and future," *IEEE Transactions on Human-Machine Systems*, vol. 47, no. 4, pp. 486–499, 2017.

[33] J. Leaman and H. M. La, "ichair: Intelligent powerchair for severely disabled people," in *Proc. ISSAT Int. Conf. Model. Complex Syst. Environ.*, pp. 1–6, 2015.

[34] J. Podobnik, J. Rejc, S. Slajpah, M. Munih, and M. Mihelj, "All-terrain wheelchair: Increasing personal mobility with a powered wheel-track hybrid wheelchair," *IEEE Robotics & Automation Magazine*, vol. 24, no. 4, pp. 26–36, 2017.

[35] W. Seamone and G. Schmeisser, "New control techniques for wheelchair mobility," *Multiple sclerosis*, vol. 3, pp. 77–2, 1981.

[36] R. C. Simpson, "Smart wheelchairs: A literature review," *Journal of rehabilitation research and development*, vol. 42, no. 4, p. 423, 2005.

[37] R. A. Cooper, "Intelligent control of power wheelchairs," *IEEE Engineering in Medicine and Biology Magazine*, vol. 14, no. 4, pp. 423–431, 1995.

[38] S. Guo, R. Cooper, M. Boninger, A. Kwarciak, and B. Ammer, "Development of power wheelchair chin-operated force-sensing joystick," in *Proceedings of the Second Joint 24th Annual Conference and the Annual Fall Meeting of the Biomedical Engineering Society][Engineering in Medicine and Biology*, vol. 3, pp. 2373–2374, IEEE, 2002.

[39] P. Taylor and H. Nguyen, "Performance of a head-movement interface for wheelchair control," in *Proceedings of the 25th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (IEEE Cat. No. 03CH37439)*, vol. 2, pp. 1590–1593, IEEE, 2003.

[40] I. Mougharbel, R. El-Hajj, H. Ghamlouch, and E. Monacelli, "Comparative study on different adaptation approaches concerning a sip and puff

controller for a powered wheelchair," in *2013 Science and Information Conference*, pp. 597–603, IEEE, 2013.

[41] L. Fehr, W. E. Langbein, and S. B. Skaar, "Adequacy of power wheelchair control interfaces for persons with severe disabilities: A clinical survey," *Journal of rehabilitation research and development*, vol. 37, no. 3, pp. 353–360, 2000.

[42] S. Linnman, "M3s: The local network for electric wheelchairs and rehabilitation equipment," *IEEE Transactions on Rehabilitation Engineering*, vol. 4, no. 3, pp. 188–192, 1996.

[43] J. O. Wobbrock, H. H. Aung, B. A. Myers, and E. F. Lopresti, "Integrated text entry from power wheelchairs," *Behaviour & information technology*, vol. 24, no. 3, pp. 187–203, 2005.

[44] E. R. Arboleda, Y. V. P. Paulite, and N. J. C. Carandang, "Smart wheelchair with dual control using touchpad and android mobile device," *Indonesian Journal of Electrical Engineering and Informatics (IJEEI)*, vol. 6, no. 1, pp. 86–96, 2018.

[45] I. J. B. Richey and B. A. Jaenke, "Wheelchair having speed and direction control touchpad," Aug. 9 2005. US Patent 6,926,106.

[46] E. J. Rechy-Ramirez, H. Hu, and K. McDonald-Maier, "Head movements based control of an intelligent wheelchair in an indoor environment," in *2012 IEEE International Conference on Robotics and Biomimetics (ROBIO)*, pp. 1464–1469, IEEE, 2012.

[47] S. Manogna, S. Vaishnavi, and B. Geethanjali, "Head movement based assist system for physically challenged," in *2010 4th International Conference on Bioinformatics and Biomedical Engineering*, pp. 1–4, IEEE, 2010.

[48] D. A. Craig and H. T. Nguyen, "Wireless real-time head movement system using a personal digital assistant (pda) for control of a power wheelchair," in

2005 IEEE Engineering in Medicine and Biology 27th Annual Conference, pp. 772–775, IEEE, 2006.

[49] E. B. Thorp, F. Abdollahi, D. Chen, A. Farshchiansadegh, M.-H. Lee, J. P. Pedersen, C. Pierella, E. J. Roth, I. S. Gonzáles, and F. A. Mussa-Ivaldi, "Upper body-based power wheelchair control interface for individuals with tetraplegia," *IEEE transactions on neural systems and rehabilitation engineering*, vol. 24, no. 2, pp. 249–260, 2015.

[50] J. Crisman and M. Cleary, "Progress on the deictic controlled wheelchair (pp. 137–149)," 1998.

[51] F. Leishman, O. Horn, and G. Bourhis, "Multimodal laser-vision approach for the deictic control of a smart wheelchair," in *International Conference on Smart Homes and Health Telematics*, pp. 98–107, Springer, 2009.

[52] Y. Rabhi, M. Mrabet, and F. Fnaiech, "Intelligent control wheelchair using a new visual joystick," *Journal of healthcare engineering*, vol. 2018, 2018.

