

Rahul Soangra

Crean College of Health and Behavioral Sciences
Chapman University
9401 Jeronimo Road
Rinker, CA 92618

(714) 516-6160
(949) 206-0012 (FAX)
soangra@chapman.edu
<https://www.chapman.edu/our-faculty/rahul-soangra>

EDUCATION

Virginia Tech-Wake Forest University, Blacksburg, Virginia
Ph.D., School of Biomedical Engineering and Sciences (2014)
Dissertation title: "Understanding Variability in Older Adults using Inertial Sensors."

Virginia Tech, Blacksburg, Virginia
MS, Industrial & Systems Engineering, Human Factors and Ergonomics Engineering (2012)

Indian Institute of Technology Roorkee, Roorkee, Uttarakhand
MTech, Chemical Engineering, Industrial Pollution Abatement (2006)

Jai Narain Vyas University, Jodhpur, India
BS, Chemical Engineering, (2003)

PROFESSIONAL EXPERIENCE

Assistant Professor, Department of Physical Therapy, Crean College of Health and Behavioral Sciences, Chapman University (2017-Till Date)

Assistant Professor (Affiliate Faculty), Department of Electrical and Computer Science Engineering, Fowler school of Engineering, Chapman University (2017-Till Date)

Assistant Professor, Department of Biotechnology and Medical Engineering, National Institute of Technology Rourkela (August 2015-Oct 2015)

Post-Doctoral Research Fellow, School of Biological and Health Systems Engineering, Arizona State University, Tempe, Arizona (Nov 2015- July 2017)

RESEARCH INTERESTS

- Fall Risk Assessment using wearable Inertial Sensors
- Fall intervention in Older Adults and Stroke patients
- Activities of Daily Living and Fall risk in Obese elderly
- Machine Learning based classification of gait in Idiopathic Toe walkers

TEACHING EXPERIENCE

- Biomechanics of Human Movement (PT-511)
- Biomechanics of Human Movement Laboratory (PT-511L)
- Scientific Inquiry IV (PT 753)

- Scientific Inquiry III (PT 752)
- Independent Research Study (291,491)

POSITIONS AND HONORS

2006-2007	Project Engineer, Wipro Technologies, Pune, India
2008-2014	Research Assistant, Virginia Tech, Blacksburg, US
2014-2015	University Grants Commission Post-Doctoral Fellow, Mumbai
2015-2015	Assistant Professor, National Institute of Technology Rourkela, India
2015-2017	Post-Doctoral Research Associate, Arizona State University, US
2017-till date	Assistant Professor, Chapman University, US

AWARDS AND HONORS

2002-2003	President, Chemical Engineering Student Association (CESA)
2004	Scholarship, Ministry of Human Resource Development, Govt. of India
2012	Best Game Prize Biomedical Engineering Society
2013-2014	Entrepreneur Lead NSF Innovation Corps
2014-2019	University Grant Commission, Post-Doctoral Fellowship
2019	Panel Reviewer at National Aeronautics and Space Administration
2019	Panel Reviewer at National Science Foundation
2020-2021	NIH Special Emphasis Panel Reviewer

CURRENT RESEARCH FUNDING AND SUPPORT

Kay Family Award (\$133,000) PI: Dr. Marybeth Grant-Beuttler CO-PI: **Rahul Soangra**

Crean College Interdisciplinary Grant 2018-2019 “Improving Quality of Care among Orange County Older Adults suffering from Bedsore: Utilizing Smart Wearable Technology for a Targeted Intervention” PI **Rahul Soangra**, Brooke Jenkins and Lynn Tierney

Grant Writers Boot Camp (\$5000)- “A Smart Shoe Intervention in the Natural Environment for Toe Walking” 9/19/19- 9/19/20 PI: Dr. Marybeth Grant-Beuttler CO-PI: **Rahul Soangra**

Children’s Hospital of Orange County (\$22,500) “Longitudinal Assessment of Atypical TPP1 Enzyme Deficiency Patients” 8/1/19-7/30/22 PI: Dr. Marybeth Grant-Beuttler CO-PI: **Rahul Soangra**

