



# ANTWI-AFARI, Maxwell Fordjour

MPhil, BSc (KNUST-Kumasi)

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Maxwell Fordjour Antwi-Afari attained his Bachelor of Science degree in Construction Technology and Management (First Class Honours) from the Kwame Nkrumah University of Science and Technology (KNUST), Ghana in 2012. He worked as a Teaching/Research Assistance in KNUST from 2012 to 2013. He also received his MPhil in Building Technology and worked as a Graduate Assistant at the Department of Building Technology, KNUST-Ghana in 2015. He is currently a Ph.D. candidate in the Department of Building and Real Estate at The Hong Kong Polytechnic University through the Postgraduate Studentship Award in August 2015. His research interests focus on construction management, labour safety in construction, construction ergonomics and biomechanical analysis. He is a student member of The Chartered Institute of Building (CIOB), International Council for Research and Innovation in Building and Construction (CIB), and Ghana Institute of Construction (GIOC).

## Supervisors

Ir. Professor LI Heng (Chief supervisor)

Dr. SEO JoonOh (Co-supervisor)

Dr. WONG Yu Lok Arnold (Co-supervisor)

## Area of Research

Construction Management, Construction Safety and Health, Construction Ergonomics, Biomechanical Analysis, Building Information Modeling (BIM), Smart Construction Information Technologies, and Technology Transfer in Construction

## Research Scope

Work-related musculoskeletal disorders (WMSDs) are amongst the most prevalent occupational health problems affecting construction workers. Construction workers (e.g., rebar workers, bricklayers) are by virtue of their occupation frequently exposed to risk factors such as repetitive motions, awkward postures and lifting weights, which represent the major causes of WMSDs. Notably, WMSDs not only lead to worker ill-health but also lead to loss of productivity, schedule delays and early retirement of workers. Besides, fall injuries are associated with slips, trips, or loss of balance events, which are one of the most frequent cause of non-fatal injuries in construction. Taken together, my research focuses on WMSDs and fall related injuries in construction workers.

## Research Methodology

My academic research evaluates the muscles activity, body kinematics, and foot plantar pressure distribution data measured by using surface electromyography, inertial measurement units, and wearable insole pressure sensors, respectively. Overall, the data collected from these wearable sensor-based approaches are used to suggest potential ergonomic interventions (e.g., assistive devices, redesign of work schedules) and proactive fall preventive measures in order to alleviate the risk of developing WMSDs and minimize fall injuries among construction workers.

## Prizes and Awards

1. **Certificate of Outstanding Contribution in Reviewing** for Elsevier, Automation in Construction at May 2018
2. **Occupational Safety & Health (OSH) Student Research Scholarship** for the 2017 Academic Year by the Hong Kong Occupational Safety & Health Council on 1st March 2018 on the winning project entitled “Evaluation of risk factors for work-related musculoskeletal disorders (WMSDs) and fall injuries in construction workers using wearable insole pressure sensors”.
3. **Gibrine Adam Promising Young Scholar Award** at 7<sup>th</sup> West Africa Built Environment Research (WABER) conference on 16<sup>th</sup> – 18<sup>th</sup> August 2017 at University of Ghana, Legon, Accra-Ghana. Paper title: Effects of Quadriceps Muscle Fatigue on Balance Control and Fall Injuries following Repetitive Squat Lifting Task in Construction Workers.
4. **Most Popular Presentation Award** at the 16<sup>th</sup> Academic Conference for Post-graduate students in Construction Management and Real Estate, June 2017, organized by CIBSC from the University of Hong Kong, The Hong Kong Polytechnic University, and The Shenzhen University. Paper title: Wearable Insole Pressure Sensors for Automated Classification of Construction Workers’ Slip-Trip-Loss of Balance Events.
5. **Post-graduate Studentship Award**, 2015/2016, Ph.D. Student at Department of Building and Real Estate, Faculty of Construction and Environment, The Hong Kong Polytechnic University, Hong Kong.
6. **Best Building Technology Student Award** (Construction Technology and Management & Quantity Surveying and Construction Economics), 2011/2012 Academic Year, Department of Building Technology, KNUST-Kumasi.

## Academic Attachment and Exchange

1. International academic exchange and communication of PolyU CIBSC with the Department of Architecture and Architectural Engineering of Seoul National University (SNU) in October 2017 in various fields including Construction Engineering & Management, Construction Automatics & Robotics.
2. International academic exchange and communication of PolyU CIBSC with the Department of Civil Engineering, National Taiwan University (NTU) in July 2017 in the fields of Construction Management, Construction Safety and Building Information Modeling.