[53] H. Singh, A. Mobin, S. Kumar, S. Chauhan, and S. Agrawal, "Design and development of voice/joystick operated microcontroller based intelligent motorised wheelchair," in *Proceedings of IEEE. IEEE Region 10 Conference. TENCON 99.'Multimedia Technology for Asia-Pacific Information Infrastructure'(Cat. No. 99CH37030)*, vol. 2, pp. 1573–1576, IEEE, 1999.

[54] M. Hawley, P. Cudd, J. Wells, A. Wilson, and P. Judd, "Wheelchair-mounted integrated control systems for multiply handicapped people," *Journal of biomedical engineering*, vol. 14, no. 3, pp. 193–198, 1992.

[55] Y. Matsumotot, T. Ino, and T. Ogsawara, "Development of intelligent wheelchair system with face and gaze based interface," in *Proceedings 10th IEEE International Workshop on Robot and Human Interactive Communication. ROMAN 2001 (Cat. No. 01TH8591)*, pp. 262–267, IEEE, 2001.

[56] S. I. Ktena, W. Abbott, and A. A. Faisal, "A virtual reality platform for safe evaluation and training of natural gaze-based wheelchair driving," in *2015 7th International IEEE/EMBS Conference on Neural Engineering (NER)*, pp. 236–239, IEEE, 2015.

[57] C. Bartolein, A. Wagner, M. Jipp, and E. Badreddin, "Easing wheelchair control by gaze-based estimation of intended motion," *IFAC Proceedings Volumes*, vol. 41, no. 2, pp. 9162–9167, 2008.

[58] D. Purwanto, R. Mardiyanto, and K. Arai, "Electric wheelchair control with gaze direction and eye blinking," *Artificial Life and Robotics*, vol. 14, no. 3, p. 397, 2009.

[59] Z. Ye, Y. Li, A. Fathi, Y. Han, A. Rozga, G. D. Abowd, and J. M. Rehg, "Detecting eye contact using wearable eye-tracking glasses," in *Proceedings of the 2012 ACM conference on ubiquitous computing*, pp. 699–704, 2012.

[60] M. Vidal, J. Turner, A. Bulling, and H. Gellersen, "Wearable eye tracking for mental health monitoring," *Computer Communications*, vol. 35, no. 11, pp. 1306–1311, 2012.

[61] C. Djeraba, "State of the art of eye tracking," *LIFL, Lille, Publication interne*, vol. 7, 2005.

[62] H. Cai and Y. Lin, "An integrated head pose and eye gaze tracking approach to non-intrusive visual attention measurement for wide fov simulators," *Virtual Reality*, vol. 16, no. 1, pp. 25–32, 2012.

[63] D. Li and D. Parkhurst, "Open-source software for real-time visible-spectrum eye tracking," in *Proceedings of the COGAIN Conference*, vol. 17, 2006.

[64] R. Ruddarraju, A. Haro, K. Nagel, Q. T. Tran, I. A. Essa, G. Abowd, and E. D. Mynatt, "Perceptual user interfaces using vision-based eye tracking,"

in *Proceedings of the 5th international conference on Multimodal interfaces*, pp. 227–233, 2003.

[65] P. Majaranta and A. Bulling, "Eye tracking and eye-based human–computer interaction," in *Advances in physiological computing*, pp. 39–65, Springer, 2014.

[66] Z. Zhu, K. Fujimura, and Q. Ji, "Real-time eye detection and tracking under various light conditions," in *Proceedings of the 2002 symposium on Eye tracking research & applications*, pp. 139–144, 2002.

[67] K.-H. Tan, D. J. Kriegman, and N. Ahuja, "Appearance-based eye gaze estimation," in *Sixth IEEE Workshop on Applications of Computer Vision, 2002.(WACV 2002). Proceedings.*, pp. 191–195, IEEE, 2002.

[68] S. K. Schnipke and M. W. Todd, "Trials and tribulations of using an eye-tracking system," in *CHI'00 extended abstracts on Human factors in computing systems*, pp. 273–274, 2000.

[69] A. Jaimes and N. Sebe, "Multimodal human computer interaction: A survey," in *International Workshop on Human-Computer Interaction*, pp. 1–15, Springer, 2005.

[70] M. B. Kumaran and A. P. Renold, "Implementation of voice based wheelchair for differently abled," in *2013 Fourth International Conference on Computing, Communications and Networking Technologies (ICCCNT)*, pp. 1–6, IEEE, 2013.

[71] I. Moon, M. Lee, J. Ryu, and M. Mun, "Intelligent robotic wheelchair with emg-, gesture-, and voice-based interfaces," in *Proceedings 2003 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2003)(Cat. No. 03CH37453)*, vol. 4, pp. 3453–3458, IEEE, 2003.

[72] J. Clark and R. Roemer, "Voice controlled wheelchair.," *Archives of physical medicine and rehabilitation*, vol. 58, no. 4, pp. 169–175, 1977.

[73] M. Nishimori, T. Saitoh, and R. Konishi, "Voice controlled intelligent wheelchair," in *SICE Annual Conference 2007*, pp. 336–340, IEEE, 2007.