CSULB- Small Equipment and Computers Award Program (\$9970) “Monitoring Activities of Daily Living using IMUs and Smartphone Interface” PI: Dr. Vennila Krishnan, Co-PI: Dr. Joby John, **Rahul Soangra**

Crean College Pandemic Excellence Fund. “Investigating effects of Dual-tasking and Biking among Individuals using Wearable Sensors” (\$5000) 06/2021-05/2022 PI: **Rahul Soangra**

Faculty COVID-19 Impact Fund. “Gait Research Resumption utilizing Wearable Sensors and Machine Learning Algorithms” (\$5000) 06/2021-05/2022 PI: **Rahul Soangra**

US Patent

US Patent # 17181238 “Device for Treating Idiopathic Toe Walking”, Marybeth Grant-Beuttler, **Rahul Soangra**

PUBLICATIONS (student authors underlined, # also first author) Google Scholar h-index: 11

Chou, E.-F., Khine, M., Lockhart, T., & **Soangra, R***. (2021). Effects of ECG Data Length on Heart Rate Variability among Young Healthy Adults. *Sensors*, 21(18), 6286.

Lockhart, T. E., **Soangra, R#.**, Yoon, H., Wu, T., Frames, C. W., Weaver, R., & Roberto, K. A. (2021). Prediction of fall risk among community-dwelling older adults using a wearable system. *Scientific Reports*, 11(1). doi:10.1038/s41598-021-00458-5

Rohafza, M., **Soangra, R***, Smith, J. A., & Ignasiak, N. K. (2022). Self-paced treadmills do not allow for valid observation of linear and nonlinear gait variability outcomes in patients with Parkinson's disease. *Gait & Posture*, 91, 35-41. doi:10.1016/j.gaitpost.2021.10.008

Moon, S.H., Frames, C.W., **Soangra, R.**, Lockhart, T.E.L., (2021). Effects of Rucksack Military Accessory on Gait Dynamic Stability. *International Journal of Prognostics and Health Management*, Vol. 12, No. 4 Special Issue on PHM for Human Health and Performance II doi:10.36001/ijphm.2021.v12i4.2778

Special Issue on PHM For Human Health and Performance II, Vol. 12, No. 4 (2021): Special Issue on PHM for Human Health & Performance II , Lockhart, T.L., **Soangra, R. (Editorial)**

Soangra R, Krishnan V, John J, Rashedi E, McKenzie A. Comparison of 360° Turn Cycles among Individuals after Stroke and Healthy Older Adults. *Applied Sciences*. 2021;11(7). doi: 10.3390/app11073202.

Soangra R, Shiraishi M, Beuttler R, Gwerder M, Boyd L, Muthukumar V, Trabia M, Aminian A, Grant-Beuttler M. Foot Contact Dynamics and Fall Risk among Children Diagnosed with Idiopathic Toe Walking. *Applied Sciences*. 2021;11(6):2862. doi: 10.3390/app11062862.

Vijayadasan J, Raghunathan D, Rajagopal S, **Soangra R**. Assessment of Major Depressive Disorders through Neuroimaging Studies and their Treatment Methods. *International Journal of Biology and Biomedical Engineering*. 2021 ;15:18-28. doi: 10.46300/91011.2021.15.4.

Soangra, R. and T. Lockhart, Smartphone-Based Prediction Model for Postoperative Cardiac Surgery Outcomes Using Preoperative Gait and Posture Measures. *Sensors*, 2021. 21(5): p. 1704.

Soangra, R. and S. Rajagopal, Effects of visual referencing on backward and forward treadmill walking in VR environments. *Displays*, 2021. 66: p. 101975.

Smith, J.A., Wilford, E.P, **Soangra, R**, Ignasiak N., Adaptations in trunk-pelvis coordination variability in response to fatiguing exercise. *Gait & Posture*, 2021. 84: p. 1-7.

Pollind, M. and **R. Soangra**, Development and Validation of Wearable Inertial Sensor System for Postural Sway Analysis. *Measurement*, 2020. 165: p. 108101.