## Publication List

1. **Antwi-Afari, M. F.**, Li, H., Pärn, E. A., and Edwards, D. J. (2018). Critical success factors for implementing building information modelling (BIM): A longitudinal review. *Automation in Construction*, 91, 100-110. DOI: <https://doi.org/10.1016/j.autcon.2018.03.010>.
2. **Antwi-Afari, M. F.**, Li, H., Edwards, D. J., Pärn, E. A., Owusu-Manu, D., Seo, J., and Wong, A. Y. L. (2018a). Identification of potential biomechanical risk factors for low back disorders during repetitive rebar lifting. *Construction Innovation: Information, Process, Management*, 18(2). DOI: <https://doi.org/10.1108/CI-05-2017-0048>.
3. Badu, E., Kissi E., Boateng, E.B., and **Antwi-Afari, M. F.** (2018). Tertiary educational infrastructure development in Ghana: Financing, Challenges, and Strategies. *Africa Educational Review*. DOI: <https://doi.org/10.1080/18146627.2016.1251295>.
4. **Antwi-Afari, M. F.**, Li, H., Edwards, D. J., Pärn, E. A., Seo, J., and Wong, A. Y. L. (2017a). Effects of different weight and lifting postures on postural control during repetitive lifting tasks. *International Journal of Building Pathology and Adaptation*, 35(3), 247-263. DOI: <https://doi.org/10.1108/IJBPA-05-2017-0025>.
5. **Antwi-Afari, M. F.**, Li, H., Edwards, D. J., Pärn, E. A., Seo, J., and Wong, A. Y. L. (2017b). Biomechanical analysis of risk factors for work-related musculoskeletal disorders during repetitive lifting task in construction workers. *Automation in Construction*, 83, 41-47. DOI: <https://doi.org/10.1016/j.autcon.2017.07.007>.
6. Umer, W., **Antwi-Afari, M. F.**, Li, H., Szeto, G. P., and Wong, A. Y. L. (2017a). The prevalence of musculoskeletal symptoms in the construction industry: A systematic review and meta-analysis. *International Archives of Occupational and Environmental Health*, 1-20. DOI: <https://doi.org/10.1007/s00420-017-1273-4>.
7. **Antwi-Afari, M. F.**, Li, H., Seo, J., and Wong, A. Y. L. Automated detection and classification of construction workers' loss of balance events using wearable insole pressure sensors. *Automation in Construction*. Manuscript ID: AUTCON\_2018\_253 (Under Review).
8. **Antwi-Afari, M. F.**, Yu, Y., Li, H., Darko, A., Seo, J., and Wong, A. Y. L. (2018b). Automated detection and classification of construction workers' awkward working postures using wearable insole pressure sensors. 1st Postgraduate in Applied Research Conference in Africa (ARCA), Accra, Ghana, February 21-23, 2018.
9. **Antwi-Afari, M. F.**, Li, H., Seo, J., Lee, S., Edwards, D. J., and Wong, A. Y. L. (2018c). Wearable insole pressure sensors for automated detection and classification of slip-trip-loss-of-balance events in construction workers. *Construction Research Congress*, New Orleans, Louisiana, USA, April 2-5, 2018. DOI: <https://doi.org/10.1061/9780784481288.008>.
10. **Antwi-Afari, M. F.**, Li, H., Seo, J., and Wong, A. Y. L. (2017c). Effects of quadriceps muscle fatigue on balance control and fall injuries following repetitive squat lifting task in construction workers. In *Proceedings of the 7th West Africa Built Environment Research (WABER) Conference*, Accra, Ghana, August 16-18, 2017. **This paper received "Gibrine Adam Promising Young Scholar Award"**.

11. **Antwi-Afari, M. F.**, Li, H., Seo, J., and Wong, A. Y. L. (2017d). Wearable insole pressure sensors for automated classification of construction worker's slip-trip-loss of balance events. The 16th Academic Conference for Postgraduate Students in Construction Management and Real Estate, Shenzhen University, China Mainland, June 19, 2017. **This paper received the "Most Popular Presentation Award"**.
12. Darko, A., Chan, A. P. C., Owusu, E. K., and **Antwi-Afari, M. F.** (2018). Benefits of green building: A literature review. RICS COBRA 201, 23-24 April 2018, London, UK.
13. Umer, W., **Antwi-Afari, M. F.**, Li, H., Szeto, G. P., and Wong, A. Y. L. (2016). The prevalence of musculoskeletal disorders in the construction industry: A systematic review. International Conference on Innovations in Public Health Science, 23-26 September, Hong Kong.
14. Owusu-Manu, D., Pärn, E. A., **Antwi-Afari, M. F.**, and Edwards, D. J. (2017). Modelling a conceptual framework of technology transfer process in construction projects: An empirical approach. *Journal of Construction Project Management and Innovation*. 7(1), pp. 1824-1842.
15. **Antwi-Afari, M. F.**, Pärn, E. A., Owusu-Manu, D., and Edwards, D. J. (2016). Conceptualization of the absorptive capability paradox in technology transfer projects: A study of the Ghanaian construction industry. *Mindanao Journal of Science and Technology*, 14, pp. 57-78.
16. Owusu-Manu, D., Edwards, D. J., Pärn, E. A., **Antwi-Afari, M. F.**, and Aigbavboa, C. (2018). The knowledge enablers of knowledge transfer: A study in construction industries in Ghana. *Journal of Engineering, Design and Technology*. 16(2), pp. 194-210. DOI: <https://doi.org/10.1108/JEDT-02-2017-0015>.
17. Owusu-Manu, D., **Antwi-Afari, M.F.**, and Fugar, F.D.K. (2014) Review of enablers and outcome factors of technology transfer process in developing countries. Conference paper to be presented at the 4<sup>th</sup> International Conference on Infrastructure Development in Africa – ICIDA 2015 on 25 March 2014.

## Hobbies

Touring, Hiking, Watching movies, Playing soccer

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Updated in July 2018