[74] S. Suryawanshi, J. Chitode, and S. Pethakar, "Voice operated intelligent wheelchair," *International Journal of Advanced Research in Computer Science Software Engineering*, vol. 3, no. 5, 2013.

[75] R. Chauhan, Y. Jain, H. Agarwal, and A. Patil, "Study of implementation of voice controlled wheelchair," in *2016 3Rd International Conference On Advanced Computing And Communication Systems (ICACCS)*, vol. 1, pp. 1–4, IEEE, 2016.

[76] A. A. Abed, "Design of voice controlled smart wheelchair," *International Journal of Computer Applications*, vol. 131, no. 1, pp. 32–38, 2015.

[77] O. Koçak, E. Gürel, A. Akpek, and A. Koçoğlu, "Control of wheel chair for quadriplegia patients: Design a bioremotecontrol," in *9th International Conference On Electrical and Electronics Engineering*, pp. 26–28, 2015.

[78] D. Farina, R. Merletti, and R. M. Enoka, "The extraction of neural strategies from the surface emg," *Journal of applied physiology*, vol. 96, no. 4, pp. 1486–1495, 2004.

[79] R. Merletti and D. Farina, "Analysis of intramuscular electromyogram signals," *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, vol. 367, no. 1887, pp. 357–368, 2009.

[80] A. Phinyomark, P. Phukpattaranont, and C. Limsakul, "A review of control methods for electric power wheelchairs based on electromyography signals with special emphasis on pattern recognition," *IETE Technical Review*, vol. 28, no. 4, pp. 316–326, 2011.

[81] A. Phinyomark, F. Quaine, S. Charbonnier, C. Serviere, F. Tarpin-Bernard, and Y. Laurillau, "Emg feature evaluation for improving myoelectric pat-

tern recognition robustness," *Expert Systems with applications*, vol. 40, no. 12, pp. 4832–4840, 2013.

[82] L. Wei, H. Hu, and K. Yuan, "Use of forehead bio-signals for controlling an intelligent wheelchair," in *2008 IEEE International Conference on Robotics and Biomimetics*, pp. 108–113, IEEE, 2009.

[83] G. Lera and M. Pinzolas, "Neighborhood based levenberg-marquardt algorithm for neural network training," *IEEE transactions on neural networks*, vol. 13, no. 5, pp. 1200–1203, 2002.

[84] Z. Yi, D. Lingling, L. Yuan, and H. Hu, "Design of a surface emg based human-machine interface for an intelligent wheelchair," in *IEEE 2011 10th International Conference on Electronic Measurement & Instruments*, vol. 3, pp. 132–136, IEEE, 2011.

[85] L. Ozyilmaz, T. Yildirim, and H. Seker, "Emg signal classification using conic section function neural networks," in *IJCNN'99. International Joint Conference on Neural Networks. Proceedings (Cat. No. 99CH36339)*, vol. 5, pp. 3601–3603, IEEE, 1999.

[86] H. Mizuno, N. Tsujiuchi, and T. Koizumi, "Forearm motion discrimination technique using real-time emg signals," in *2011 Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, pp. 4435–4438, IEEE, 2011.

[87] C. L. Pulliam, J. M. Lambrecht, and R. F. Kirsch, "Emg-based neural network control of transhumeral prostheses," *Journal of rehabilitation research and development*, vol. 48, no. 6, p. 739, 2011.

[88] V. Rajesh, D. K. Reddy, *et al.*, "Semg based human machine interface for controlling wheel chair by using ann," in *2009 International Conference on Control, Automation, Communication and Energy Conservation*, pp. 1–6, IEEE, 2009.

[89] M. Hamedi, S.-H. Salleh, T. T. Swee, *et al.*, "Surface electromyography-based facial expression recognition in bi-polar configuration," *Journal of Computer Science*, vol. 7, no. 9, p. 1407, 2011.

[90] J.-S. Han, Z. Z. Bien, D.-J. Kim, H.-E. Lee, and J.-S. Kim, "Human-machine interface for wheelchair control with emg and its evaluation," in *Proceedings of the 25th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (IEEE Cat. No. 03CH37439)*, vol. 2, pp. 1602–1605, IEEE, 2003.

[91] J.-H. Song, J.-W. Jung, S.-W. Lee, and Z. Bien, "Robust emg pattern recognition to muscular fatigue effect for powered wheelchair control," *Journal of Intelligent & Fuzzy Systems*, vol. 20, no. 1, 2, pp. 3–12, 2009.

[92] B. Karlik, M. O. Tokhi, and M. Alci, "A fuzzy clustering neural network architecture for multifunction upper-limb prosthesis," *IEEE Transactions on Biomedical Engineering*, vol. 50, no. 11, pp. 1255–1261, 2003.

[93] S. E. Hussein and M. H. Granat, "Intention detection using a neuro-fuzzy emg classifier," *IEEE Engineering in Medicine and Biology Magazine*, vol. 21, no. 6, pp. 123–129, 2002.

[94] M. Khezri and M. Jahed, "Introducing a new multi-wavelet function suitable for semg signal to identify hand motion commands," in *2007 29th Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, pp. 1924–1927, IEEE, 2007.