ML. Pollind and **R. Soangra**, "Mini-Logger- A Wearable Inertial Measurement Unit (IMU) for Postural Sway Analysis," *IEEE Engineering in Medicine & Biology Society (EMBC)*, Montreal, QC, Canada, 2020, pp. 4600-4603, doi: 10.1109/EMBC44109.2020.9175167.

Zhang, J., **R. Soangra**, and T. E. Lockhart, Automatic Detection of Dynamic and Static Activities of the Older Adults Using a Wearable Sensor and Support Vector Machines. *Sci*, 2020. 2(3): p. 50.

Zhang, J., **R. Soangra**, and T. E. Lockhart, A Comparison of Denoising Methods in Onset Determination in Medial Gastrocnemius Muscle Activations during Stance. *Sci*, 2020. 2(2): p. 39.

Soangra, R., Multi-day Longitudinal Assessment of Physical Activity and Sleep Behavior Among Healthy Young and Older Adults Using Wearable Sensors. *IRBM*, 2020. 41(2): p. 80-87.

Kim, S., **Soangra R.**, et al., *Wearable Sensor-Based Gait Classification in Idiopathic Toe Walking Adolescents*. *Biomed Sci Instrum*, 2019. 55(2): p. 178-185.

Pollind, M., **Soangra R.**, et al., Customized Wearable Sensor-Based Insoles for Gait Re-Training in Idiopathic Toe Walkers. *Biomed Sci Instrum*, 2019. 55(2): p. 192-198.

Lockhart, T.E., Frames C, **Soangra R.** et al., Effects of Obesity and Fall Risk on Gait and Posture of Community-Dwelling Older Adults. *Int J Progn Health Manag*, 2019. 10(1).

Soangra, R. and V. Krishnan, Wavelet-Based Analysis of Physical Activity and Sleep Movement Data from Wearable Sensors among Obese Adults. *Sensors (Basel)*, 2019. 19(17).

Frames, C., **Soangra, R.**, Lockhart, T., Lach, J., Ha, D., Roberto, K., & Lieberman, A. (2018). Dynamical Properties of Postural Control in Obese Community-Dwelling Older Adults. *Sensors*, 18(6), 1692. doi:10.3390/s18061692

Rezvanian, S., Lockhart, T., Frames, C., **Soangra, R.**, & Lieberman, A. (2018). Motor Subtypes of Parkinson's Disease Can Be Identified by Frequency Component of Postural Stability. *Sensors*, 18(4), 1102. doi:10.3390/s18041102

Soangra, R., Bhatt, H., & Rashedi, E. (2018). Effects of load carriage and surface inclination on linear and non-linear postural variability. *Safety Science*. doi:10.1016/j.ssci.2018.03.019

Soangra, R., & Lockhart, T. (2018). Inertial Sensor-Based Variables Are Indicators of Frailty and Adverse Post-Operative Outcomes in Cardiovascular Disease Patients. *Sensors*, 18(6), 1792.

R. Soangra, T.E. Lockhart. Dual-task does not increase slip and fall risk in healthy young and older adults during walking. *Applied Bionics and Biomechanics*. Vol. 2017, pp. 1-12, 2017

Barfield JP, Newsome L, John EB, Sallee D, Frames C, **Soangra R**, et al. A case report of shoulder fatigue imbalance in wheelchair rugby: implications to pain and injury. *Spinal Cord Series And Cases*. 2016;2:16002.

R. Soangra, T. E. Lockhart, J. Lach, and E. M. Abdel-Rahman, "Effects of Hemodialysis Therapy on Sit-to-Walk Characteristics in End Stage Renal Disease Patients," *Annals of Biomedical Engineering*, vol. 41, pp. 795-805, Apr 2013.

Zhang, J., Lockhart, T. E., & **Soangra, R.** (2014). Classifying lower extremity muscle fatigue during walking using machine learning and inertial sensors. *Ann Biomed Eng*, 42(3), 600-612. doi: 0.1007/s10439-013-0917-0

R. Soangra, M.C. Soangra (2015). Hydatid Cyst of Thoracic Spine: A Rare Cause of Paraplegia. *International Journal of Science and Research*, 4(4) 3210-3212, April 2015

R. Soangra, C B Majumder and P. Roy. Exploitation of genetic capacities of Bacteria for Improved plasmid stability in remediation of Arsenic Pollution, *European journal of Advances in Engineering and Technology*, 2015, 2(4): 84-49

R. Soangra, C B Majumder and P. Roy. Whole cell Arsenic Biosensor-A Cheap Technology for Bioavailable Arsenic (As) Determination, *European Journal of Advances in Engineering and Technology*, 2015, 2(5): 52-61

SELECTED CONFERENCE PRESENTATIONS (student authors underlined)

Moon, S. H., **Soangra, R.**, Frames, C. W., & Lockhart, T. E. (2021). Three days monitoring of activities of daily living among young healthy adults and Parkinson's disease patients. *Biomedical Sciences Instrumentation*, 57, 2.

G. Ershadi, M. Gwak, A. Aminian, **R. Soangra**, M. Grant-Beuttler and M. Sarrafzadeh, "Smart Insole: Remote Gait Detection Algorithm Using Pressure Sensors For Toe Walking Rehabilitation," *2021 IEEE 7th World Forum on Internet of Things (WF-IoT)*, 2021, pp. 332-337, doi: 10.1109/WF-IoT51360.2021.9595676.

Abdollahi, M., Kuber, P.M., Hoang, C., Shiraishi, M., **Soangra, R.**, Rashedi, E., (2021). 43rd Annual Kinematic Assessment of Turning and Walking Tasks Among Stroke Survivors by Employing Wearable Sensors and Pressure Platform. International Conference of the IEEE Engineering in Medicine and Biology Society

Xu, P., Haik, D., Jiang, P., Brevik, A., Peta, A., Okhunov, Z., **Soangra, R.**, John, E.B, Clayman, R. (2021). Pd58-11 Beyond Efficiency: Surface Electromyography Enables Further Insights into the Quality of Surgical Movement of Expert Urologists. *Journal of Urology*, 206(Supplement 3). doi:10.1097/ju.0000000000002092.11

Charbonneau, A., Garson, B., Bisoffi, F., Esparza, S., Bhakta, M., Bailey, L., **Soangra, R.**, *Load Carriage affects Kinematics during Ingress and Egress on Simulated Travelators*. Proceedings of the Human Factors and Ergonomics Society Annual Meeting, 2021. **64**(1): p. 1079-1083.

Espino, C., Faustino, R., Franco, T., Galvan, A. R., Gothong, M., Khaleq, E., Occhino, C., **Soangra, R.**, *Asymmetric Load Carriage at Shoulder Height affects Temporal Gait Characteristics among Food Service Workers*. Proceedings of the Human Factors and Ergonomics Society Annual Meeting, 2021. **64**(1): p. 1084-1087.

Carballo, A., Chang, M., Hirmiz, B., Lambright, N., Lee, V., Lewis, M., Nguyen, M., Gothong, M., **Soangra, R.**, *Effects of Auditory Cueing on Cadence and Gait Pattern*. Proceedings of the Human Factors and Ergonomics Society Annual Meeting, 2021. **64**(1): p. 1233-1237.

Nyangau, N., **R. Soangra**, and V. Krishnan, Abstract TP145: Kinematics of Turning 360 in Healthy Older Adults and Stroke Survivors. International Stroke Conference, 2020. 51(Suppl_1): p. ATP145-ATP145.

Shannon Toy, Christopher De Leon, Mirai Manatad, Tiffany Lubrino, Armond Gray, Christopher Hoang, Michael Shiraishi, **Rahul Soangra**, "Evaluating Effects of Localized Muscle Fatigue on Motor Unit Firing Rates using Decomposition EMG", BMES 2020 Virtual Annual Meeting on October 14-17, 2020.