[95] M. Vuskovic and S. Du, "Classification of prehensile emg patterns with simplified fuzzy artmap networks," in *Proceedings of the 2002 International Joint Conference on Neural Networks. IJCNN'02 (Cat. No. 02CH37290)*, vol. 3, pp. 2539–2544, IEEE, 2002.

[96] K.-H. Kim, g. K. Kim, J.-S. Kim, W. Son, and S.-Y. Lee, "A biosignal-based human interface controlling a power-wheelchair for people with motor disabilities," *ETRI journal*, vol. 28, no. 1, pp. 111–114, 2006.

[97] Y. Huang, K. B. Englehart, B. Hudgins, and A. D. Chan, "A gaussian mixture model based classification scheme for myoelectric control of powered upper limb prostheses," *IEEE Transactions on Biomedical Engineering*, vol. 52, no. 11, pp. 1801–1811, 2005.

[98] O. Fukuda, T. Tsuji, M. Kaneko, and A. Otsuka, "A human-assisting manipulator teleoperated by emg signals and arm motions," *IEEE transactions on robotics and automation*, vol. 19, no. 2, pp. 210–222, 2003.

[99] S. M. P. Firoozabadi, M. A. Oskoei, and H. Hu, "A human-computer interface based on forehead multi-channel bio-signals to control a virtual wheelchair," in *Proceedings of the 14th Iranian conference on biomedical engineering (ICBME)*, pp. 272–277, 2008.

[100] M. A. Oskoei and H. Hu, "Myoelectric based virtual joystick applied to electric powered wheelchair," in *2008 IEEE/RSJ International Conference on Intelligent Robots and Systems*, pp. 2374–2379, IEEE, 2008.

[101] L. Wei and H. Hu, "Emg and visual based hmi for hands-free control of an intelligent wheelchair," in *2010 8th World Congress on Intelligent Control and Automation*, pp. 1027–1032, IEEE, 2010.

[102] M. A. Oskoei and H. Hu, "Support vector machine-based classification scheme for myoelectric control applied to upper limb," *IEEE transactions on biomedical engineering*, vol. 55, no. 8, pp. 1956–1965, 2008.

[103] T. C. Chieh, M. M. Mustafa, A. Hussain, S. F. Hendi, and B. Y. Majlis, "Development of vehicle driver drowsiness detection system using electrooculogram (eog)," in *2005 1st International Conference on Computers, Communications, & Signal Processing with Special Track on Biomedical Engineering*, pp. 165–168, IEEE, 2005.

[104] A. Ubeda, E. Ianez, and J. M. Azorin, "Wireless and portable eog-based interface for assisting disabled people," *IEEE/ASME Transactions on mechatronics*, vol. 16, no. 5, pp. 870–873, 2011.

[105] H. Singh and J. Singh, "A review on electrooculography," *International Journal of Advanced Engineering Technology*, vol. 3, no. 4, pp. 115–122, 2012.

[106] S. Ramkumar, K. S. Kumar, T. D. Rajkumar, M. Ilayaraja, and K. Shankar, "A review-classification of electrooculogram based human computer interfaces," 2018.

[107] M. Trikha, A. Bhandari, and T. Gandhi, "Automatic electrooculogram classification of microcontroller based interface system," in *Systems and Information Engineering Design Symposium (SIEDS)*, pp. 1–6, 2007.

[108] Y. Rahul, R. K. Sharma, and P. Nissi, "A review on eeg control smart wheel chair," *International Journal of Advanced Research in Computer Science*, vol. 8, no. 9, 2017.

[109] D. Huang, K. Qian, D.-Y. Fei, W. Jia, X. Chen, and O. Bai, "Electroencephalography (eeg)-based brain–computer interface (bci): A 2-d virtual wheelchair control based on event-related desynchronization/synchronization and state control," *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, vol. 20, no. 3, pp. 379–388, 2012.

[110] T. Geng, J. Q. Gan, and H. Hu, "A self-paced online bci for mobile robot control," *International Journal of Advanced Mechatronic Systems*, vol. 2, no. 1-2, pp. 28–35, 2010.

[111] F. Galán, M. Nuttin, E. Lew, P. W. Ferrez, G. Vanacker, J. Philips, and J. d. R. Millán, "A brain-actuated wheelchair: asynchronous and non-invasive brain–computer interfaces for continuous control of robots," *Clinical neurophysiology*, vol. 119, no. 9, pp. 2159–2169, 2008.

[112] J. Li, J. Liang, Q. Zhao, J. Li, K. Hong, and L. Zhang, "Design of assistive wheelchair system directly steered by human thoughts," *International journal of neural systems*, vol. 23, no. 03, p. 1350013, 2013.

[113] A. O. Barbosa, D. R. Achanccaray, and M. A. Meggiolaro, "Activation of a mobile robot through a brain computer interface," in *2010 IEEE International Conference on Robotics and Automation*, pp. 4815–4821, IEEE, 2010.

[114] G. Pires, M. Castelo-Branco, and U. Nunes, "Visual p300-based bci to steer a wheelchair: a bayesian approach," in *2008 30th Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, pp. 658–661, IEEE, 2008.