Armond Gray, Tiffany Lubrino, Shannon Toy, Mirai Manatad, Christopher De Leon, Nathaniel Addonizio, Lexi Nehls, Amir Memarian, Michael Shiraishi, Christopher Hoang, **Rahul Soangra**,

“Effects of Asymmetrical Ankle Fatigue on Postural Stability”, BMES 2020 Virtual Annual Meeting on October 14-17, 2020.

Seong Hyun Moon, **Rahul Soangra**, Chris Frames, Thurmon Lockhart, “Osteoporosis affects Postural Stability among Older Adults with High Fall Risk”, BMES 2020 Virtual Annual Meeting on October 14-17, 2020.

Tiffany Lubrino, Armond Gray, Shannon Toy, Christopher De Leon, Mirai Manatad, Nathaniel Addonizio, Lexi Nehls, Amir Memmari, Christopher Hoang, Michael Shiraishi, **Rahul Soangra**, “Impact of Single Limb Ankle Joint Localized Muscle Fatigue on Gait Characteristics”, BMES 2020 Virtual Annual Meeting on October 14-17, 2020.

Wesley Scott, Vinson Tan, Don Hoang, Justin DeGuia, Celeste Kim, Eric Lee, Larry Oakes, David Phu, Kori Yamasaki, **Rahul Soangra**, Emmanuel John,” Evaluating Driving Performance during Texting using Driving Simulator “, BMES 2020 Virtual Annual Meeting on October 14-17, 2020.

M. Shiraishi, C. Hoang, M. Grant-Beuttler, R. Beuttler, A. Aminian, **R. Soangra**, “Kinetics and Kinematic Differences in Idiopathic Toe Walking Children”, European Society for Movement Analysis in Adults, 17 September 2020

C. Hoang, M. Shiraishi, R. Beuttler, M. Grant-Beuttler, A. Aminian, **R. Soangra**, “Limits of Stability in Children diagnosed with Idiopathic Toe walking”, European Society for Movement Analysis in Adults, 17 September 2020

Michelle Gwerder, Christopher Hoang, Michael Shiraishi, **Rahul Soangra**, Richard Beuttler, Afshin Aminian, Marybeth Grant-Beuttler, “Relationship between different methods to measure ankle range of motion in children with idiopathic toe walking” European Society for Movement Analysis in Adults, 17 September 2020

Andrei Carballo, Matthew Chang, Brian Hirmiz, Nicolette Lambright, Vivian Lee, Marla Lewis, Martin Nguyen, Matthew Gothong, **Rahul Soangra**, “Effects of Auditory Cueing on Cadence and Gait Pattern” Human Factors Ergonomic Society 64th International Annual Conference, October 5-9, 2020

Alexa Charbonneau, Ben Garson, Fiona Bisoffi, Stephanie Esparza, Miral Bhakta, Luke Bailey, **Rahul Soangra**, “Load Carriage affects Kinematics during Ingress and Egress on Simulated Travelators ” Human Factors Ergonomic Society 64th International Annual Conference, October 5-9, 2020

Christopher Espino, Robin Faustino, Tiffany Franco, Angel Reign Galvan, Matthew Gothong, Ennis Khaleq, Cody Occhino, **Rahul Soangra**, “Asymmetric Load Carriage at Shoulder Height affects Temporal Gait Characteristics among Food Service Workers” Human Factors Ergonomic Society 64th International Annual Conference, October 5-9, 2020

Rachel Kling, Alex Chung, Courtney Cox, Emily Kimbro, Jim Grodzianek, Stephen Ayres, Shireen Hosseini, Michael Shiraishi, **Rahul Soangra**, “Surface Inclination Influences Fall Risk and Lower Extremity Joint Moments During Walking” Human Factors Ergonomic Society 64th International Annual Conference, October 5-9, 2020

Chu, V.W., Girolami, G.L., **Soangra, R.**, Beuttler, R., Hollandsworth, C., Chheda, S., Grant-Beuttler, M. (October 2019). Children with idiopathic toe walking showed differences in areas of tactile and vestibular processing. (Program No. 764.04). Peer-reviewed poster presentation at Neuroscience 2019, Society for Neuroscience Annual Meeting, Chicago, IL.