[115] B.-G. Shin, T. Kim, and S. Jo, "Non-invasive brain signal interface for a wheelchair navigation," in *ICCAS 2010*, pp. 2257–2260, IEEE, 2010.

[116] B. Rebsamen, C. Guan, H. Zhang, C. Wang, C. Teo, M. H. Ang, and E. Burdet, "A brain controlled wheelchair to navigate in familiar environments," *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, vol. 18, no. 6, pp. 590–598, 2010.

[117] C. Escolano, A. R. Murguialday, T. Matuz, N. Birbaumer, and J. Minguez, "A telepresence robotic system operated with a p300-based brain-computer interface: initial tests with als patients," in *2010 Annual International Conference of the IEEE Engineering in Medicine and Biology*, pp. 4476–4480, IEEE, 2010.

[118] I. Iturrate, J. M. Antelis, A. Kubler, and J. Minguez, "A noninvasive brain-actuated wheelchair based on a p300 neurophysiological protocol and automated navigation," *IEEE transactions on robotics*, vol. 25, no. 3, pp. 614–627, 2009.

[119] B. Rebsamen, E. Burdet, C. Guan, H. Zhang, C. L. Teo, Q. Zeng, C. Laugier, and M. H. Ang, "Controlling a wheelchair indoors using thought," *IEEE intelligent systems*, vol. 22, no. 2, pp. 18–24, 2007.

[120] C. Mandel, T. Lüth, T. Laue, T. Röfer, A. Gräser, and B. Krieg-Brückner, "Navigating a smart wheelchair with a brain-computer interface interpret-

ing steady-state visual evoked potentials," in *2009 IEEE/RSJ International Conference on Intelligent Robots and Systems*, pp. 1118–1125, IEEE, 2009.

[121] J.-S. Lin, K.-C. Chen, and W.-C. Yang, "Eeg and eye-blinking signals through a brain-computer interface based control for electric wheelchairs with wireless scheme," in *4th International Conference on New Trends in Information Science and Service Science*, pp. 731–734, IEEE, 2010.

[122] B. J. A. Rani and A. Umamakeswari, "Electroencephalogram-based brain controlled robotic wheelchair," *Indian Journal of Science and Technology*, vol. 8, no. S9, pp. 188–197, 2015.

[123] S. K. Swee, K. D. T. Kiang, and L. Z. You, "Eeg controlled wheelchair," in *MATEC Web of Conferences*, vol. 51, p. 02011, EDP Sciences, 2016.

[124] A. Siswoyo, Z. Arief, and I. A. Sulistijono, "Application of artificial neural networks in modeling direction wheelchairs using neurosky mindset mobile (eeg) device," *EMITTER International Journal of Engineering Technology*, vol. 5, no. 1, pp. 170–191, 2017.

[125] Y. Li, J. Pan, F. Wang, and Z. Yu, "A hybrid bci system combining p300 and ssvep and its application to wheelchair control," *IEEE Transactions on Biomedical Engineering*, vol. 60, no. 11, pp. 3156–3166, 2013.

[126] J. Long, Y. Li, H. Wang, T. Yu, J. Pan, and F. Li, "A hybrid brain computer interface to control the direction and speed of a simulated or real wheelchair," *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, vol. 20, no. 5, pp. 720–729, 2012.

[127] A. C. Lopes, G. Pires, L. Vaz, and U. Nunes, "Wheelchair navigation assisted by human-machine shared-control and a p300-based brain computer interface," in *2011 IEEE/RSJ International Conference on Intelligent Robots and Systems*, pp. 2438–2444, IEEE, 2011.

[128] B. Rebsamen, E. Burdet, C. Guan, H. Zhang, C. L. Teo, Q. Zeng, M. Ang, and C. Laugier, "A brain-controlled wheelchair based on p300 and path guidance," in *The First IEEE/RAS-EMBS International Conference on Biomedical Robotics and Biomechatronics, 2006. BioRob 2006.*, pp. 1101–1106, IEEE, 2006.

[129] R. J. Barry, S. Kirkaikul, and D. Hodder, "Eeg alpha activity and the erp to target stimuli in an auditory oddball paradigm," *International journal of psychophysiology*, vol. 39, no. 1, pp. 39–50, 2000.

[130] P. F. Diez, S. M. T. Müller, V. A. Mut, E. Laciar, E. Avila, T. F. Bastos-Filho, and M. Sarcinelli-Filho, "Commanding a robotic wheelchair with a high-frequency steady-state visual evoked potential based brain–computer interface," *Medical engineering & physics*, vol. 35, no. 8, pp. 1155–1164, 2013.

[131] S. P. Parikh, V. Grassi, V. Kumar, and J. Okamoto, "Integrating human inputs with autonomous behaviors on an intelligent wheelchair platform," *IEEE Intelligent Systems*, vol. 22, no. 2, pp. 33–41, 2007.

[132] S. P. Levine, D. A. Bell, L. A. Jaros, R. C. Simpson, Y. Koren, and J. Borenstein, "The navchair assistive wheelchair navigation system," *IEEE transactions on rehabilitation engineering*, vol. 7, no. 4, pp. 443–451, 1999.

[133] Y. Touati and A. Ali-Cherif, "Smart powered wheelchair platform design and control for people with severe disabilities," *Software Engineering*, vol. 2, no. 3, pp. 49–56, 2012.

[134] V. Tyagi, N. K. Gupta, and P. K. Tyagi, "Smart wheelchair using fuzzy inference system," in *2013 IEEE Global Humanitarian Technology Conference: South Asia Satellite (GHTC-SAS)*, pp. 175–180, IEEE, 2013.

[135] R. Tang, X. Q. Chen, M. Hayes, and I. Palmer, "Development of a navigation system for semi-autonomous operation of wheelchairs," in *Proceedings of 2012 IEEE/ASME 8th IEEE/ASME International Conference on*

Mechatronic and Embedded Systems and Applications, pp. 257–262, IEEE, 2012.

[136] K. Miyazaki, M. Hashimoto, M. Shimada, and K. Takahashi, "Guide following control using laser range sensor for a smart wheelchair," in *2009 ICCAS-SICE*, pp. 4613–4616, IEEE, 2009.

[137] T. Sugano, Y. Dan, H. Okajima, N. Matsunaga, and Z. Hu, "Indoor platoon driving of electric wheelchair with model error compensator along wheel track of preceding vehicle," in *Proceedings of the 5th International Symposium on Advanced Control of Industrial Processes (2014b)*, pp. 219–224, 2014.

[138] Y. Kobayashi, Y. Kinpara, E. Takano, Y. Kuno, K. Yamazaki, and A. Yamazaki, "Robotic wheelchair moving with caregiver collaboratively depending on circumstances," in *CHI'11 Extended Abstracts on Human Factors in Computing Systems*, pp. 2239–2244, 2011.

[139] R. Suzuki, T. Yamada, M. Arai, Y. Sato, Y. Kobayashi, and Y. Kuno, "Multiple robotic wheelchair system considering group communication," in *International symposium on visual computing*, pp. 805–814, Springer, 2014.

[140] S. Cockrell, G. Lee, and W. Newman, "Determining navigability of terrain using point cloud data," in *2013 IEEE 13th International Conference on Rehabilitation Robotics (ICORR)*, pp. 1–6, IEEE, 2013.

[141] K. Ohno, T. Tsubouchi, B. Shigematsu, and S. Yuta, "Differential gps and odometry-based outdoor navigation of a mobile robot," *Advanced Robotics*, vol. 18, no. 6, pp. 611–635, 2004.

[142] E. North, J. Georgy, U. Iqbal, M. Tarbochi, and A. Noureldin, "Improved inertial/odometry/gps positioning of wheeled robots even in gps-denied environments," *Global Navig. Satell. Syst.—Sig., Theory Appl*, vol. 11, pp. 257–278, 2012.

[143] H. M. La, R. S. Lim, B. B. Basily, N. Gucunski, J. Yi, A. Maher, F. A. Romero, and H. Parvardeh, "Mechatronic systems design for an autonomous robotic system for high-efficiency bridge deck inspection and evaluation," *IEEE/ASME Transactions on Mechatronics*, vol. 18, no. 6, pp. 1655–1664, 2013.

[144] H. M. La, N. Gucunski, S.-H. Kee, J. Yi, T. Senlet, and L. Nguyen, "Autonomous robotic system for bridge deck data collection and analysis," in *2014 IEEE/RSJ International Conference on Intelligent Robots and Systems*, pp. 1950–1955, IEEE, 2014.

[145] L. Yang, X. Wu, D. Zhao, H. Li, and J. Zhai, "An improved prewitt algorithm for edge detection based on noised image," in *2011 4th International congress on image and signal processing*, vol. 3, pp. 1197–1200, IEEE, 2011.

[146] T. Rofer, C. Mandel, and T. Laue, "Controlling an automated wheelchair via joystick/head-joystick supported by smart driving assistance," in *2009 IEEE International Conference on Rehabilitation Robotics*, pp. 743–748, IEEE, 2009.

[147] P. Viswanathan, J. Little, A. Mackworth, and A. Mihailidis, "Adaptive navigation assistance for visually-impaired wheelchair users," in *Proceedings of the IROS 2011 Workshop on New and Emerging Technologies in Assistive Robotics*, Citeseer, 2011.

[148] E. B. Vander Poorten, E. Demeester, E. Reekmans, J. Philips, A. Hüntemann, and J. De Schutter, "Powered wheelchair navigation assistance through kinematically correct environmental haptic feedback," in *2012 IEEE International Conference on Robotics and Automation*, pp. 3706–3712, IEEE, 2012.

[149] M. R. M. Tomari, Y. Kobayashi, and Y. Kuno, "Enhancing wheelchair's control operation of a severe impairment user," in *The 8th International*

Conference on Robotic, Vision, Signal Processing & Power Applications, pp. 65–72, Springer, 2014.

[150] P. A. Hancock, D. R. Billings, K. E. Schaefer, J. Y. Chen, E. J. De Visser, and R. Parasuraman, "A meta-analysis of factors affecting trust in human-robot interaction," *Human factors*, vol. 53, no. 5, pp. 517–527, 2011.