Ghazaal Ershadi, Migyeong Gwak, Majid Sarrafzadeh, Afshin Aminian, **Rahul Soangra**, Marybeth Grant-Beuttler Smart Insole: Pedometer and Toe Walk Detection Platform for Remote Monitoring of

Walking Patterns. Institute for Social and Economic Research. International Conference on Academic Research in Business Management, Social Science, Humanities, & Economic Growth Volume 1, Issue 12 (ABMSE-Sep-2019) Best Western Globus Hotel Rome, Italy

Rahul Soangra, “Does Lateral Stepping Gait and Dual-Tasking affect Variability of healthy Young and Older Adults”, Society for Chaos Theory in Psychology & Life Sciences 28th Annual International Conference, 1-3 August 2019 in Orange, CA

Rivera, A., Pollind, M., Tierney, L., Jenkins, B., & Soangra, R. (2019, October) “Smart UP- An Inertial Sensor-based Wearable Device for Pressure Injury Prevention and Management.” Poster presented at the 52nd Annual Meeting of the Biomedical Engineering Society, Philadelphia, PA.

Hoang, C., Dougherty, K., Brown, P., Ito, C., Tierney, L., Jenkins, B., & Soangra, R. (2019, October). Asymmetry in Temporal Parameters of Gait among Stroke Survivors. Poster presented at the 52nd Annual Meeting of the Biomedical Engineering Society, Philadelphia, PA.

Rahul Soangra, Richard Beuttler, R. Caprice Hollandsworth, Shweta Chheda, Afshin Aminian, Marybeth Grant-Beuttler, “Spatiotemporal Gait Characteristics in Adolescent Idiopathic Toe Walkers” International Society of Posture and Gait Research 2019

Marybeth Grant-Beuttler, R. Caprice Hollandsworth, Shweta Chheda, Richard Beuttler, Afshin Aminian, **Rahul Soangra** “Evaluation of Balance in Adolescent Idiopathic Toe Walkers”, International Society of Posture and Gait Research 2019

Andrei Carballo, Matthew Chang, Morgan Engelmann, Brian Hirmiz, Nicolette Lambright, Vivian Lee, Marla Lewis, Martin Nguyen, Rahul Soangra, “Effects of Rhythmic Auditory Cueing on Gait of Healthy Young Adults”, American Society of Biomechanics 2019

Valeria Abarca, Erin Bond, Wilford Eiteman-Pang, Celeste Kim, Rahul Soangra (BMES 2018: 2930) Effects of unilateral and bilateral load carriage of a backpack on single stance durations, Biomedical Engineering Symposium (BMES), Atlanta, Georgia, October 17-20, 2018

Nicholas Bowden, Yagnesh Desai, Sam Ha, Eric Lee, Rahul Soangra (BMES 2018: 2946) Does intensity of Physical Activity affect Sleep Quality? Biomedical Engineering Symposium (BMES), Atlanta, Georgia, October 17-20, 2018

Harbir Bhatti, Rahul Soangra (BMES 2018: 2873) GRAIL based sensory perturbations - A new tool to assess sensory organization and fall risk during walking in the elderly. Biomedical Engineering Symposium (BMES), Atlanta, Georgia, October 17-20, 2018.

Tyler Hofstee, Don Hoang, Cory Barella, Justin DeGuia and Rahul Soangra Texting while walking influences Step Width, 42nd Annual Meeting of the American Society of Biomechanics (Submission ID: 2) Friday, August 10, 2018, Rochester, Minnesota at the Mayo Civic Center

Chad Anderson, James Aubrey, Alyssa Haley, Thuy-Vi Le and Rahul Soangra Effects of Sound on Static Postural Stability, 42nd Annual Meeting of the American Society of Biomechanics. Friday, August 10, 2018, Rochester, Minnesota at the Mayo Civic Center