[151] L. Riek and D. Howard, "A code of ethics for the human-robot interaction profession," *Proceedings of We Robot*, 2014.

[152] G. Di Gironimo, G. Matrone, A. Tarallo, M. Trotta, and A. Lanzotti, "A virtual reality approach for usability assessment: case study on a wheelchair-mounted robot manipulator," *Engineering with Computers*, vol. 29, no. 3, pp. 359–373, 2013.

[153] Y. Kanki, N. Kuwahara, and K. Morimoto, "An evaluation of physical strains while driving an electric wheelchair," in *2014 IIAI 3rd International Conference on Advanced Applied Informatics*, pp. 863–866, IEEE, 2014.

[154] E. M. Giesbrecht, W. C. Miller, I. M. Mitchell, and R. L. Woodgate, "Development of a wheelchair skills home program for older adults using a participatory action design approach," *BioMed research international*, vol. 2014, 2014.

[155] M. Jipp, "Individual differences and their impact on the safety and the efficiency of human-wheelchair systems," *Human factors*, vol. 54, no. 6, pp. 1075–1086, 2012.

[156] L. Jensen, "User perspectives on assistive technology: A qualitative analysis of 55 letters from citizens applying for assistive technology," *World Federation of Occupational Therapists Bulletin*, vol. 69, no. 1, pp. 42–45, 2014.

[157] M. Hillman, K. Hagan, S. Hagan, J. Jepson, and R. Orpwood, "The weston wheelchair mounted assistive robot-the design story," *Robotica*, vol. 20, no. 2, pp. 125–132, 2002.

[158] M. Hillman and A. Gammie, "The bath institute of medical engineering assistive robot," in *Proc. ICORR*, vol. 94, pp. 211–212, 1994.

[159] H. A. Tijsma, F. Liefhebber, and J. L. Herder, "Evaluation of new user interface features for the manus robot arm," in *9th International Conference on Rehabilitation Robotics, 2005. ICORR 2005.*, pp. 258–263, IEEE, 2005.

[160] C. Balaguer, A. Gimenez, A. Jardon, R. Cabas, and R. Correal, "Live experimentation of the service robot applications for elderly people care in home environments," in *2005 IEEE/RSJ International Conference on Intelligent Robots and Systems*, pp. 2345–2350, IEEE, 2005.

[161] J. Xu, G. G. Grindle, B. Salatin, J. J. Vazquez, H. Wang, D. Ding, and R. A. Cooper, "Enhanced bimanual manipulation assistance with the personal mobility and manipulation appliance (permma)," in *2010 IEEE/RSJ International Conference on Intelligent Robots and Systems*, pp. 5042–5047, IEEE, 2010.

[162] V. Maheu, P. S. Archambault, J. Frappier, and F. Routhier, "Evaluation of the jaco robotic arm: Clinico-economic study for powered wheelchair users with upper-extremity disabilities," in *2011 IEEE International Conference on Rehabilitation Robotics*, pp. 1–5, IEEE, 2011.

[163] Y. Jiang, M. Lim, C. Zheng, and A. Saxena, "Learning to place new objects in a scene," *The International Journal of Robotics Research*, vol. 31, no. 9, pp. 1021–1043, 2012.

[164] G. Havur, G. Ozbilgin, E. Erdem, and V. Patoglu, "Geometric rearrangement of multiple movable objects on cluttered surfaces: A hybrid reasoning approach," in *2014 IEEE International Conference on Robotics and Automation (ICRA)*, pp. 445–452, IEEE, 2014.

[165] S. Schiffer, A. Ferrein, and G. Lakemeyer, "Reasoning with qualitative positional information for domestic domains in the situation calculus," *Journal of Intelligent & Robotic Systems*, vol. 66, no. 1-2, pp. 273–300, 2012.

[166] A. G. B. P. Jayasekara, K. Watanabe, and K. Izumi, "Understanding user commands by evaluating fuzzy linguistic information based on visual attention," *Artificial Life and Robotics*, vol. 14, no. 1, pp. 48–52, 2009.

[167] J. Tan, Z. Ju, and H. Liu, "Grounding spatial relations in natural language by fuzzy representation for human-robot interaction," in *2014 IEEE International Conference on Fuzzy Systems (FUZZ-IEEE)*, pp. 1743–1750, IEEE, 2014.

[168] P. H. D. A. S. Srimal and A. G. B. P. Jayasekara, "A multi-modal approach for enhancing object placement," in *2017 6th National Conference on Technology and Management (NCTM)*, pp. 17–22, IEEE, 2017.

[169] M. Lim, K.-S. Pyo, K. Lee, J. Park, H. Choi, and H. Kweon, "The development and usability testing of the smart home for wheelchair users-focus on the activities of daily living at home," *Journal of the HCI Society of Korea*, vol. 11, no. 2, pp. 5–14, 2016.

[170] C. F. Riman, "Multi-controlled wheelchair for upper extremities disability," 2018.

[171] S. R. Rupanagudi, V. G. Bhat, R. Nehitha, G. Jeevitha, K. Kaushik, K. P. Reddy, M. Priya, N. Raagashree, M. Harshitha, S. S. Sheelavant, *et al.*, "A novel air gesture based wheelchair control and home automation system," in *International Conference on Intelligent Systems Design and Applications*, pp. 730–739, Springer, 2018.

[172] B. Mutlu, N. Roy, and S. Šabanović, "Cognitive human–robot interaction," *Springer Handbook of Robotics*, pp. 1907–1934, 2016.

[173] D. F. P. Granados, B. A. Yamamoto, H. Kamide, J. Kinugawa, and K. Kosuge, "Dance teaching by a robot: Combining cognitive and physical human–robot interaction for supporting the skill learning process," *IEEE Robotics and Automation Letters*, vol. 2, no. 3, pp. 1452–1459, 2017.

[174] S. Sathish, K. Nithyakalyani, S. Vinurajkumar, C. Vijayalakshmi, and J. Sivaraman, "Control of robotic wheel chair using emg signals for paralysed persons," *Indian Journal of Science and Technology*, vol. 9, no. 1, pp. 1–3, 2016.

[175] N. Chen, X. Wang, X. Men, X. Han, J. Sun, and C. Guo, "Hybrid bci based control strategy of the intelligent wheelchair manipulator system," in *2018 13th IEEE Conference on Industrial Electronics and Applications (ICIEA)*, pp. 824–828, IEEE, 2018.

[176] C. Guger, C. Kapeller, H. Ogawa, R. Prückl, J. Grünwald, and K. Kamada, "Electrocorticogram based brain–computer interfaces," in *Smart Wheelchairs and Brain-Computer Interfaces*, pp. 197–227, Elsevier, 2018.

[177] M. M. Sidik, S. C. Ghani, and M. M. Padzi, "Development of a wireless surface electromyography (semg) signal acquisition device for power-assisted wheelchair system," *International Journal of Engineering and Advanced Technology*, vol. 8, no. 6, pp. 3414–3418, 2019.

[178] Z. Jiang, M. O. G. Nayeem, K. Fukuda, S. Ding, H. Jin, T. Yokota, D. Inoue, D. Hashizume, and T. Someya, "Highly stretchable metallic nanowire networks reinforced by the underlying randomly distributed elastic polymer nanofibers via interfacial adhesion improvement," *Advanced Materials*, vol. 31, no. 37, p. 1903446, 2019.

[179] A. S. Kundu, O. Mazumder, P. K. Lenka, and S. Bhaumik, "Hand gesture recognition based omnidirectional wheelchair control using imu and emg sensors," *Journal of Intelligent & Robotic Systems*, vol. 91, no. 3, pp. 529–541, 2018.

[180] G. Jang, J. Kim, S. Lee, and Y. Choi, "Emg-based continuous control scheme with simple classifier for electric-powered wheelchair," *IEEE Transactions on Industrial Electronics*, vol. 63, no. 6, pp. 3695–3705, 2016.

[181] M. S. Kaiser, Z. I. Chowdhury, S. Al Mamun, A. Hussain, and M. Mahmud, "A neuro-fuzzy control system based on feature extraction of surface electromyogram signal for solar-powered wheelchair," *Cognitive Computation*, vol. 8, no. 5, pp. 946–954, 2016.

[182] Intelligent Service Robotics Group, "EMG Based Controller for a Wheelchair with Robotic Manipulator." [Online]. Available: https://drive.google.com. [Accessed on 02-09-2021].

[183] D. Cattaneo, I. Lamers, R. Bertoni, P. Feys, and J. Jonsdottir, "Participation restriction in people with multiple sclerosis: prevalence and correlations with cognitive, walking, balance, and upper limb impairments," *Archives of physical medicine and rehabilitation*, vol. 98, no. 7, pp. 1308–1315, 2017.

[184] V. K. Narayanan, *Characterizing assistive shared control through vision-based and human-aware designs for wheelchair mobility assistance.* PhD thesis, 2016.

[185] W. Tao, J. Xu, and T. Liu, "Electric-powered wheelchair with stair-climbing ability," *International Journal of Advanced Robotic Systems*, vol. 14, no. 4, p. 1729881417721436, 2017.

[186] M. E. Hudson, A. Zambone, and J. Brickhouse, "Teaching early numeracy skills using single switch voice-output devices to students with severe multiple disabilities," *Journal of Developmental and Physical Disabilities*, vol. 28, no. 1, pp. 153–175, 2016.

[187] Kinova, "Kinova jaco user guide." [Online]. Available: https://www.kinovarobotics.com/sites/default/files/PS-PRA-JAC-UG-INT-EN[Accessed on 07-Nov-2021].

[188] P. I. Corke, "A simple and systematic approach to assigning denavit–hartenberg parameters," *IEEE transactions on robotics*, vol. 23, no. 3, pp. 590–594, 2007.

[189] A. Puig-Diví, C. Escalona-Marfil, J. M. Padullés-Riu, A. Busquets, X. Padullés-Chando, and D. Marcos-Ruiz, "Validity and reliability of the kinovea program in obtaining angles and distances using coordinates in 4 perspectives," *PloS one*, vol. 14, no. 6, p. e0216448, 2019.