Megan Cabrales, Becca Koppel, Samuel Cauble, Christopher Foster and Rahul Soangra How does touch influence postural stability of single leg stance? 42nd Annual Meeting of the American Society of Biomechanics, Thursday, August 9, 2018, Rochester, Minnesota at the Mayo Civic Center

R. Soangra and T. E. Lockhart, "Determination of stabilogram diffusion analysis coefficients and invariant density analysis parameters to understand postural stability associated with standing on anti-fatigue mats," *Biomed Sci Instrum*, vol. 48, pp. 415-22, 2012. **PMID: 22846314**

R. Soangra and T. E. Lockhart, "A comparative study for performance evaluation of sit-to-stand task with body worn sensor and existing laboratory methods," *Biomed Sci Instrum*, vol. 48, pp. 407-14, 2012. **PMID: 22846313**

T. E. Lockhart, H. T. Yeoh, **R. Soangra**, M. Jongprasithporn, J. Zhang, X. Wu, et al., "Non-invasive fall risk assessment in community dwelling elderly with wireless inertial measurement units," *Biomed Sci Instrum*, vol. 48, pp. 260-7, 2012. **PMCID: PMC3716278**

Frames, **R. Soangra**, and T. E. Lockhart, "Assessment of postural stability using inertial measurement unit on inclined surfaces in healthy adults - biomed 2013," *Biomed Sci Instrum*, vol. 49, pp. 234-42, 2013. **PMID: 23686205**

A.

R. Soangra and T. E. Lockhart, "Comparison of intra individual physiological sway complexity from force plate and inertial measurement unit - biomed 2013," *Biomed Sci Instrum*, vol. 49, pp. 180-6, 2013. **PMID: 23686198**

T. E. Lockhart, **R. Soangra**, J. Zhang, and X. Wu, "Wavelet based automated postural event detection and activity classification with single imu - biomed 2013," *Biomed Sci Instrum*, vol. 49, pp. 224-33, 2013. **PMID: 23686204**

Lockhart, T. E., **Soangra, R.**, Chung, C., Frames, C., Fino, P., & Zhang, J. (2014). Development of automated gait assessment algorithm using three inertial sensors and its reliability. *Biomed Sci Instrum*, 50, 297-306. **PMID: 25405437**

Soangra, R., & Lockhart, T. E. (2014). Agreement in gait speed from smartphone and stopwatch for five meter walk in laboratory and clinical environments. *Biomed Sci Instrum*, 50, 254-264. **PMID: 25405433**

R. Soangra, B. Jones, and T. E. Lockhart, "Effects of Anti-Fatigue Flooring on Gait Parameters," *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, vol. 54, pp. 2019-2022, 2010. **doi: 10.1177/154193121005402324**

R. Soangra, T. E. Lockhart, and N. Van de Berge, "An approach for identifying gait events using wavelet denoising technique and single wireless IMU," *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, vol. 55, pp. 1990-1994, 2011. **doi: 10.1177/1071181311551415**

X. Wu, H. T. Yeoh, **R. Soangra**, and T. E. Lockhart, "Investigation into the Functional Mobility Difference between Obese and Non-Obese Elderly," *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, vol. 56, pp. 1814-1816, 2012. **doi: 10.1177/1071181312561365**

Chung, C. C., **Soangra, R.**, & Lockhart, T. E. (2014). Recurrence Quantitative Analysis of Postural Sway using Force Plate and Smartphone. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, 58(1), 1271-1275. **doi: 10.1177/1541931214581265**

Soangra, R., Lockhart, T. E., Frames, C. W., Zhang, J., Moon, S. H., & Park, J. (2014). Potential for using Smartphone Accelerometers in Non-laboratory Environments. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, 58(1), 1672-1675. **doi: 10.1177/1541931214581349**

T. E. Lockhart, A. T. Barth, X. Zhang, **R. Songra**, E. Abdel-Rahman, and J. Lach, "Portable, Non-Invasive Fall Risk Assessment in End Stage Renal Disease Patients on Hemodialysis," *ACM Trans Comput Hum Interact*, pp. 84-93, 2010. **PMID:22124286**

Lockhart, T., Frame, C., Soangra, R., & Lach, J. Sensing & Measurement Fall risk prediction using wearable wireless sensors. **doi: 10.1117/2.1201405.005437**

Effects of Orthotics on Dynamic Stability in the Elderly T. E. Lockhart, H. Yeoh, **R. Soangra**, C. Haynes, and P. G. Brolinson, Virginia Tech, Blacksburg, VA, Edward Via Virginia College of Osteopathic Medicine, Blacksburg, VA PS – Fri – A – 187 BMES 2011 Thursday, October 13, 2011

“An Objective Assessment Device For Quantifying Ankle Plantarflexion Muscle Performance During Dialysis” **R. Soangra**, and T. E. Lockhart Virginia Tech, Blacksburg, VA BMES 2010

An Approach for Identifying Posturo-Lo-motion-Manual Events Using Wavelet Denoising Technique and Three Wireless IMU **R. Soangra**, and T. E. Lockhart Virginia Tech, Blacksburg, VA PS–Fri–A–94, Thursday, October 13, 2011

Sit-to-stand evaluation in young and older adults using body worn sensors, **Rahul Soangra**, Thurmon Lockhart, BMES 2012 Saturday, October 27, 2012

Wavelet based automated postural event detection and activity classification with single IMU, **Rahul Soangra** and Thurmon E. Lockhart, 10th Annual Graduate Student Research Symposium, May 12, 2011 Virginia Tech- Wake Forest University

Effects of hemodialysis therapy on sit-to-walk characteristics in ESRD patients, **Rahul Soangra** and Thurmon E. Lockhart, 11th Annual Graduate Student Research Symposium, May 10, 2012 Virginia Tech- Wake Forest University

Effects Of Electromyogram Signal Filtering On Muscle Activation Time American Society of Biomechanics Omaha 2013, **Rahul Soangra**; Thurmon Lockhart; Jian Zhang

Ankle Fatigue Classification Using Support Vector Machines American Society of Biomechanics Omaha 2013 Jian Zhang; Thurmon Lockhart; **Rahul Soangra**

NSF iCORPS (Technical Presentation) <https://www.youtube.com/watch?v=ZKahX08CCI>

NSF iCORPS (Lesson Learned) <https://www.youtube.com/watch?v=bioKcbr15zU>

Poster FR-P0747 “A Novel Assessment of Fall Risk in Hemodialysis Patients: Preliminary Findings” at American Society of Nephrology, Kidney week 2012 Annual Meeting, San Diego, California Friday, November 2, 2012, Emaad Abdel Rahman, Thurmon Lockhart, **Rahul Soangra**, John Lach

Balance Measurements Using A Smartphone At The Upper Arm Compared To The Balance Error Scoring System, Peter Fino, Matthew Weirath, **Rahul Soangra**, Thurmon Lockhart, Per Gunnar Brolinson, Virginia Tech *American Society of Biomechanics, August 8th 2015*

Effects of Plantarflexor Muscle Fatigue on Gait Characteristics, Ehsan Rashedi, **Rahul Soangra**, Thurmon Lockhart and Maury Nussbaum, *40th Annual Meeting of the American Society of Biomechanics*, At Raleigh, NC, August 2016

P-Fri-468 “Smartphone Based Fall Risk Assessment Using Dynamic Stability in Healthy Individuals” Seong Moon, **Rahul Soangra**, Saba Rezvanian, Victoria Smith, Chris Frames, Markey Olson, and Thurmon Lockhart, Biomedical Engineering Society 5-8 October 2016

P-Fri-469 “Can Inertial Sensors Measure movement variability in Young and Older Subjects” ,**Rahul Soangra** and Thurmon Lockhart, Biomedical Engineering Society 5-8 October 2016

P-Sat-269 “Determining Static and Dynamic Movement Between both Gender with Inertial Measurement Unit” Ryan Bridges, Sydney Connor, Seong Moon, Victoria Smith, **Rahul Soangra** and Thurmon Lockhart, Biomedical Engineering Society 5-8 October 2016